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SCREENING CANDIDATE MISSISSIPPIAN FIELDS IN WEST CENTRAL KANSAS BASED ON THIER POTENTIAL FOR EXPLOITATION BY HORIZONTAL INFILL DRILLING: A DOE PUMP (PREFERRED UPSTREAM MANAGEMENT PRACTICES) PROJECT

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by

Saibal Bhattacharya
Paul Gerlach
Alan P. Byrnes

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Kansas Geological Survey
1930 Constant Avenue
University of Kansas
Lawrence, KS 66047-3726

Screening candidate Mississippian fields in West Central Kansas based on their potential for exploitation by horizontal infill drilling: A DOE PUMP (Preferred Upstream Management Practices) project

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Introduction

Of the 6 billion barrels of oil produced in Kansas, Mississippian carbonate reservoirs account for nearly 1 billion (16.6% as of 2000). With declining production in other age reservoirs the contribution of Mississippian reservoirs to the state's oil production has increased to 33% over the past ten years (Figure 1), and totaled about 21 million barrels (43% of the state's annual production) in 1994. The majority of Mississippian production in Kansas occurs at or near the top of the Mississippian section just below the pre-Pennsylvanian unconformity. Figure 2 shows the structure on the Mississippian and the location of the fields producing from this interval. Small independent operators, with limited technical and financial resources, operate most of these fields. Reservoir heterogeneity, high water cuts and low recovery efficiencies place operations in many fields at or near economic limits. Low average recovery factors, 13 to 15%, result in high well abandonment rates, and leave significant residual reserves (estimated to be 5.5 billion barrels) in the ground. In this regard, improvement of field management practices that result in an additional recovery of as little as 10% of residual reserves translates to a boost in the domestic production by about 550 million barrels.

For producers of Kansas, access to new technology is important for sustaining production and increasing profitability. Problems of low recovery efficiency in shallow shelf carbonate reservoirs and limited operator resources are present throughout the mid-continent region of the United States. To address these problems a US DOE-sponsored project (Contract # FED27180), funded under the DOE ***PUMP*** (**P**referred ***U***pstream **M**anagement **P**ractices) program, was initiated in August, 2001. The overall project objective is to demonstrate preferred management practices (*PMPs*) that address producibility problems in Mississippian shallow shelf carbonates resulting from inadequate reservoir characterization, inability of vertical wells to effectively drain all portions of reservoirs and control water flow from underlying aquifers, lack of geologic and production data, and low recovery factors.

Previous studies (Carr et al., 1996; Franseen, et al. 1998) have shown that Mississippian carbonate reservoirs of the mid-continent fall within the "Type C" reservoir classification of Fritz (1991) and are, therefore, suitable candidates for horizontal drilling applications. This project applies modern and cost-effective tools, techniques, and methodologies to evaluate and exploit residual reserves in mature Mississippian fields. The objective is to demonstrate the use of cost-effective technologies to characterize, model, and simulate reservoirs and to apply horizontal infill drilling to extend the economic life of these mature shallow-shelf carbonate fields, and in the process recover significant incremental reserves. This project highlights the practical implementation of integrated multi-disciplinary reservoir description to map remaining reserves in these mature and complex reservoirs. It is also demonstrates the applicability of horizontal infill wells, effectively located, to exploit the residual potential. A goal is to reveal the fracture characteristics of Mississippian rocks.

The project involves the investigation and demonstration of the following ***PMPs***:

1) Use of techniques to screen production regions/areas to identify fields/leases with residual potential using Internet based relational databases
2) Use of cost-effective tools and applications for integrated reservoir characterization and geomodel construction
3) Fracture model development using data from core analysis and fracture image log
4) PC-based cost-effective reservoir simulation
5) Economic planning of drilling and completion of horizontal wells
6) Production optimization by post-drill monitoring

This report reviews work performed primarily on the first ***PMP***; Screening production regions/areas to identify fields/leases with residual potential. Work in progress addresses ranking of prospects (***PMP 1***) and reservoir characterization (***PMP 2***). Future work will address the remaining ***PMPs***.

This project is a partnership between the Kansas Geological Survey, the Tertiary Oil Recovery Project, Mull Drilling Company Inc. (MDCI), Maurer Engineering Inc., and the U.S. DOE. It is anticipated that the demonstration of the above PMPs to select, characterize, and locate a candidate reservoir/lease to design, drill and complete optimally an infill horizontal well will develop a learning curve and build confidence

among independent operators of the Mid-continent to drill effective infill horizontal wells in mature fields.

Region definition and identification of production constraints

Mississippian carbonate reservoirs are major contributors to oil production of Kansas. These heavily dolomitized shallow-shelf carbonates are truncated by the pre-Pennsylvanian unconformity. The subcropping Mississippian rock units tend to get progressively older near the central Kansas uplift and are absent on the uplift. The top of the Mississippian is an erosional karst surface (Franseen et al., 1998, Carr et al., 1996, Merriam et al., 1963). The combination of a karsted erosional surface, the influences of original depositional facies and subsequent diagenesis have had a significant control on development and preservation of reservoir quality. The reservoirs consist of numerous vertically and laterally segregated compartments. Sedimentologic, stratigraphic, and paragenetic studies indicate that the most favorable areas for successful production may be where echinoderm-rich and spicultic-rich facies containing abundant evaporites intersect fractures associated with the post-Mississippian uncomformity and form topographic highs (Franseen et al., 1998).

Production from Mississippian reservoirs is constrained by:

1) Horizontal and vertical heterogeneity resulting from variation in depositional facies and from diagenetic overprinting
2) Close proximity of a strong bottom water drive
3) Effects of a prevalent fracture network
4) Limitations of vertical wells to drain compartmentalized reservoirs without getting flooded
5) Limited technological and financial resources of independent producers operating these fields

Significant lateral changes in lithology at the interwell scale, from shale-rich low permeability to clean high permeability, are evident from gamma log run in a recently drilled 500 foot horizontal well in the Ness City North field, Ness County, Kansas. Most Mississippian fields are developed on 40-acre spacing in Kansas with expected drainage radii of approximately 660 feet. Lateral heterogeneities compartmentalize the reservoir

into isolated pods. The presence of multiple isolated pods within the drainage area of a vertical well severely limits its drainage potential. The gross pay thickness in Mississippian carbonates varies between 35 to 45 feet. A plot of mini-permeameter values (at intervals of quarter foot), simplified depiction of facies, fracturing, breciation and other features as related to these values, and locations of oil staining are shown in Figure 3 (Franseen et al., 1998), and reveals the extent of vertical stratification in the reservoir. Cased Mississippian wells often have higher cumulative production than wells completed open-hole after drilling the top few feet of the Mississippian. This may be indicative of flow barriers to vertical migration within the Mississippian, and that vertical heterogeneity significantly reduces the net pay interval in vertical wells that had open-hole completions.

Mississippian reservoirs in Kansas are generally underlain by active aquifers. These aquifers help to maintain reservoir pressure but also result in significant water production. Production data from different Mississippian fields reveal that most productive wells (such as Moore B1 from Schaben field, Ness County, Kansas and shown in Figure 4) exhibit an initial period (6 to 24 months) of water free production followed by a rapid drop in the oil cut, and then decades of a near constant but very high water-cut. Sub-surface cross sections and detailed core studies (Bhattacharya et al., 1999, and Carr et al., 1996) indicate migration of oil across multiple correlated reservoir zones within the Mississippian. The characteristic well production profile and the nature of oil migration indicate the presence of an active fracture system in these reservoirs. However, no detailed fracture characterization study has been reported on Mississippian carbonates, in Kansas.

Increased oil production potential in the region

The volume and the scale of residual hydrocarbons left behind in mature Mississippian carbonate reservoirs is well illustrated by the Welch-Bornholdt-Wherry fields, Rice County, Kansas (Bhattacharya et al., 2000). These fields were discovered in 1964 and produce from a stratigraphic Mississippian trap. Cumulative production through 1997 was approximately 60 MMBO. Figure 5 reveals areas with significant volumes of residual oil (approximately 7 MMBO per quarter section). Ineffective drainage by

vertical wells in highly compartmentalized reservoirs leaves behind significant unswept reserves. Another example of residual potential in Mississippian reservoir is the Aldrich field, Ness County, Kansas (Bhattacharya et al., 2000). This field was discovered in 1929, and by 1973 had produced 1.04 MMBO from 15 producing wells. By 1973, the field production had declined to less than 400 BO/month, and 8 vertical infill wells were drilled as a part of the infill-drilling program. By mid-1997, an additional 553 MBO of oil had been recovered from the field by the infill wells. Aldrich field is a typical example of a mature Mississippian field having significant recoverable reserves left behind due to inadequate drainage by vertical wells in a heterogeneous reservoir.

The cumulative production from Mississippian carbonates has exceeded 1 billion barrels. Average recovery factors are poor, in the range of 13 to 15%. Recovery factors in some fields are as low as 6 to 8%, while in some others it is as high 20 to 25% (Bhattacharya et al., 2000). The residual reserves, unswept by vertical wells, in Mississippian reservoirs of Kansas are estimated to be about 5.5 billion barrels, using an average recovery efficiency of 15%. Using a conservative estimate, an additional recovery of 10% of this residual potential will result in the production of at least 500 million barrels of oil. Independent operators, thus, should be encouraged to apply modern technology such as infill horizontal wells to exploit significant remaining potential in these complex compartmentalized water driven reservoirs of the Mid-continent. Production enhancement from mature fields will not only boost the local economy, but will also result in the recovery of invaluable national resource which otherwise will remain unproduced.

However, one of the principal causes of failure for horizontal wells has been poor evaluation and selection of targets (Coffin, (SPE 26618), Joshi, et al., (SPE 37036)). Typically, a horizontal well costs about 1.4 to 3 times (Joshi, 1991) that of a vertical well. The industry's rule of thumb (Lacy, 1992) suggests that for a horizontal well to be an economic success, it should recover volumes that are between two to three times that of a vertical well. This makes the identification of reservoirs that are viable candidates for horizontal drilling to be of crucial importance, especially for an independent producer with limited resources. As of 2000, only 11 horizontal wells have been drilled in the Mississippian formations in Kansas. Limited available data show that the majority of

these wells have been economically unsuccessful. The inability to identify appropriate horizontal well applications coupled with the higher drilling costs have been two of the major reasons why the horizontal drilling potential of Mississippian carbonates have not been fully utilized in Kansas.

Screening of fields and "target region" selection

Accurate screening of prospective horizontal infill drilling candidates is critical to successful implementation. Often the independent operator's area of interest is wide spread and a quick screening work-flow is required for practical application. A *PMP* for this region is the utilization of the numerous quick screening tests using databases available on the Internet and publicly accessible data sources to identify and rank prospective sites.

One of the principal causes behind the economic failure of a majority of horizontal wells drilled in Mississippian carbonate reservoirs of Kansas has been incorrect target selection often due to application of operator experience in similar reservoirs in another part of the continent but without comprehensive screening of the local target reservoirs. Issues regarding lease ownership, so prevalent in the mid-continent, often limit operators from applying screening techniques to evaluate the whole region or field to identify drilling locations with potential. Inexpensive screening techniques that are locally applicable and help define prospective horizontal infill locations in a field or producing region will appeal the independent producers enough to gain implementation.

In older petroleum producing regions, reservoir and production data are often unavailable for individual leases. However, mature areas, thanks to their history of development and production, often collectively have a rich bank of data that includes petrophysical log and core data, production test results and production and pressure history. Long production history of a mature field ensures availability of petrophysical and fluid data, from adjacent (nearby) analogous reservoirs, which can be used as substitutes. This availability of regional data somewhat balances the often questionable quality and limited quantity of data available for a select wells or leases or a field, and serves as an invaluable resource to develop reservoir models to evaluate remaining

potential. The intent of this project is to demonstrate application of cost-effective techniques to select prospects for horizontal infill drilling. Potential areas were selected by applying one or a combination of methods (Bhattacharya et al., 2000) including: a) production data analysis, b) geologic mapping, c) integration of geologic and production data, and d) field-level and lease-level recovery factor calculations.

These screening techniques were applied using spreadsheet-based plotting programs, a commercial mapping program, and online relational databases (Digital Petroleum Atlas maintained at the KGS website) to obtain production and geologic data of Mississippian producing intervals in different areas of Kansas. Data accessibility and inexpensive screening tools will enable independent operators to quickly focus on areas of significant potential after having initiated the investigation from a regional scale.

Bhattacharya et al, (2000) reviewed several simple and effective techniques for screening horizontal well candidates in mature Mississippian carbonates areas. Production data are generally available data in mature fields. The effective vertical permeability in fractured Mississippian reservoirs is often significant, and results in rapid decline of the oil cut after an initial period of water free production. In most cases, the high water cut persists, at almost a constant level, for the major part of the well's producing life. Plotting of production information at the well level quickly identifies areas with poor vertical sweep due to water conning. An additional screening tool is to overlay a map of cumulative production (at the well level) on a map of initial production rates (IPs). Areas where the cumulative production volumes are disproportionate to the corresponding IPs may indicate unswept reserves. Comparing cumulative production, at field and well level, before and after infill drilling in analogous reservoirs with similar well spacing is an effective way to identify fields that are candidates for horizontal infill drilling by virtue of excessive well spacing.

An important application of a horizontal infill well is the recovery of attic oil. First derivative structure maps can effectively delineate the axis of the attic (Figure 7). Additionally, horizontal wells effectively drain reserves trapped in thin pay zones in the Mississippian. Overlay of the cumulative production map on the pay isopach map highlights areas with significant pay thickness but low cumulative production. Inability of vertical wells to effectively drain compartmentalized reservoirs may be the cause for this

mismatch between pay thickness and cumulative production. These areas can be considered as potential candidates for horizontal infill wells. Areas were also screened by approximating the initial reserves in place through volumetric calculations based on log-derived petrophysical parameters from a type-well located in each field.

A "target region" for the project was selected in consultation with MDCI (industry partner). MDCI owns and/or has interests in several fields producing from the Mississippian carbonate reservoirs in this region, and is therefore interested in identifying candidate fields/leases that have significant potential for exploitation through horizontal infill drilling. The initial study area is located in West Central Kansas, in the area ranging from Township 16S to 27S and 20W to 26W (Map 1). Major Mississippian fields in this region (highlighted in color) are of different sizes (with wells per field ranging from 5 to 90) and of different vintages. A majority of these fields are at mature stages of primary production. In the initial analysis, with input from MDCI, seventeen (17) fields from the area shown in Map 1 were selected for screening characterization using Internet based relational databases to identify fields/leases with residual potential.

Screening characterization of selected fields

Table 1 lists the seventeen fields selected for screening analysis to identify their residual potential. To identify residual potential requires at a minimum the delineation of:

- reservoir thickness and areal extent
- porosity
- remaining oil in place
- reservoir pressure

Reservoir thickness and areal extent were delineated using wireline logs, drill stem test (DST), and initial production (IP) data. Porosity was obtained from wireline logs. Remaining oil in place was determined from calculations of original oil in place, (based on reservoir size, porosity, and estimates of original oil saturation based on logs and/or capillary pressure relations) and reported production. Reservoir pressures were

obtained from analysis of final shut-in pressure (FSIP) data through time. The following text briefly reviews each of these analyses.

Reservoir thickness and areal extent

Available DST and IP production rates were analyzed to delineate the boundary outside of which only dry wells exist for each field. Available wireline log data were analyzed to determine the presence or absence of the pay zone in some of the wells at the boundary of each field. A type-well was selected for each field to obtain average values for petrophysical properties including pay height. Available fluid recovery data from DSTs were analyzed at the well level in each field to approximate an oil-water contact (OWC). For a first-pass evaluation, the height above the OWC to the top of the Mississippian interval was defined as net pay in each well. From the net pay thickness maps net pay distribution maps was constructed for each field. Net pay isopach and structure maps for each selected field are presented in Appendix A. The maps show that Mississippian fields in this region exhibit significant area with thickness of 30-40 ft above the OWC and in limited regions exhibit thickness up to 60-80 ft.

Reservoir Porosity

Reservoir porosity was obtained from wireline logs. For each field, either a single type-log or a pair of type-logs was selected. Most fields have recent wells drilled where "modern" compensated density-neutron porosity logs were recorded and thus available. The average porosity and vertical porosity distribution were obtained from type-logs and are presented for each field in Appendix A.

Remaining oil in place

Mississippian reservoirs generally display a decline in the oil rate with time accompanied by increasing and then near constant high water-cut. Newly drilled wells in mature fields, however, frequently produce at moderate oil rates with low water cuts indicating inefficient drainage by existing well spacing. These high oil and low water production rates may also possibly indicate reservoir compartmentalization. Gamma-ray logs of a recent horizontal well in a Mississippian reservoir, drilled under the support of

the DOE program (DE-FC22-93BC14987) revealed the presence of vertical shale barriers believed to result from infill of vertical fractures widened by karst processes. These vertical barriers would limit drainage of vertical wells making them ineffective in draining compartmentalized reservoirs resulting in significant remaining reserves in compartmentalized pockets. These significant remaining reserves provide good opportunities for infill horizontal drilling.

Remaining reserves estimates from detailed characterization and simulation studies in some of the selected fields will be evaluated in future and reported in future reports. At present, several cost-effective methods will be used for quick estimation of remaining reserve potential. For initial screening purposes, the remaining oil in place will be calculated by determining the difference between estimated original oil in place and reported cumulative oil production. Initial reserves in place will be calculated through volumetric calculations based on log-derived petrophysical parameters from type-well(s), located in each field, such as porosity, pay, and the initial water saturation. Gross pay, porosity, and saturation are used to calculate the OOIP (original oil in place volumes) on a lease level. Commonly available production data is reported at the lease level in the Mid-continent, and this will be used to calculate the distribution of cumulative production at a lease level. Remaining oil in place (ROIP) volumes and recovery efficiencies calculated on lease levels will be then determined. Estimated (constant) residual oil saturation will be used to obtain the recoverable reserve volume per lease in each of the target fields.

Regional recovery efficiency distribution will be mapped from the estimates of initial reserves and the cumulative production. Areas/fields/leases showing low recovery efficiencies will be identified as candidates for horizontal well applications.

Reservoir Pressure

Oil recovery rates, reserves, and economics are proportional to the difference between reservoir pressure and the bottom hole pumping pressure. Thus, a horizontal well that has been drilled in an under pressured formation may not produce efficiently or economically. In the Rocky Mountain region, medium radius long horizontal wells have been unsuccessful when drilled into depleted reservoirs because the limited incremental

recoveries from these wells were not enough to justify the additional costs of drilling a short horizontal well. Though short horizontal wells may not be economic at certain low reservoir pressures, longer wells may be economic depending on the pressure, reservoir thickness, permeability, and remaining oil.

To determine present reservoir pressure, readily available production data, including final shut-in pressures (FSIPs), final flowing pressures (FFPs), and initial production (IP) rates of oil and gas, were entered in a database. These data, collected at the well level during the time of their drilling, were then mapped for each field. In most fields, some level of drilling activity has continued over the productive life of the field. For reservoirs operating under pressure communication, plots of FSIPs through time provide an approximate measure of the decline in average reservoir pressure.

Ranking of target fields

Both accurate screening of prospective horizontal infill drilling candidates and accurate ranking of prospect quality is critical to successful implementation. A ***PMP*** for this region is the utilization of the numerous screening tests that can be applied to identify and rank prospective sites. These tools will utilize databases available on the Internet and from publicly accessible data libraries.

The process of selecting the best fields for implementation of the demonstration horizontal infill drilling program requires that the fields/lease be ranked on their suitability and potential for economic return. Ranking of fields will be based on the following criteria:

a) Estimated potential of recoverable reserves
b) Reservoir properties – Permeability, pay thickness, drive mechanism
c) Current reservoir pressure, reservoir/aquifer geometry
d) Availability of production data – its accuracy and resolution (lease or well level)
e) Availability of logs
f) Availability of cores
g) Availability of reservoir fluid data
h) Availability of DST data
i) Availability of data from analog Mississippian reservoirs

j) Vertical permeability especially if there is gas cap or underlying aquifer

k) Anticipated drilling problems – if any

l) Ownership and operational rights

m) Uncertainties associated with the evaluation process

Data are being compiled and input into a database for ranking of the seventeen "target" fields and the results of this ranking will be presented in a future report.

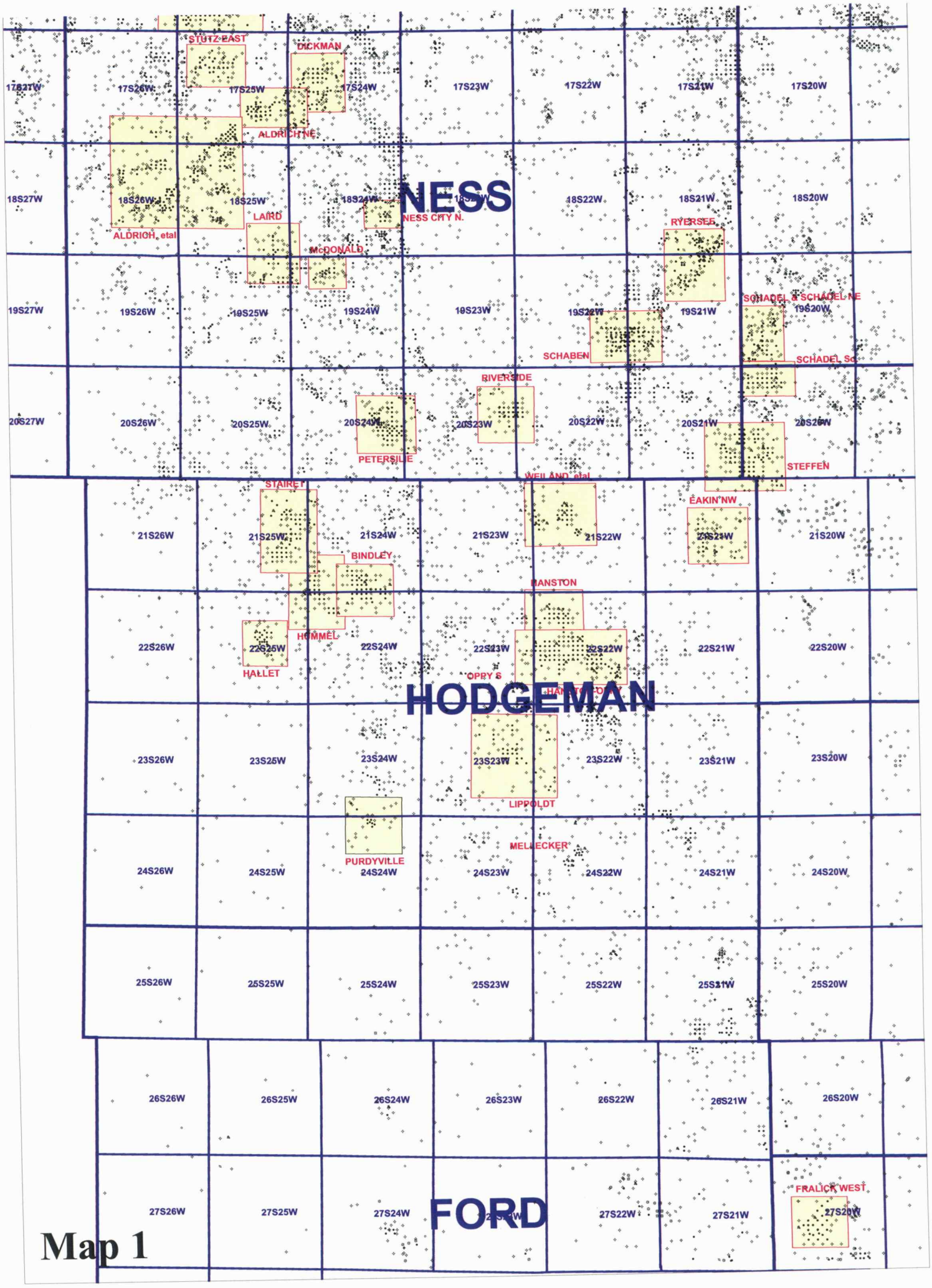
Integrated reservoir characterization

A PMP for Mississisippian reservoirs is the construction of reservoir geomodels, based on integrated geologic, petrophysical, and engineering characterization of a site, prior to numerical simulation or drilling of the site. To accurately predict the production potential of a reservoir it is necessary to know the storage and flow properties of the rocks that comprise that reservoir. Because of the paucity of publicly available petrophysical data, for Mississippian reservoirs, and the frequent lack of such data for many leases, it is necessary to develop a databank of representative petrophysical properties. Characterization can be performed using petrophysical information from analog rocks, available from rock catalogues, and using cost-effective analytical tools such as PfEFFER. Toward the goal of constructing a rock catalogue for the Mississippian reservoirs in Kansas, preliminary work has been conducted comparing reservoir properties in different major Mississippian fields. Cost-effective tools, such as Super-Pickett crossplot, capillary pressure analyses, and detailed core and log studies, are also being obtained to enhance geomodel development by integrated characterization studies in this project. Initial work has focused on identification of publicly available cores, compilation of existing core petrophysical data, and measurement of advanced rock properties including Archie parameters for electric wireline log interpretation of water saturation.

Mississippian shallow shelf carbonates exhibit a wide range of lithofacies, as the result of differences in depositional environments and subsequent karst and diagenetic modification. Different lithofacies normally exhibit characteristic petrophysical properties. In Mississippian carbonates, distinct porosity-permeability relationships exist for major lithofacies. Comparison of porosity(ϕ)-permeability(k) trends for the three

fields (Figure 7) indicates that there is consistency in the relative relationships between lithofacies. In all fields, porosity and permeability increase with transition through the following lithofacies: mudstone-wackestone-packstone-grainstone. Comparison indicates that Mississippian reservoirs tend to exhibit similar ranges in porosity and permeaiblity for similar lithofacies within a variance that may provide sufficient accuracy for screening and analog purposes. Similarly, Figure 8 indicates that there may be sufficient consistency in capillary pressure properties that saturations may be predicted using generalized saturation versus porosity or permeability relationships or the use of these in conjunction with log-calculated saturations.

Cores from the Schaben, Bindley, and Ness City fields are available at the KGS and have been involved in previous studies and the present study. Additional cores from other Mississippian fields in the study area are being located and obtained. Reservoir formation evaluation is ongoing to develop quantitative relationships for prediction of reservoir properties from readily available data such as wireline porosity.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DICKMAN
ALDRICH NE
NESS
NESS CITY N.
LAIRD
ALDRICH, etal
McDONALD
RYERSEE
SCHADEL & SCHADEL NE
SCHABEN
SCHADEL, Sc
RIVERSIDE
PETERSILIE
STEFFEN
WEILAND, etal
EAKIN NW
STAIRET
BINDLEY
HANSTON
HOMMEL
HALLET
OPPY S
HODGEMAN
LIPPOLDT
PURDYVILLE
MELLECKER
FRALICK WEST
FORD
17S27W
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Map 1

Table 1

No.	Field Name	Sec	Miss Top	Miss Base	Low Por	High Por	Net Pay	Low Sw	High Sw	Reservoir	Phi min	Phi max	Sw min	Sw max
1	Aldrich N	7	-1894	-1915	12	12	4	35	60	Dolomite	12.0	12.0	35.0	60.0
	Aldrich S	13	-1910	-1923	18	18	5	25	58	Dolomite				
	Aldrich S	23	-1907	-1960	15	18	53	36	52	Dolomite				
2	Arnold SW	31	-1923	-1950	16	16	8	41	50	Dolomite	12.5	17.0	40.5	52.0
		29	-1897	-1949	9	18	26	40	54	Dolomite				
3	Fralick W	28	-2544	-2569	20	23	10	37	37	Dolomite	20.0	23.0	37.0	37.0
4	Stairett	13	-2089	-2117	8	12	17	31	47	Dolomite	8.0	12.0	31.0	47.0
5	Riverside	13	-2091	-2121	13	18	30	38	48	Dolomite	13.0	18.0	38.0	48.0
6	Judica	3	-1914	-1933	24	28	19	28	50		24.0	28.0	28.0	50.0
7	Stutz E	8	-1944	-1961	18	18	17	35	60	Dolomite	18.0	18.0	35.0	60.0
8	Laird	36	-1994	-2030	10	16	8	19	47	Dolomite	12.5	15.5	27.5	47.0
		36	-1999	-2039	15	15	10	36	47	Dolomite				
9	Lippoldt	14	-2218	-2240	14	16	22	17	37	Dolomite	14.0	17.0	25.5	51.0
		13	-2218	-2252	14	18	34	34	65	Dolomite				
10	Arnold	23	-1961	-1976	16	16	8	41	50	Dolomite	16.0	16.0	41.0	50.0
11	Arnold N	10	-1946	-1975	10	20	12	35	40	Dolomite	10.0	20.0	35.0	40.0
12	Steffen W	25	-2142	-2166	18	18	24	51	62	Chery-dol	18.0	18.0	51.0	62.0
13	McDonald	5	-2021	-2050	18	18	29	36	66		18.0	18.0	36.0	66.0
14	Ness City North	23	-2001	-2001	10	14	16	45	60	Dolomite	12.0	17.5	32.5	55.5
		24	-1998	-2022	14	21	10	20	51					

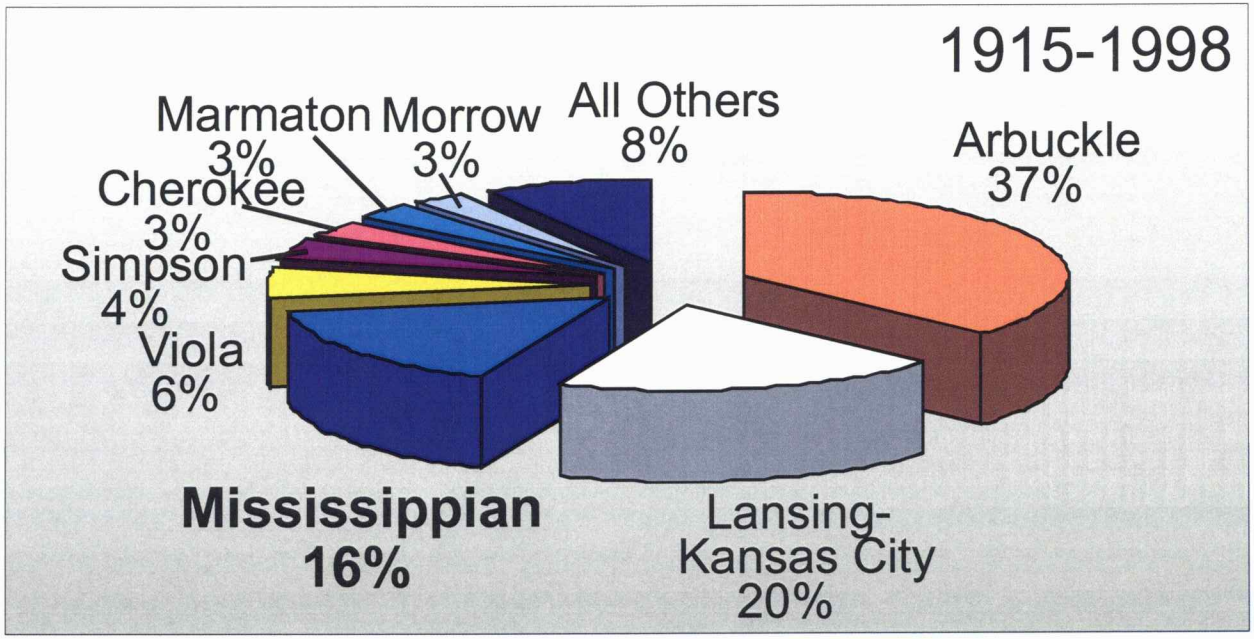

1915-1998
Marmaton
3%
Morrow
3%
All Others
8%
Arbuckle
37%
Cherokee
3%
Simpson
4%
Viola
6%
Mississippian
16%
Lansing-
Kansas City
20%

Figure 1

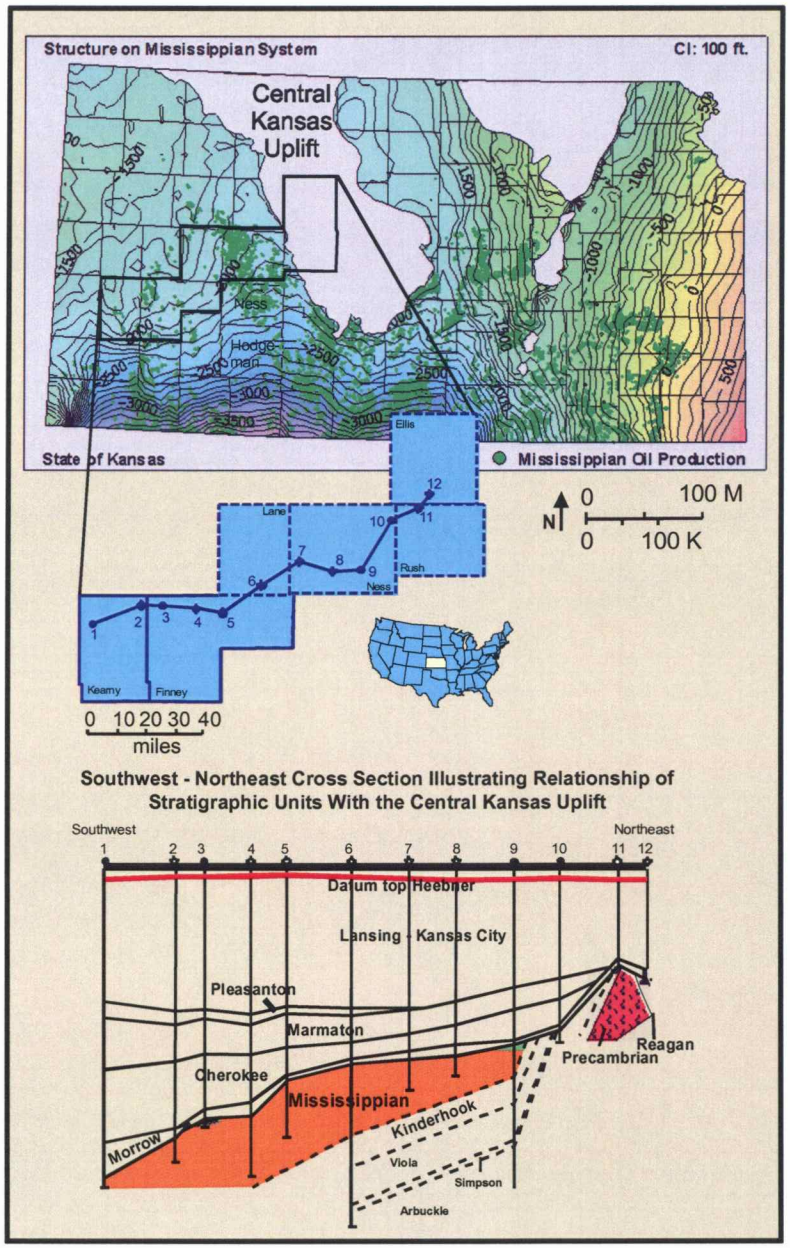
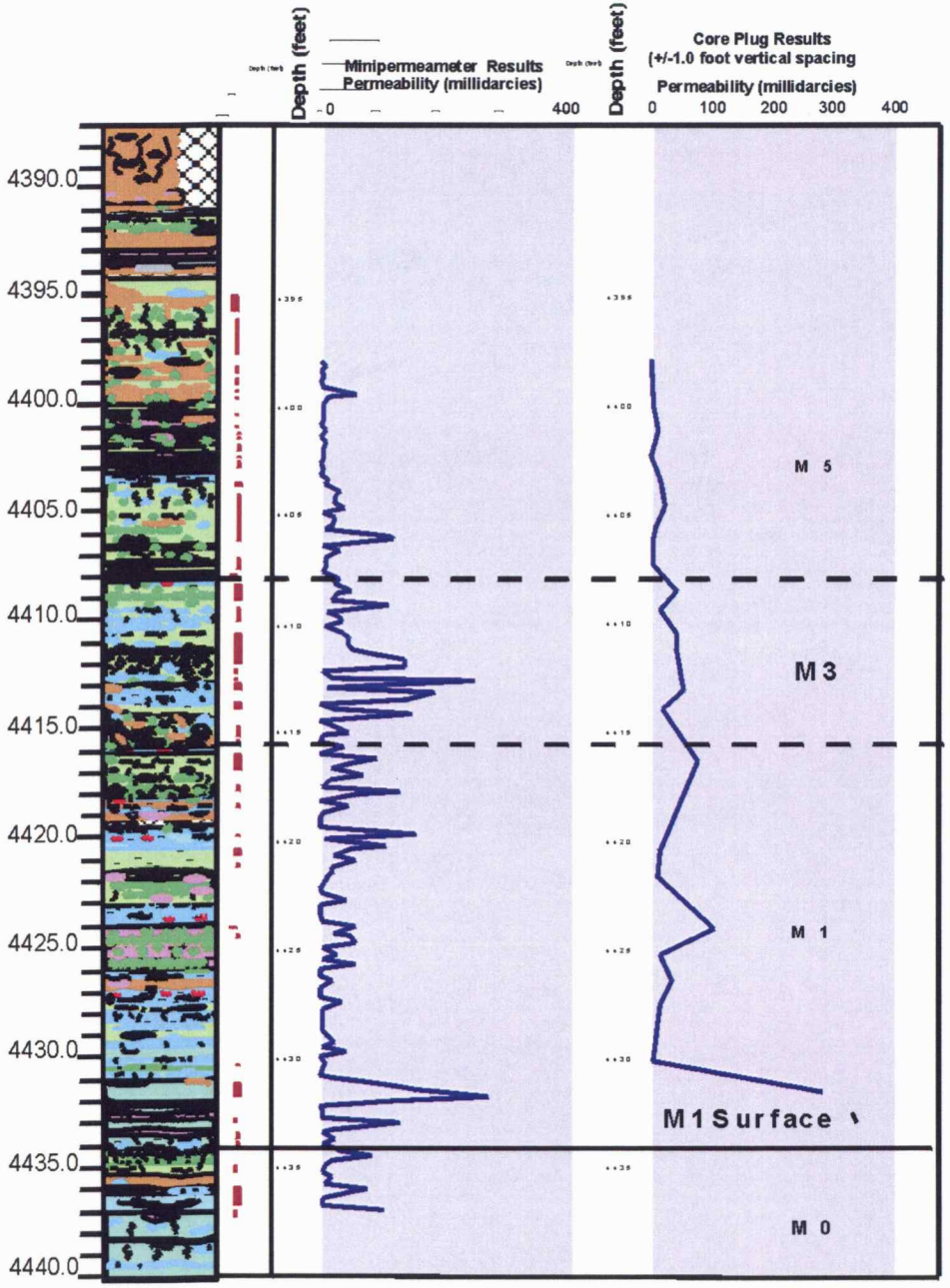

Structure on Mississippian System
CI: 100 ft.
Central
Kansas
Uplift
Ness
Hodgeman
Ellis
State of Kansas
Mississippian Oil Production
N
0
100 M
0
100 K
Lane
Rush
Ness
Kearny
Finney
0 10 20 30 40
miles
Southwest - Northeast Cross Section Illustrating Relationship of
Stratigraphic Units With the Central Kansas Uplift
Southwest
Northeast
Datum top Heebner
Lansing - Kansas City
Pleasanton
Marmaton
Cherokee
Mississippian
Morrow
Kinderhook
Viola
Simpson
Arbuckle
Reagan
Precambrian

Figure 2


Depth (feet)
Minipermeameter Results
Permeability (millidarcies)
0
400
Depth (feet)
Core Plug Results
(+/-1.0 foot vertical spacing
Permeability (millidarcies)
0
100
200
300
400
4390.0
4395.0
4400.0
4405.0
4410.0
4415.0
4420.0
4425.0
4430.0
4435.0
4440.0
M 5
M 3
M 1
M 0
M1 Surface

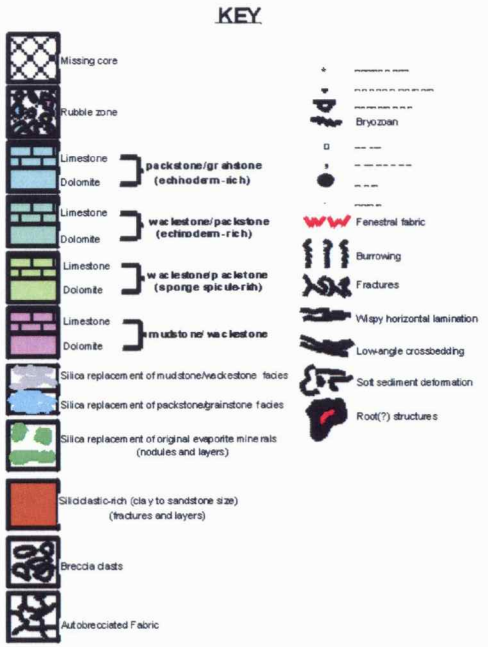

KEY
Missing core
Rubble zone
Limestone
Dolomite
packstone/grainstone (echinoderm-rich)
Limestone
Dolomite
wackestone/packstone (echinoderm-rich)
Limestone
Dolomite
wackestone/packstone (sponge spicule-rich)
Limestone
Dolomite
mudstone/wackestone
Silica replacement of mudstone/wackestone facies
Silica replacement of packstone/grainstone facies
Silica replacement of original evaporite minerals (nodules and layers)
Siliciclastic-rich (clay to sandstone size) (fractures and layers)
Breccia clasts
Autobrecciated Fabric
Bryozoan
Fenestral fabric
Burrowing
Fractures
Wispy horizontal lamination
Low-angle crossbedding
Soft sediment deformation
Root(?) structures

Figure 3

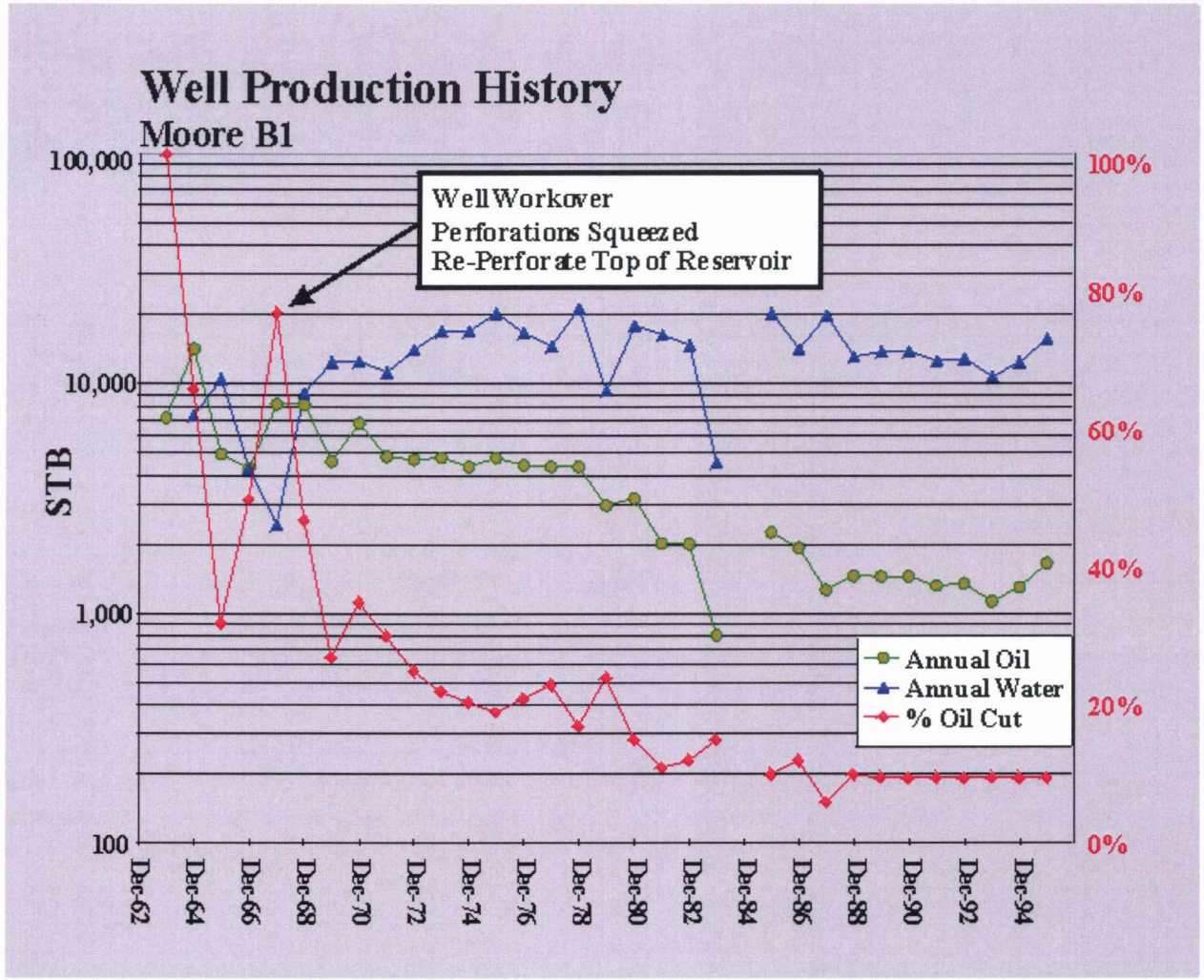

Well Production History
Moore B1
100,000
10,000
1,000
100
STB
100%
80%
60%
40%
20%
0%
Well Workover
Perforations Squeezed
Re-Perforate Top of Reservoir
Annual Oil
Annual Water
% Oil Cut
Dec-62
Dec-64
Dec-66
Dec-68
Dec-70
Dec-72
Dec-74
Dec-76
Dec-78
Dec-80
Dec-82
Dec-84
Dec-86
Dec-88
Dec-90
Dec-92
Dec-94

Figure 4

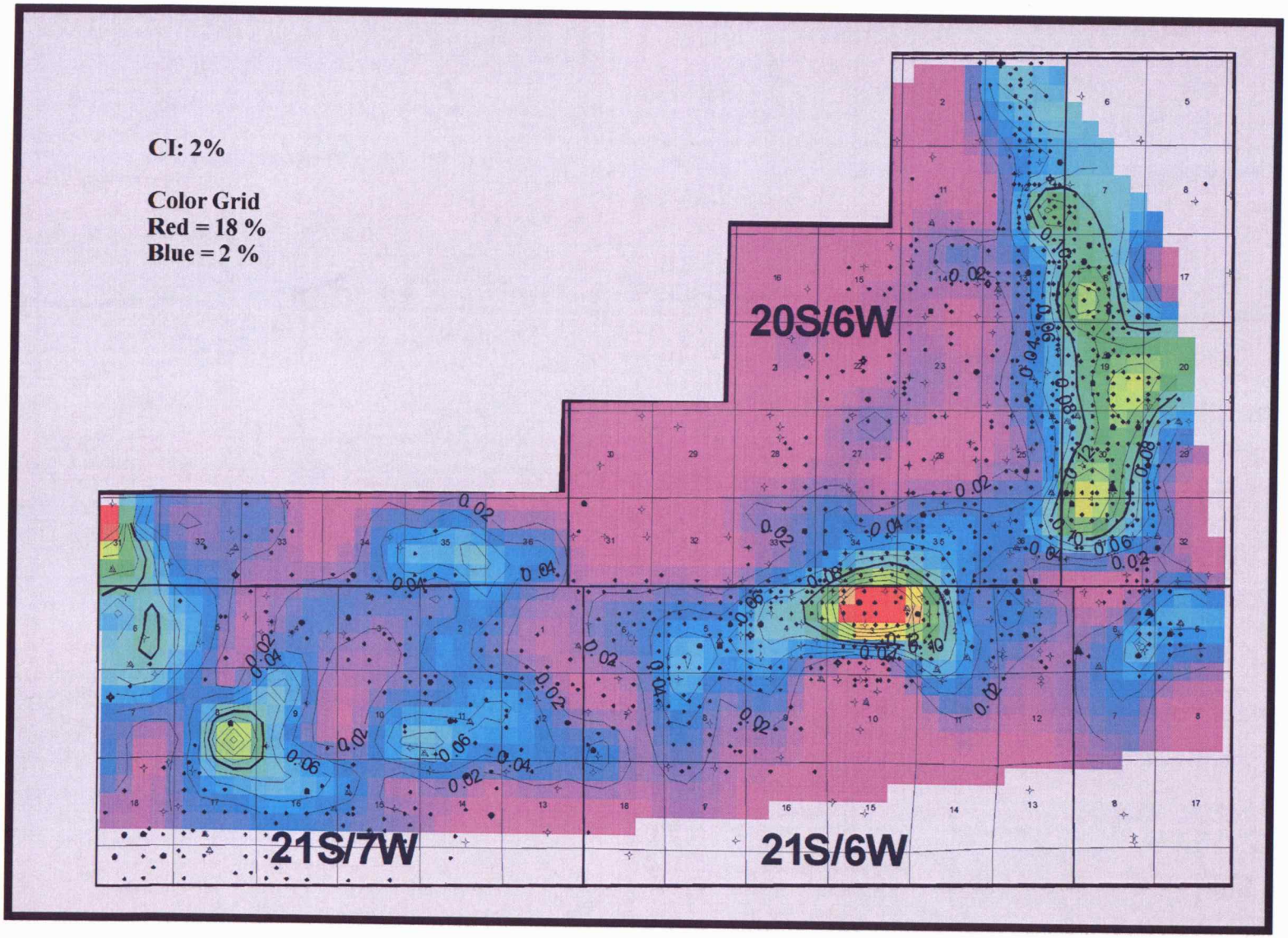


Figure 5

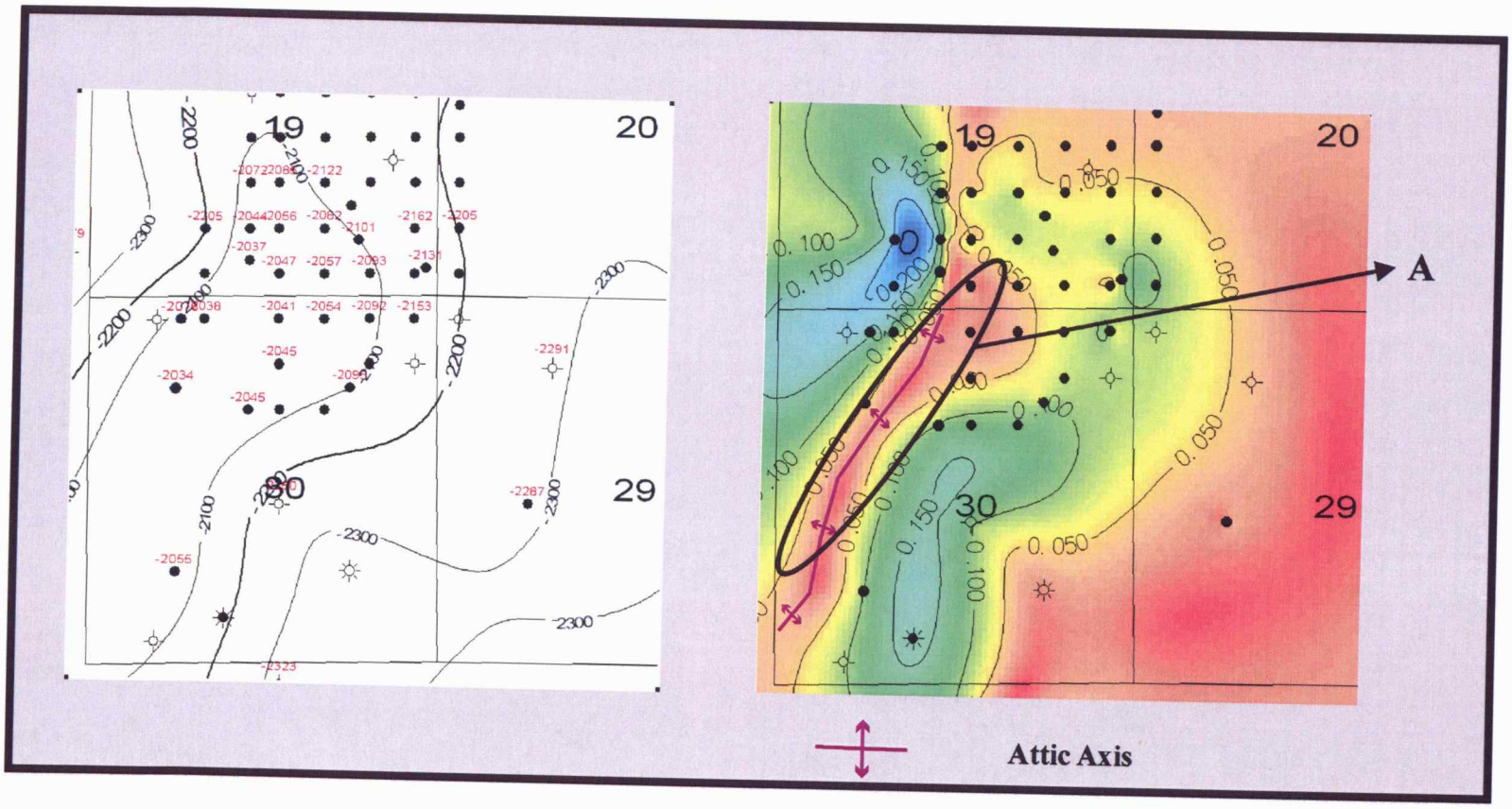


Figure 6

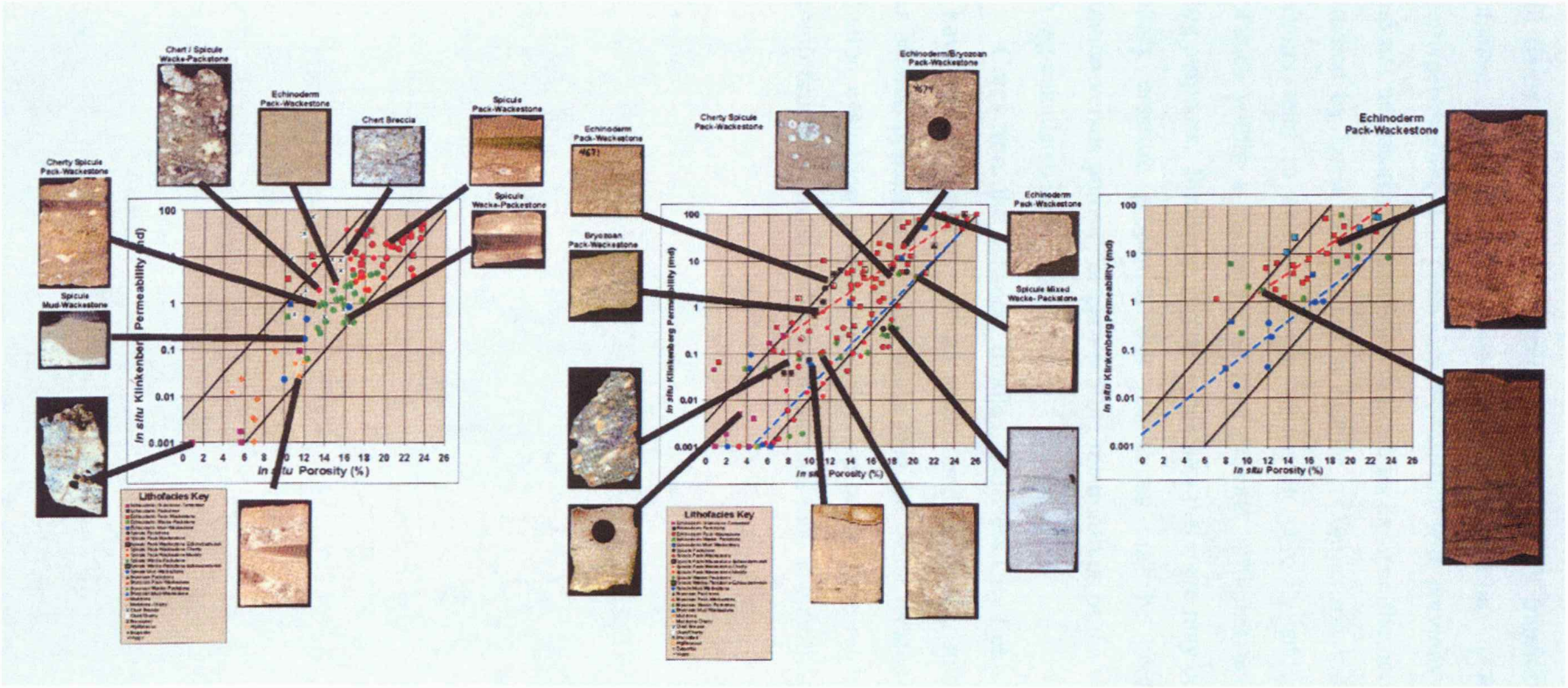
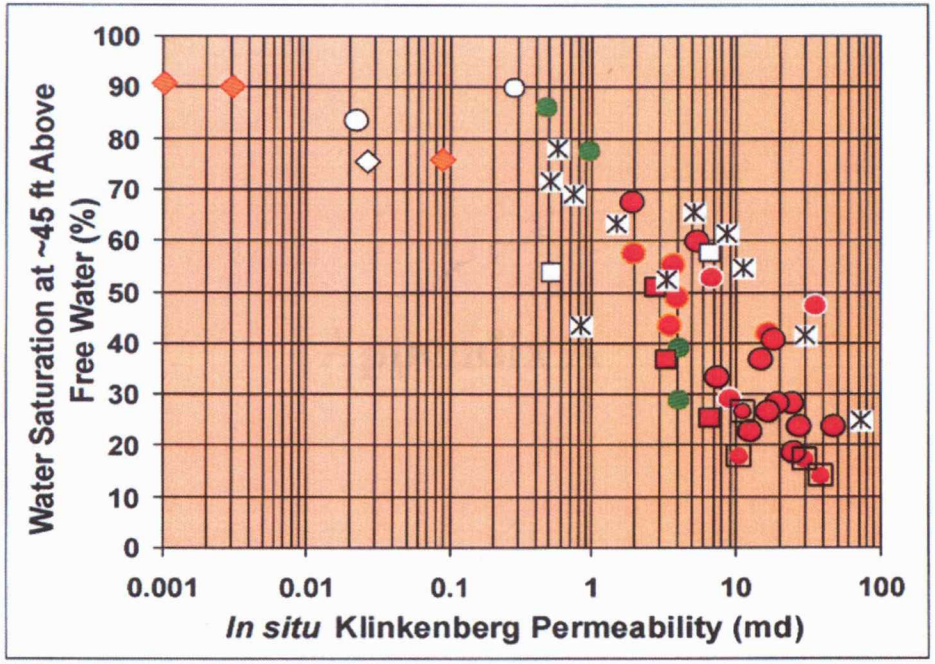

Chert / Spicule Wacke-Packstone
Echinoderm Pack-Wackestone
Chert Breccia
Spicule Pack-Wackestone
Spicule Wacke-Packstone
Cherty Spicule Pack-Wackestone
Spicule Mud-Wackestone
Permeability (md)
In situ Porosity (%)
Lithofacies Key
Echinoderm/Bryozoan Pack-Wackestone
Echinoderm Pack-Wackestone
Bryozoan Pack-Wackestone
Spicule Mixed Wacke- Packstone
Echinoderm Pack-Wackestone

Figure 7


Water Saturation at ~45 ft Above Free Water (%)
100
90
80
70
60
50
40
30
20
10
0
0.001
0.01
0.1
1
10
100
In situ Klinkenberg Permeability (md)

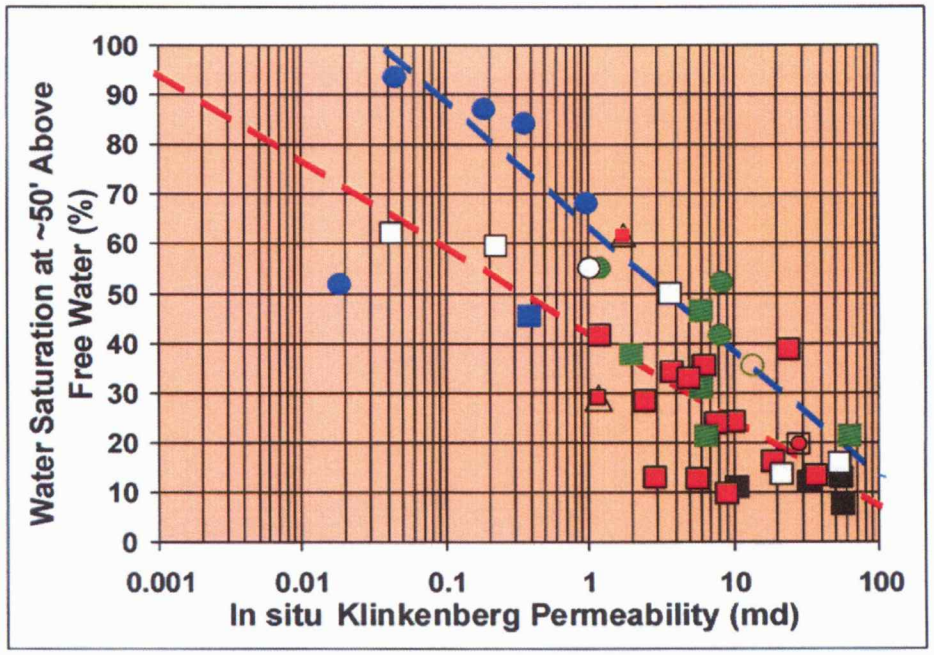
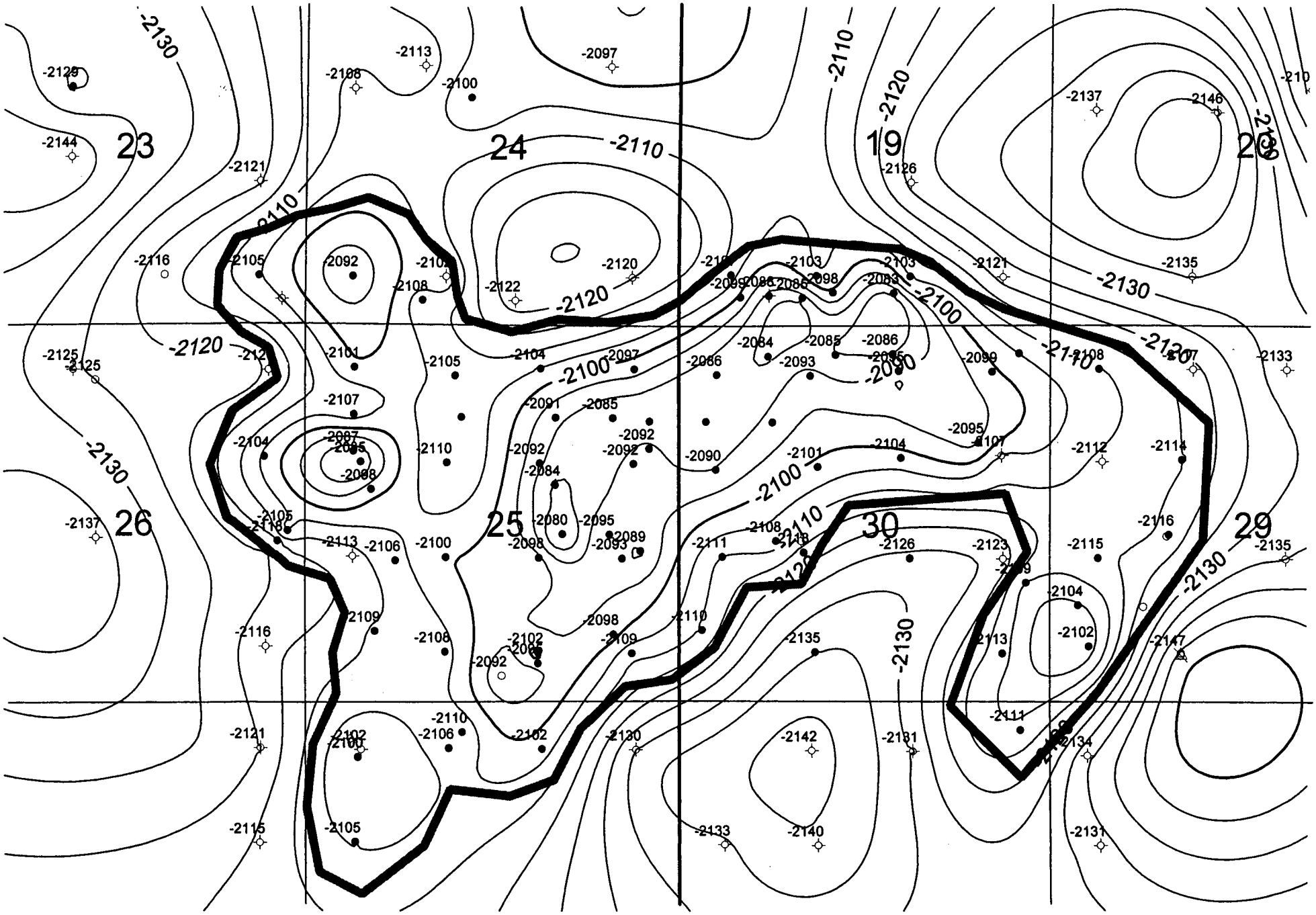
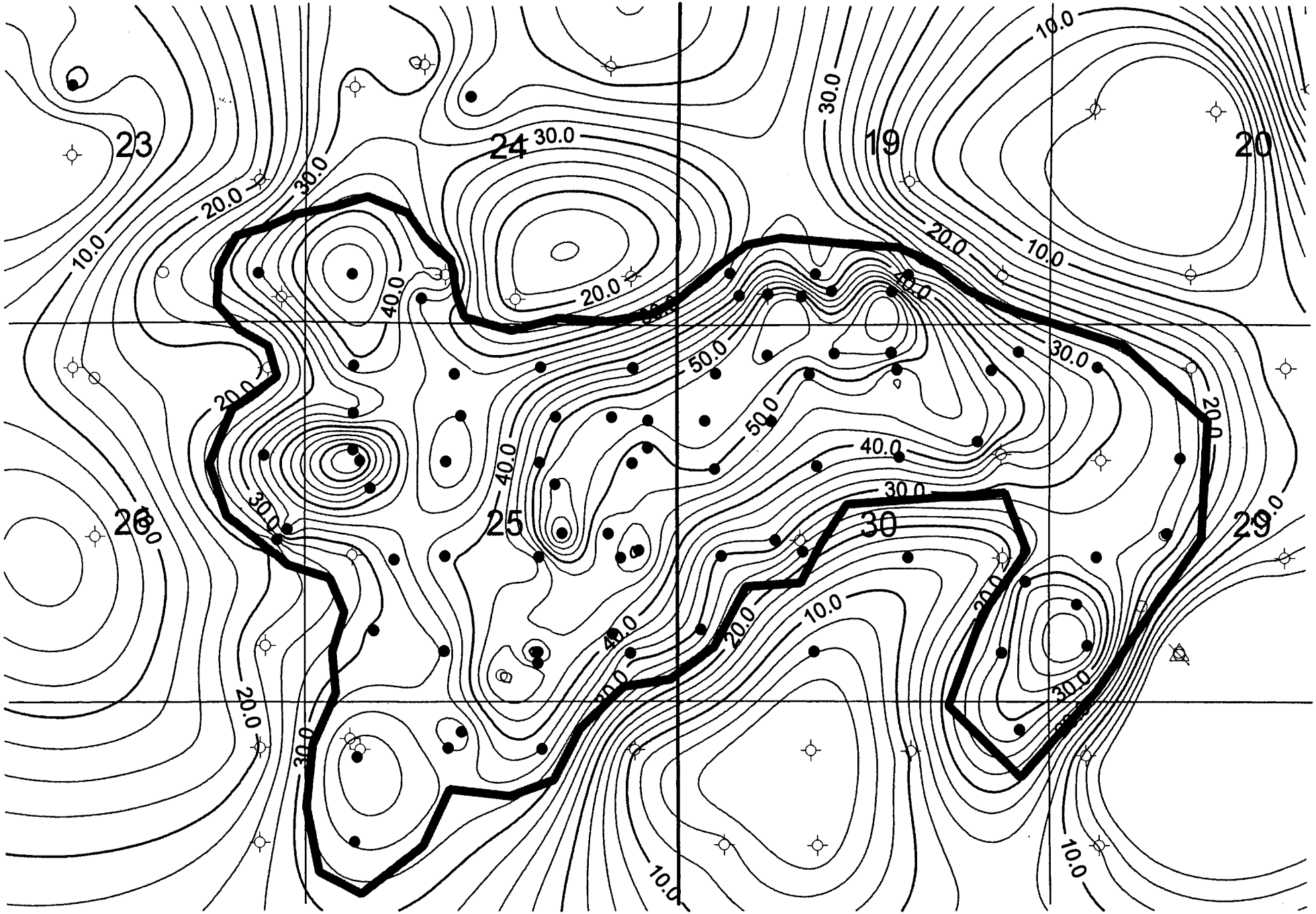

Water Saturation at ~50' Above Free Water (%)
100
90
80
70
60
50
40
30
20
10
0
0.001
0.01
0.1
1
10
100
In situ Klinkenberg Permeability (md)

Figure 8

Appendix A


SCHABEN FIELD
FIELD OUTLINE
MISS SUBSEA

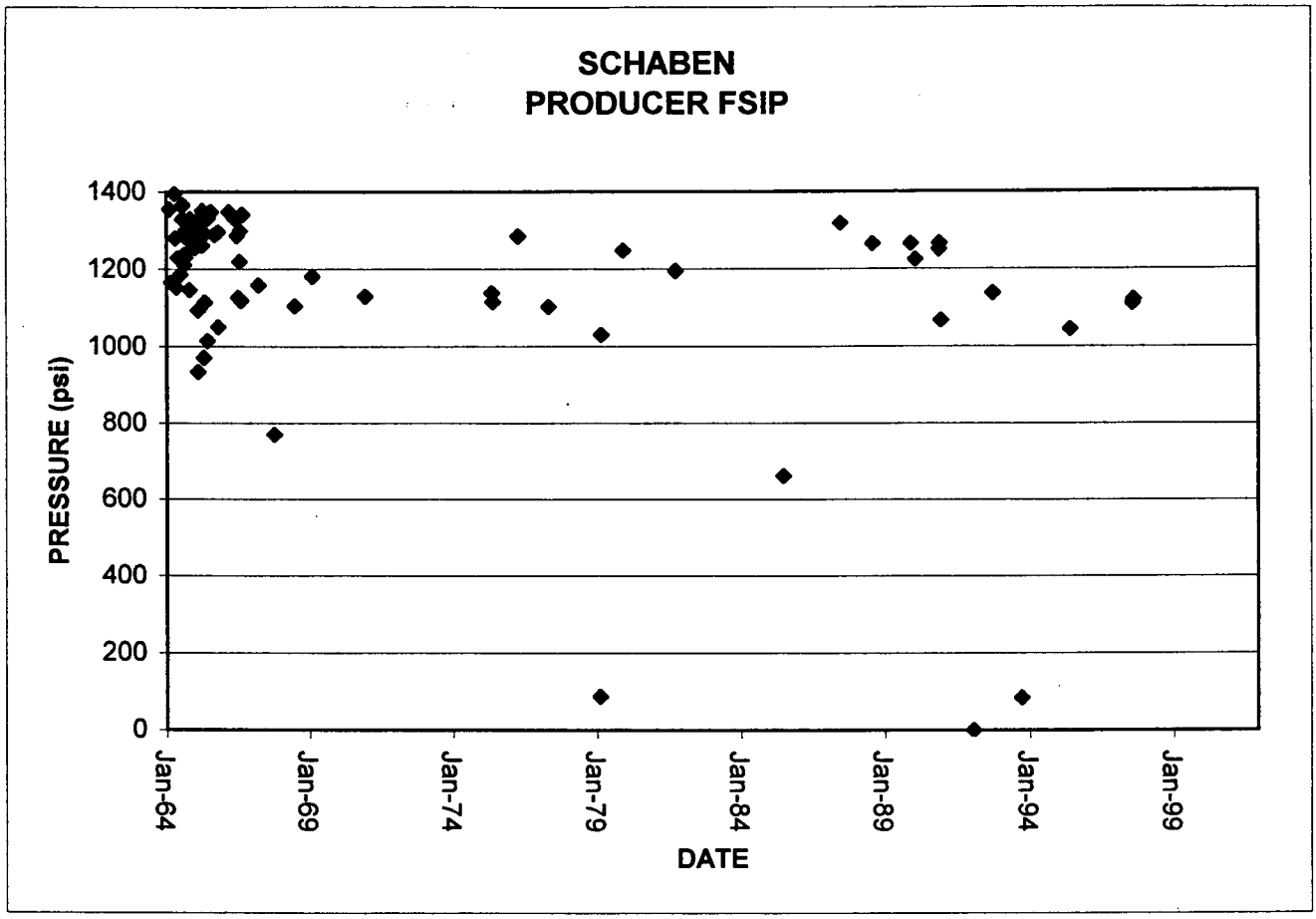


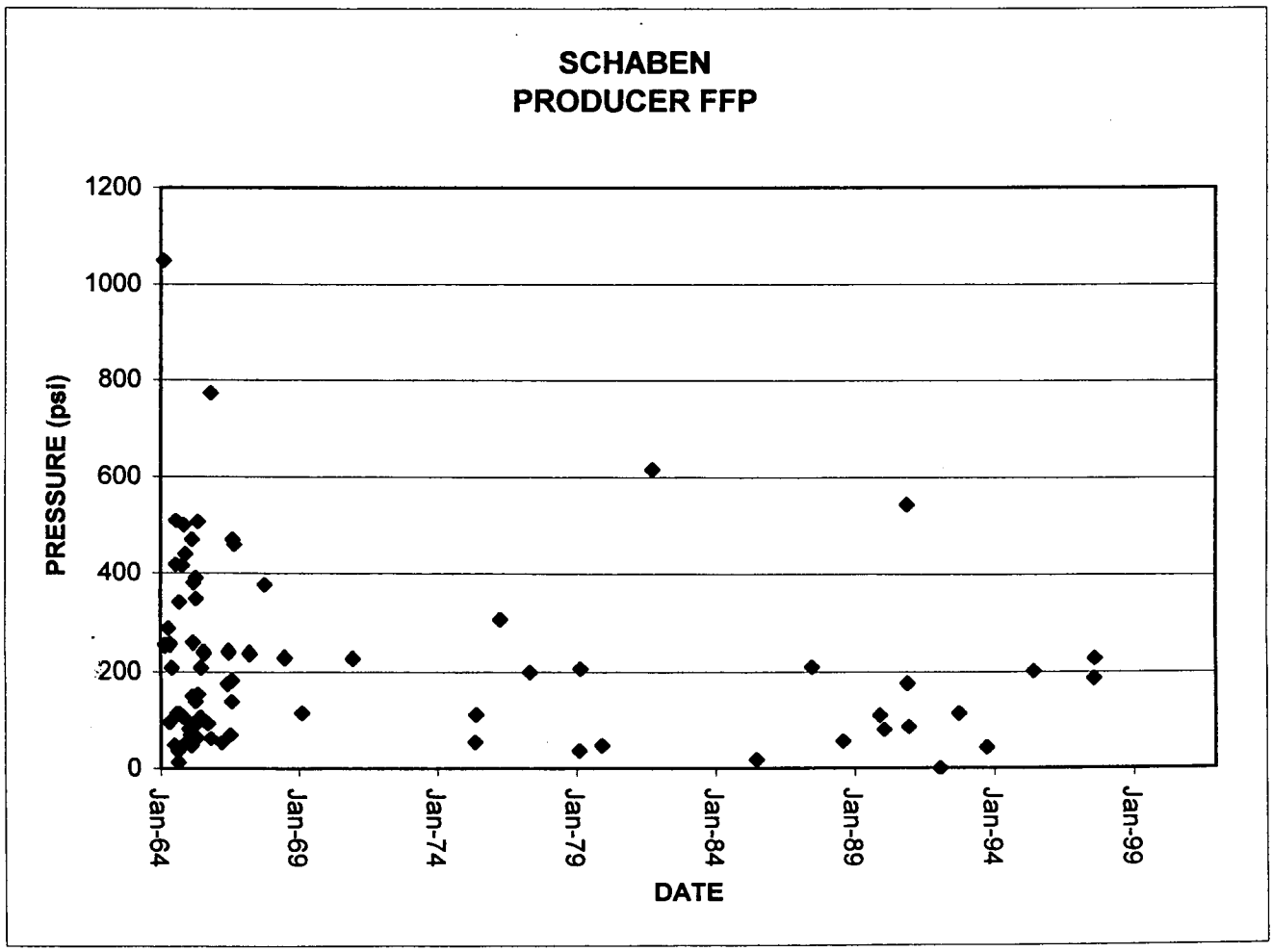
SCHABEN FIELD

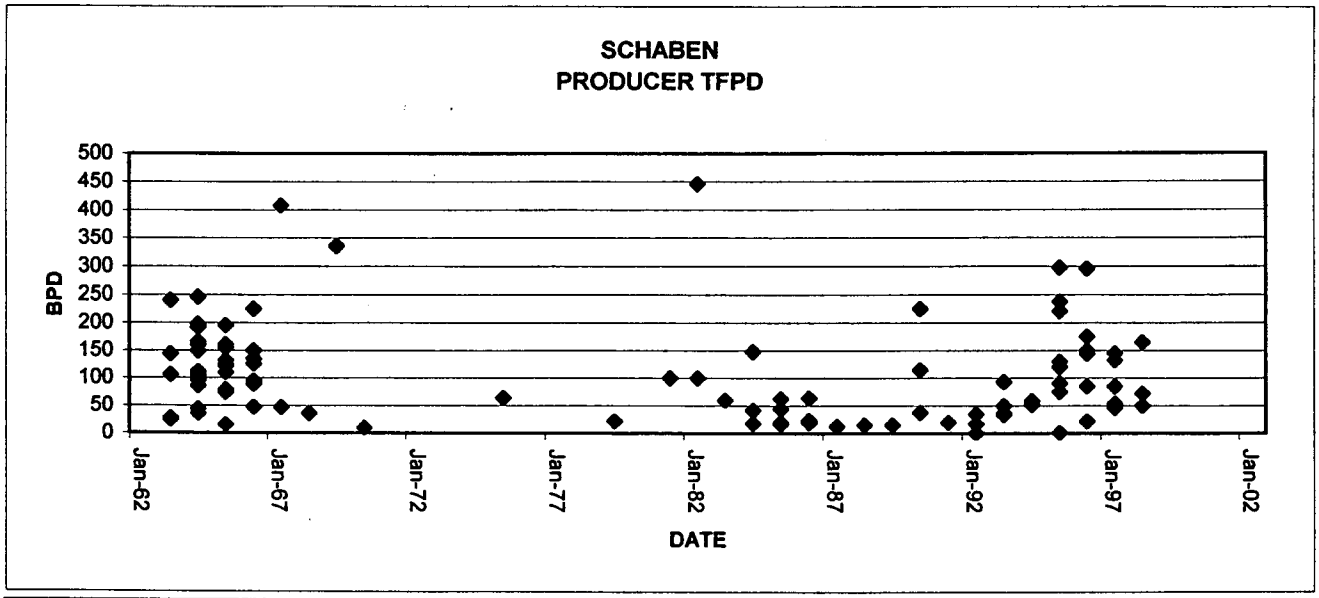
FIELD OUTLINE

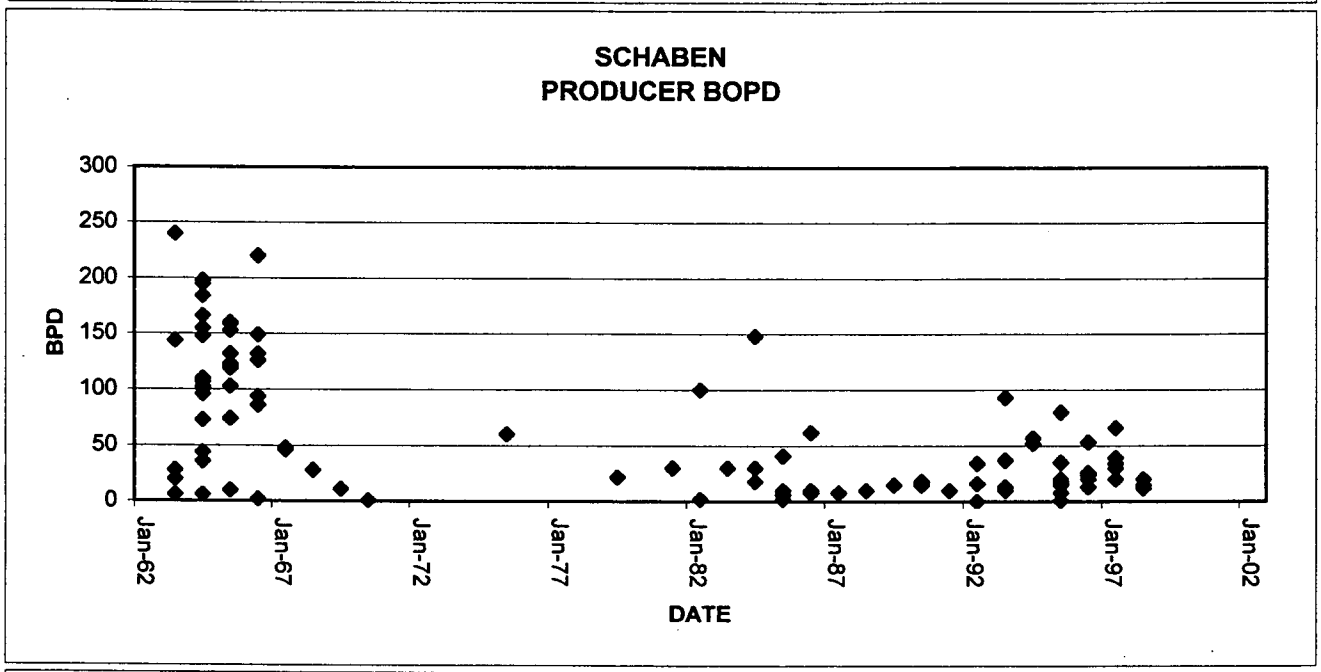
o/w -2140

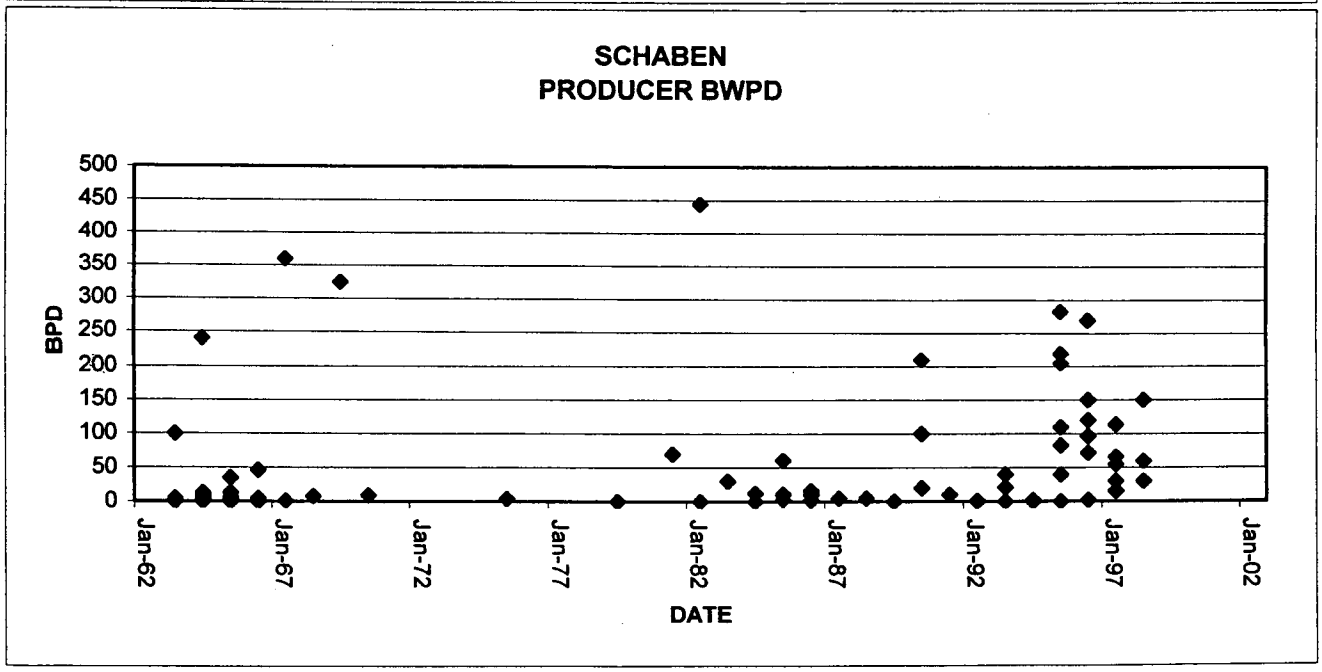
PAY HEIGHT ISOPACH

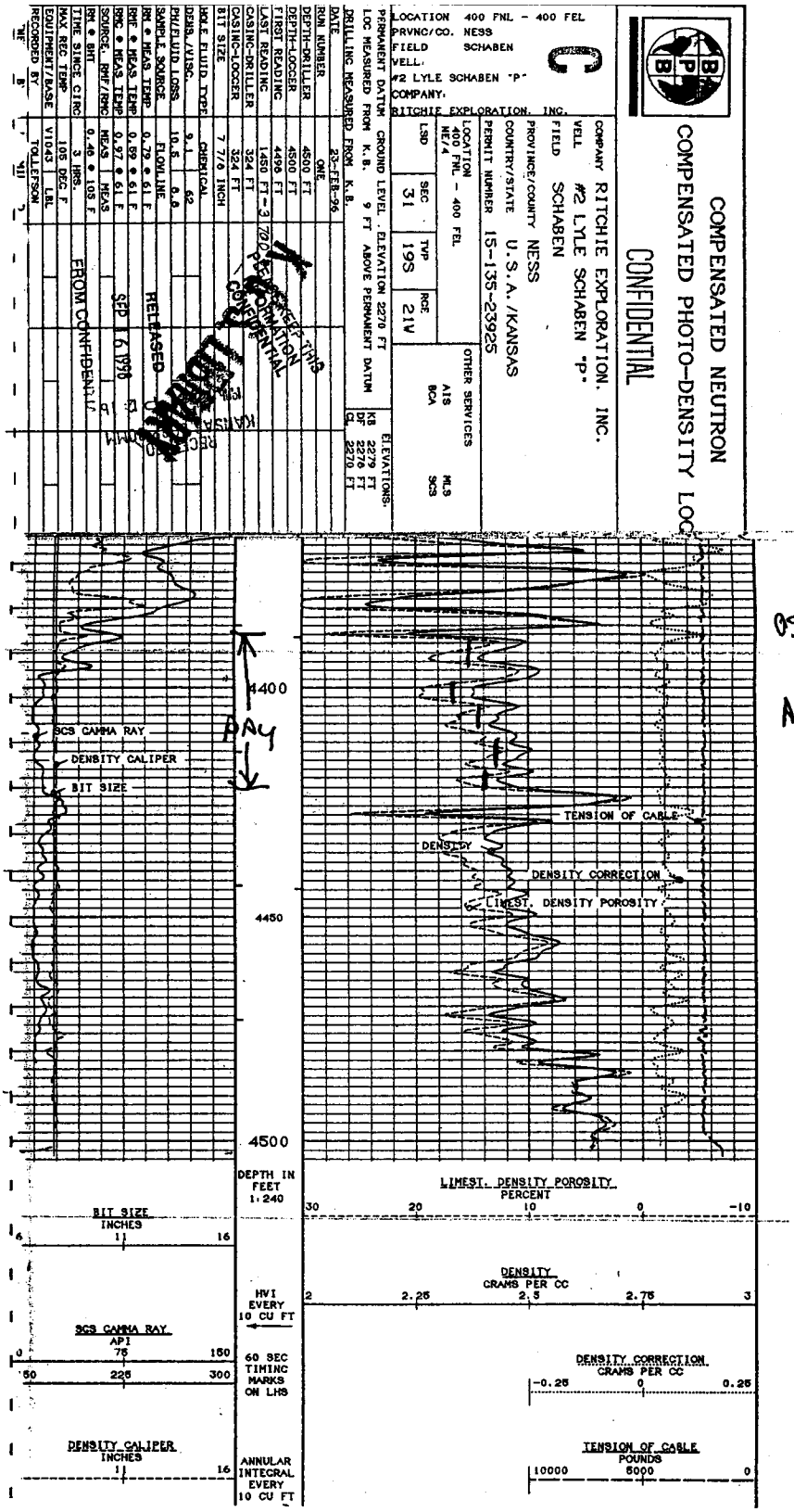

SCHABEN
PRODUCER FSIP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-64
Jan-69
Jan-74
Jan-79
Jan-84
Jan-89
Jan-94
Jan-99
DATE


SCHABEN
PRODUCER FFP
PRESSURE (psi)
1200
1000
800
600
400
200
0
Jan-64
Jan-69
Jan-74
Jan-79
Jan-84
Jan-89
Jan-94
Jan-99
DATE


SCHABEN
PRODUCER TFPD
BPD
500
450
400
350
300
250
200
150
100
50
0
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
Jan-02
DATE

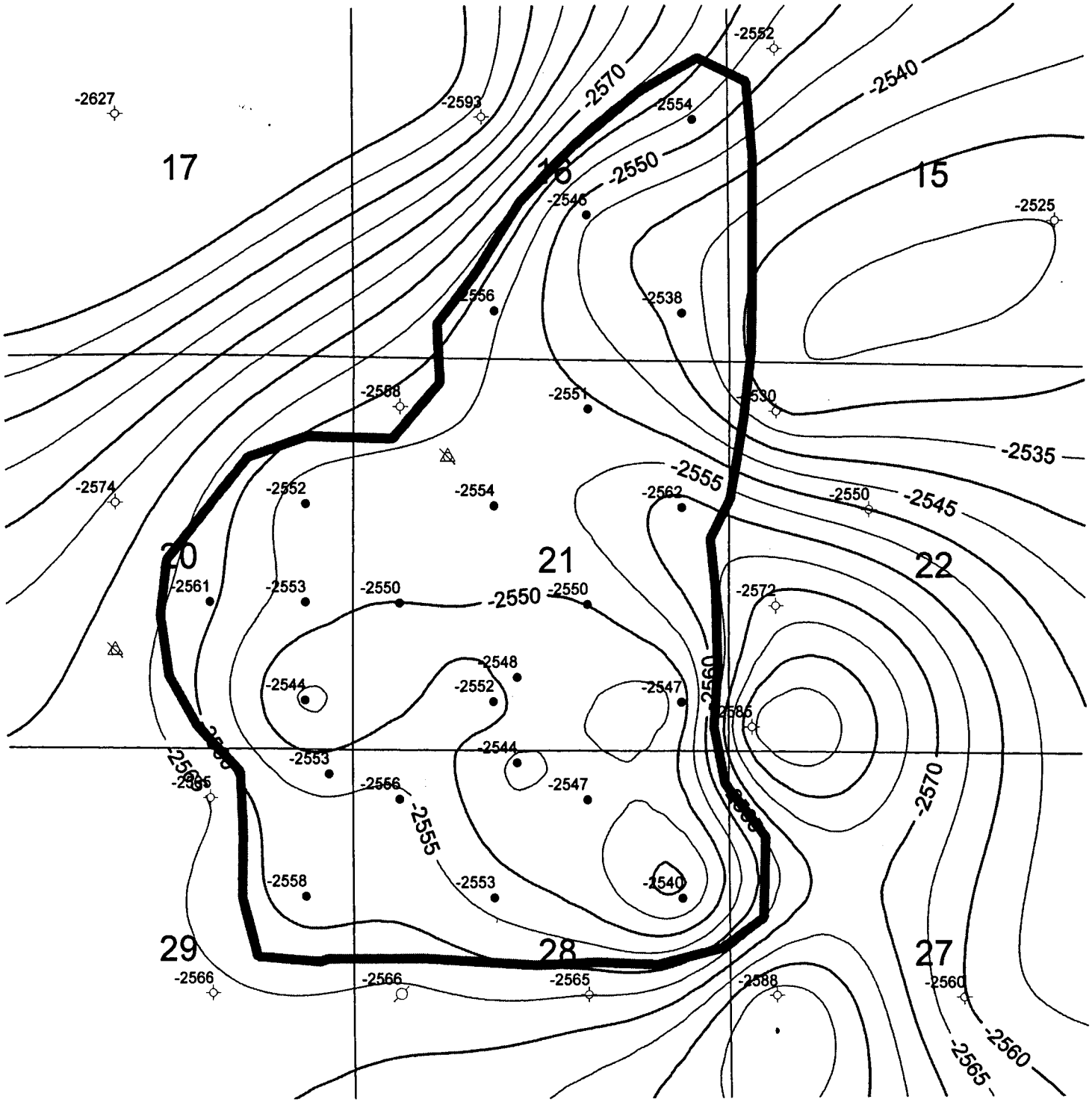

SCHABEN
PRODUCER BOPD
BPD
300
250
200
150
100
50
0
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
Jan-02
DATE

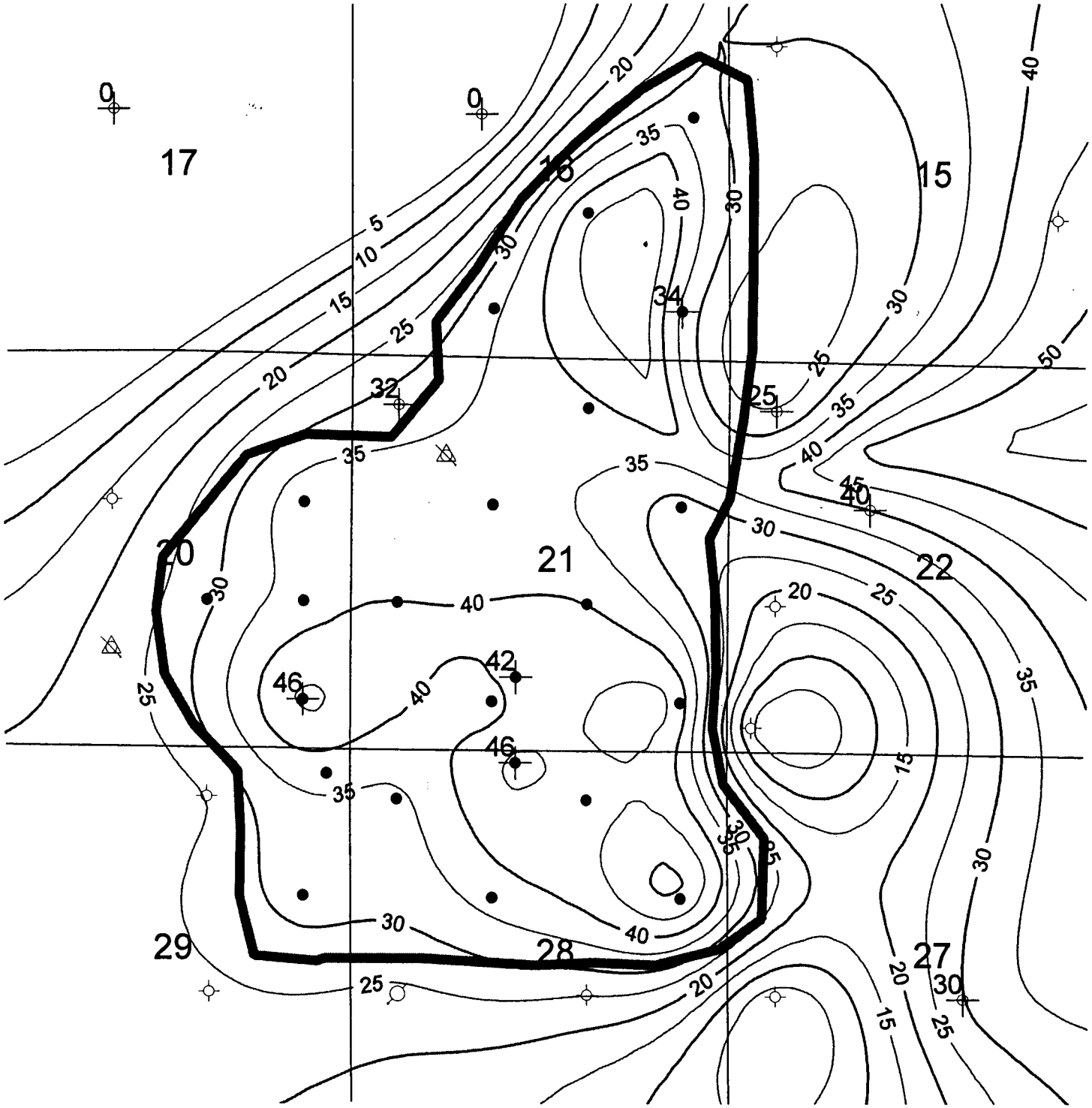

SCHABEN
PRODUCER BWPD
BPD
500
450
400
350
300
250
200
150
100
50
0
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
Jan-02
DATE

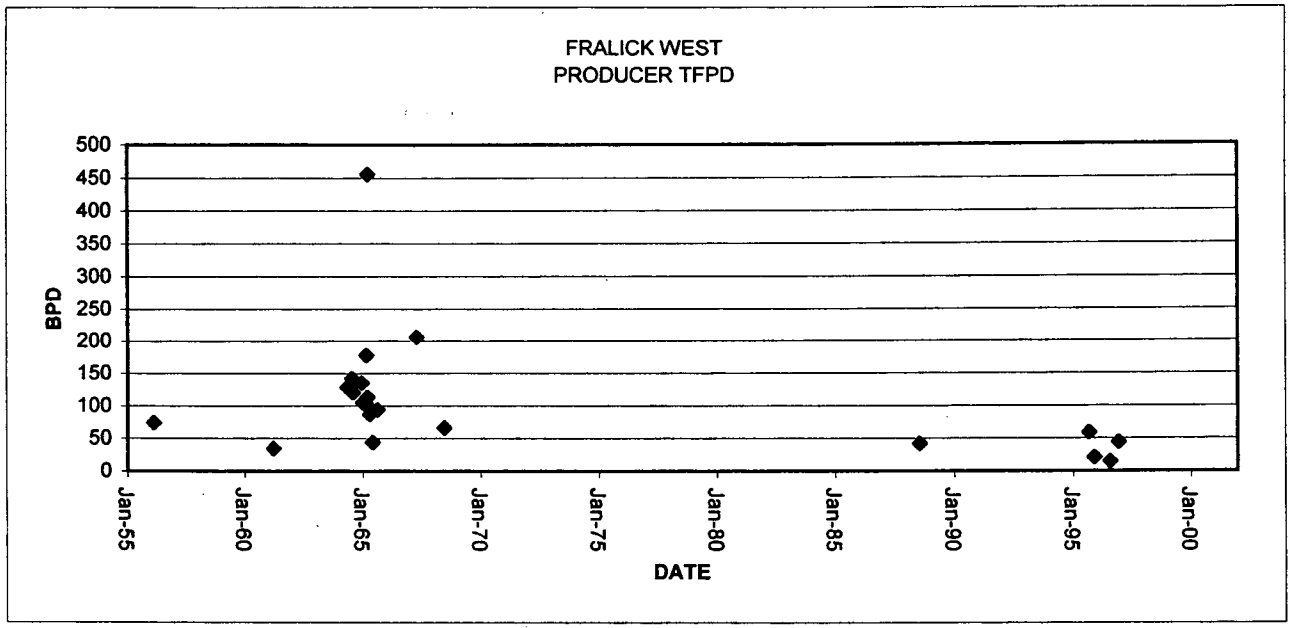


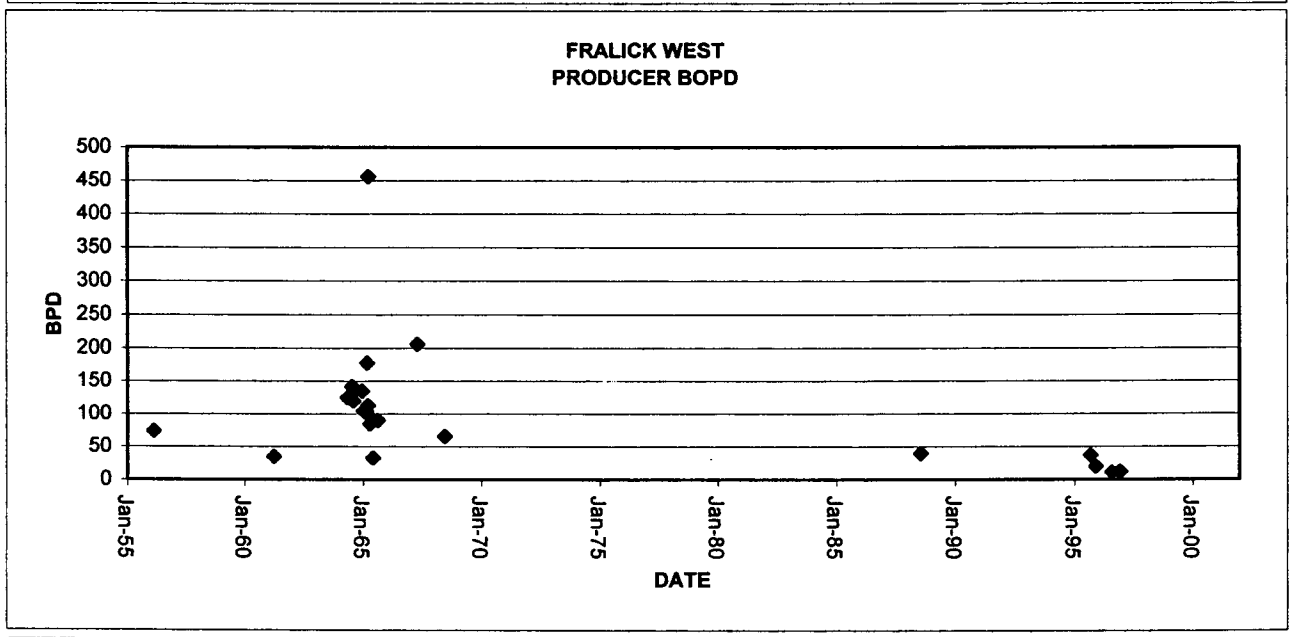
Usage Δ

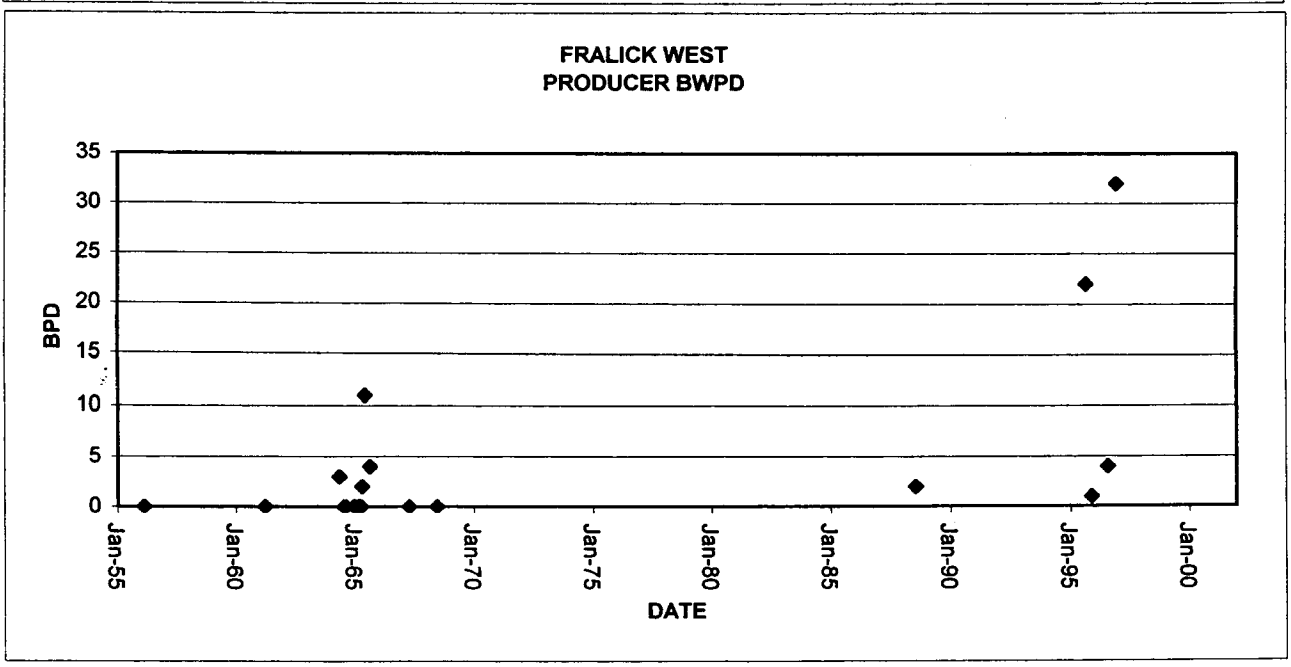
Avg 15%

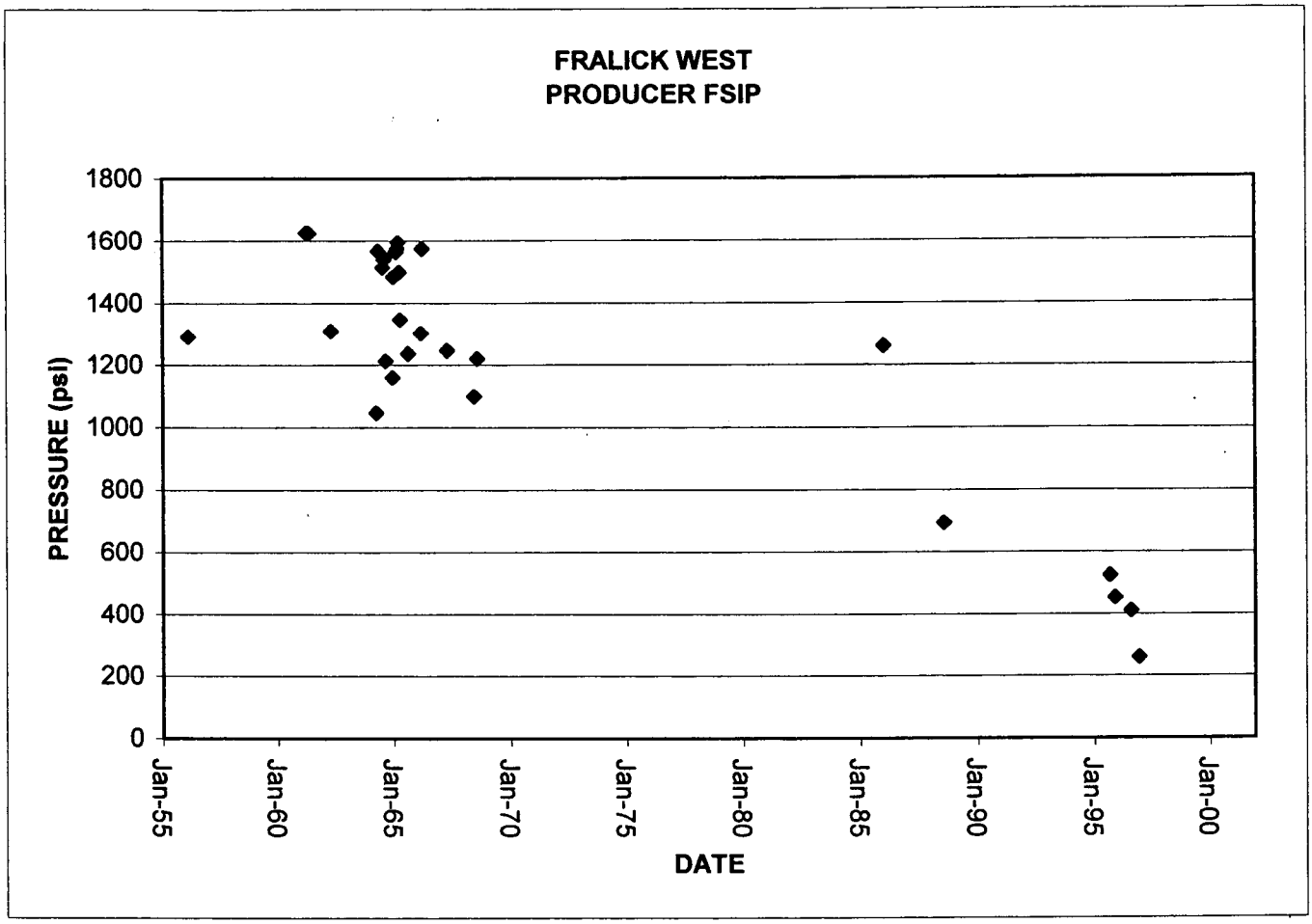

FRALICK WEST FIELD
FIELD OUTLINE
MISS SUBSEA
17
16
15
20
21
22
29
28
27
-2627
-2593
-2570
-2552
-2540
-2554
-2550
-2546
-2525
-2556
-2538
-2568
-2551
-2530
-2535
-2574
-2555
-2552
-2554
-2562
-2550
-2545
-2561
-2553
-2550
-2572
-2548
-2544
-2552
-2547
-2560
-2586
-2544
-2553
-2566
-2547
-2555
-2570
-2558
-2553
-2540
-2566
-2565
-2588
-2560
-2565

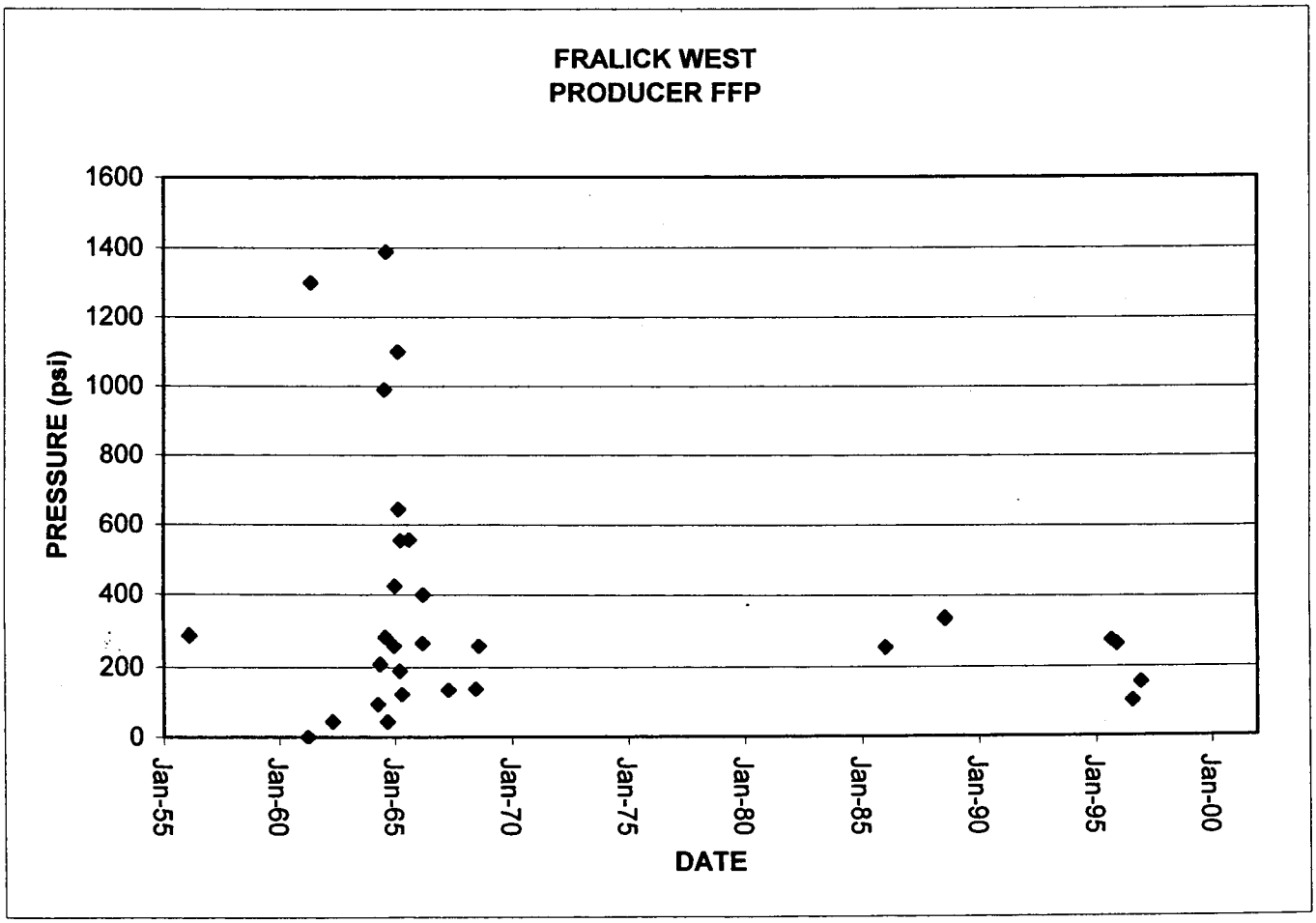

FRALICK WEST FIELD
FIELD OUTLINE
PAY HEIGHT ISOPACH


FRALICK WEST
PRODUCER TFPD
BPD
500
450
400
350
300
250
200
150
100
50
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


FRALICK WEST
PRODUCER BOPD
BPD
500
450
400
350
300
250
200
150
100
50
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


FRALICK WEST
PRODUCER BWPD
BPD
35
30
25
20
15
10
5
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


FRALICK WEST
PRODUCER FSIP
PRESSURE (psi)
1800
1600
1400
1200
1000
800
600
400
200
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


FRALICK WEST
PRODUCER FFP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

Aug 18%

COMPANY: MULL DRILLING COMPANY INC

WELL: ZEIGLER # 5

FIELD: FRALICK WEST

COUNTY: KIOWA STATE: KANSAS

Schlumberger

* PLATFORM EXPRESS *
COMPENSATED NEUTRON
LITHODENSITY - GR

Field: FRALICK WEST
Location: NE NE NW
Well: ZEIGLER # 5
Company: MULL DRILLING COMPANY INC

LOCATION

NE NE NW
5050' FSL & 2970' FEL

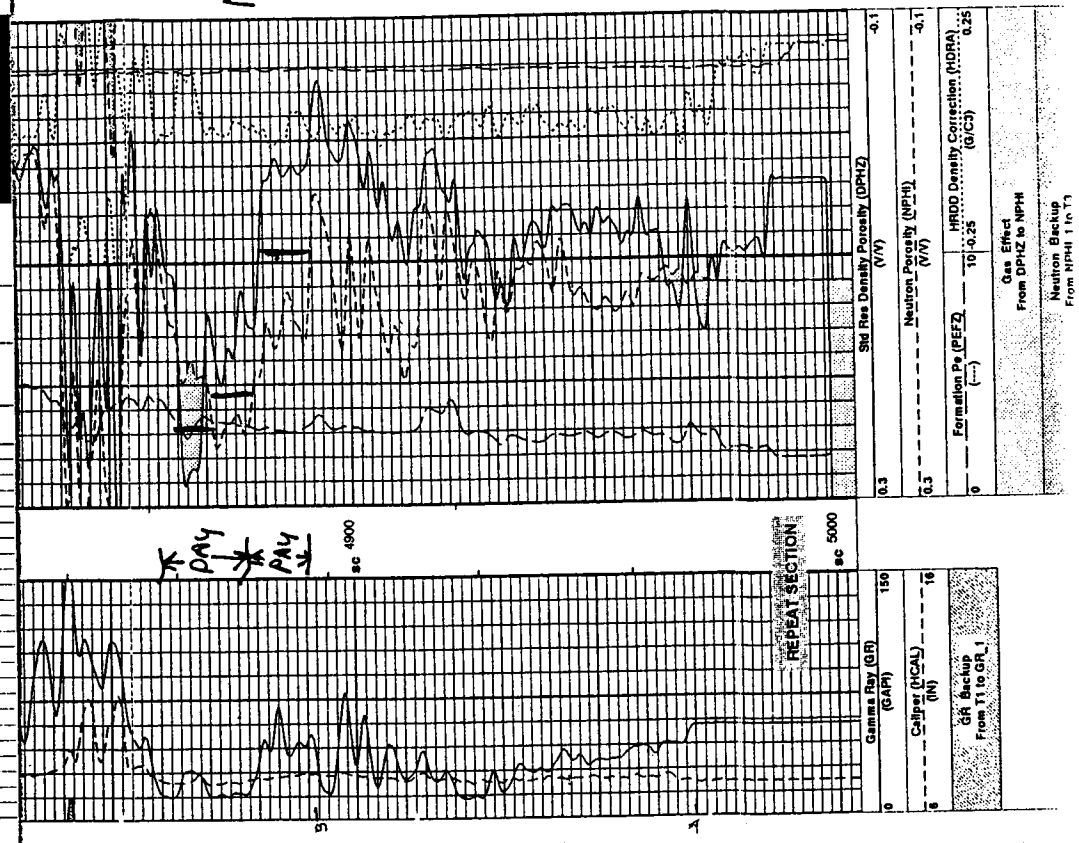
Elev.: K.B. 2308 F
G.L. 2299 F
D.F. 2308 F

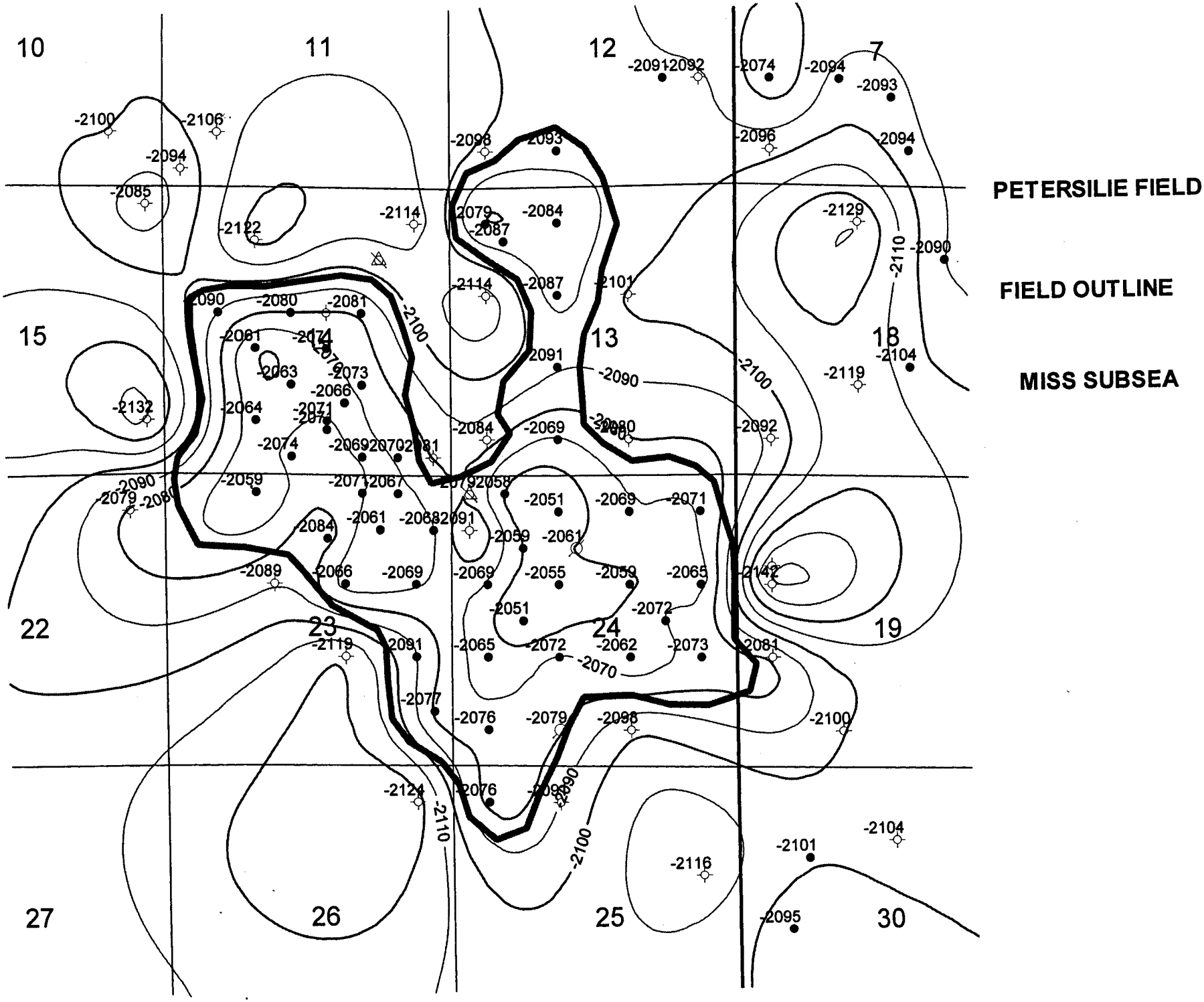
Permanent Datum: GROUND LEVEL Elev.: 2299 F
Log Measured From: KELLY BUSHING 9.0 F above Perm. Datum
Drilling Measured From: KELLY BUSHING

API Serial No.	SECTION	TOWNSHIP	RANGE
15-097-21385	28	27 S	20 W

Logging Date	13-SEP-1995					
Run Number	ONE					
Depth Driller	4990 F					
Schlumberger Depth	4990 F					
Bottom Log Interval	4972 F					
Top Log Interval	335 F					
Casing Driller Size @ Depth	8.625 IN	@	335 F	@		
Casing Schlumberger	336 F					
Bit Size	7.875 IN					
Type Fluid In Hole	CHEMICAL					
Density / Viscosity	8.9 LB/G	60 S				
Fluid Loss / PH	11.2 C3	10.5				
Source Of Sample	CIRCULATED					
RM @ Measured Temperature	0.800 OHMM	@	100 DEGF	@		
RMF @ Measured Temperature	0.800 OHMM	@	100 DEGF	@		
RMC @ Measured Temperature	1.200 OHMM	@	100 DEGF	@		
Source RMF / RMC	CALCULATED	CALCULATED				
RM @ MRT / RMF @ MRT	0.701 @ 115	0.526 @ 115		@	@	
Maximum Recorded Temperatures	115 DEGF					
Circulation Stopped / Time	13-SEP-1995	15:00				
Logger On Bottom / Time	13-SEP-1995	16:00				
Unit Number / Location	3008	LIBERAL				
Recorded By	KENTON LIPPERT					
Witnessed By	ROGER MARTIN					

K.G.S. LIBRARY




PETERSILIE FIELD
FIELD OUTLINE
MISS SUBSEA
10
11
12
7
15
14
13
18
22
23
24
19
27
26
25
30
-2100
-2106
-2094
-2085
-2122
-2114
-2098
-2093
-2084
-2087
-2091
-2092
-2074
-2096
-2129
-2110
-2090
-2101
-2080
-2081
-2061
-2063
-2073
-2066
-2064
-2071
-2132
-2091
-2104
-2119
-2092
-2059
-2067
-2058
-2051
-2069
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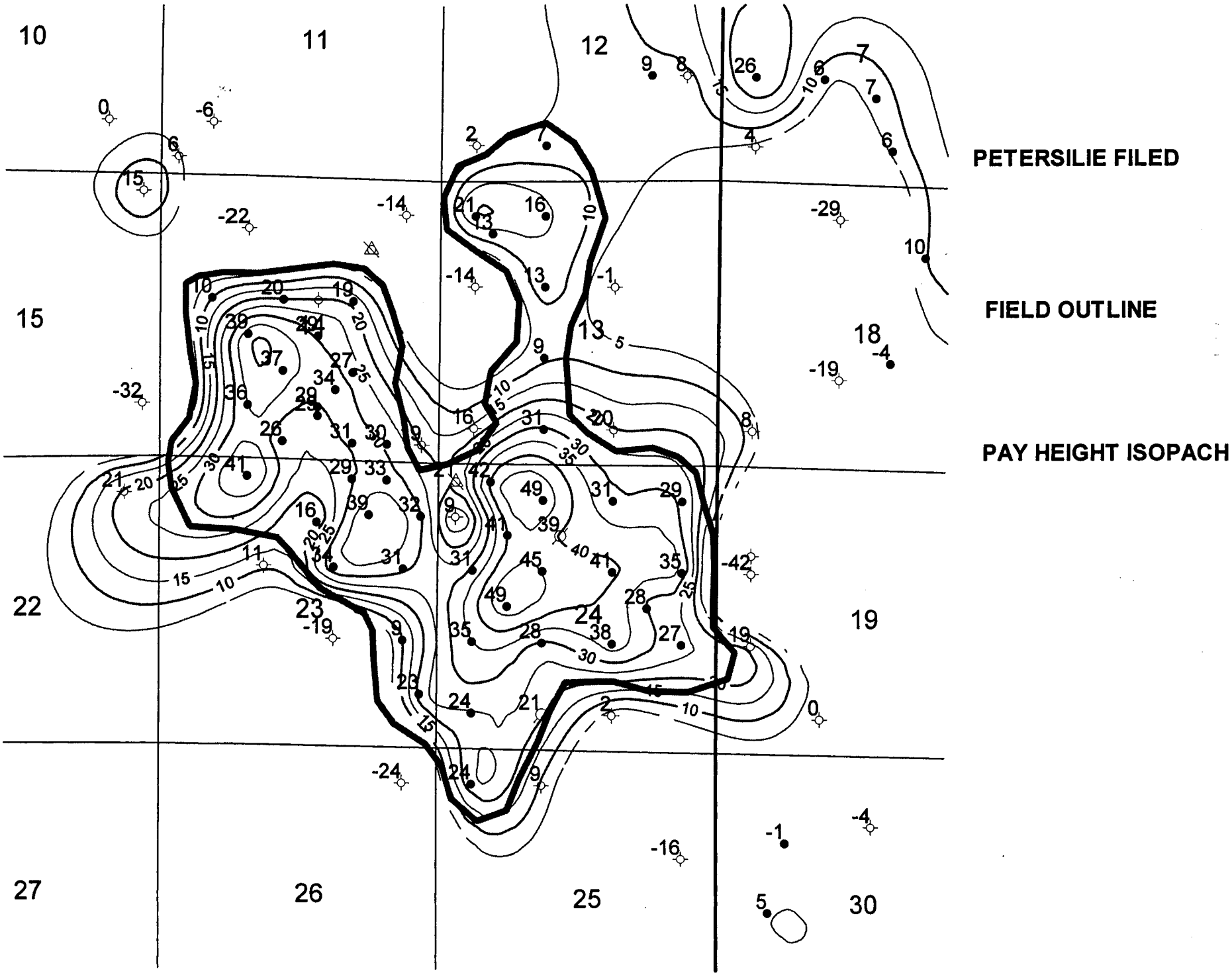
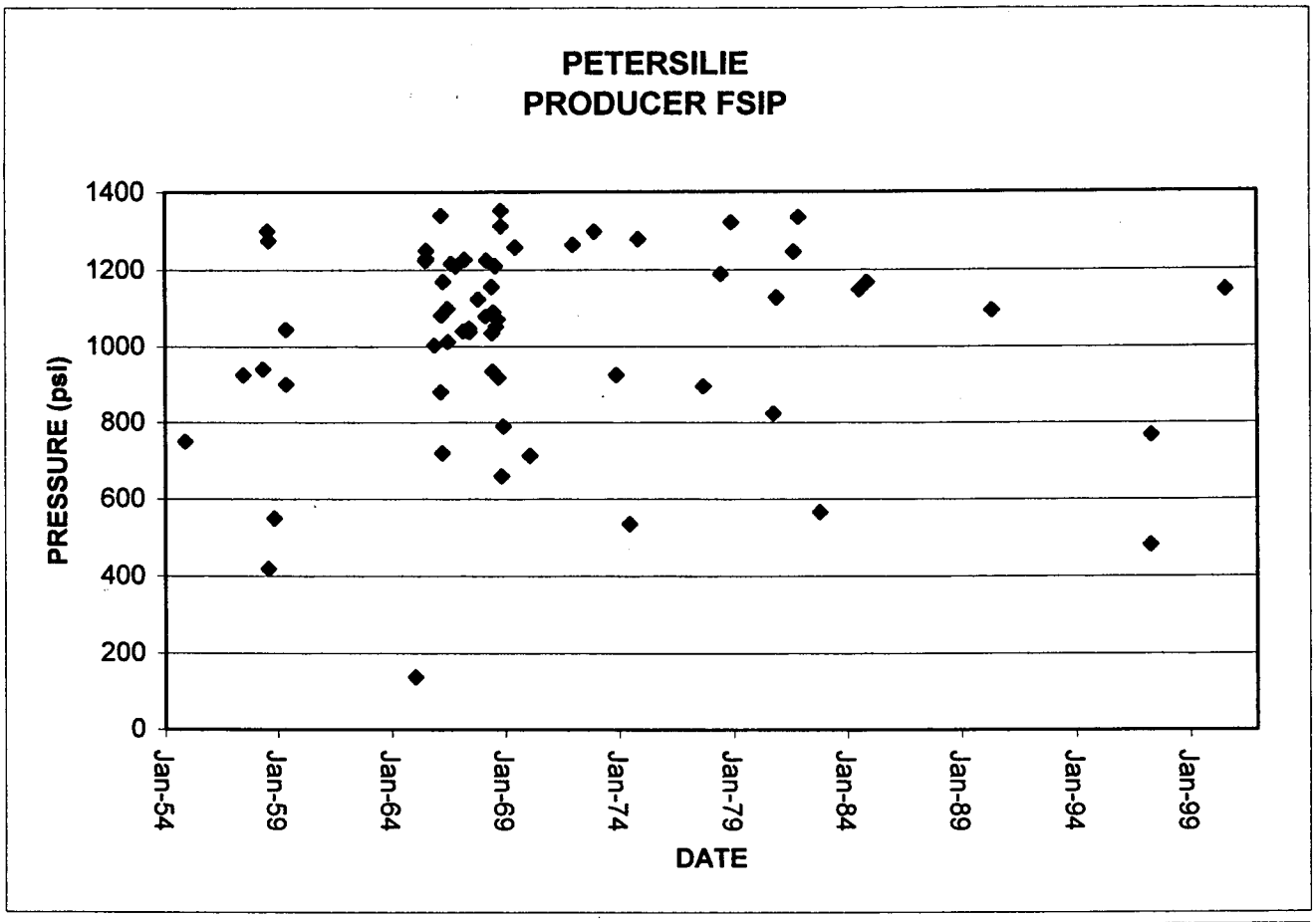
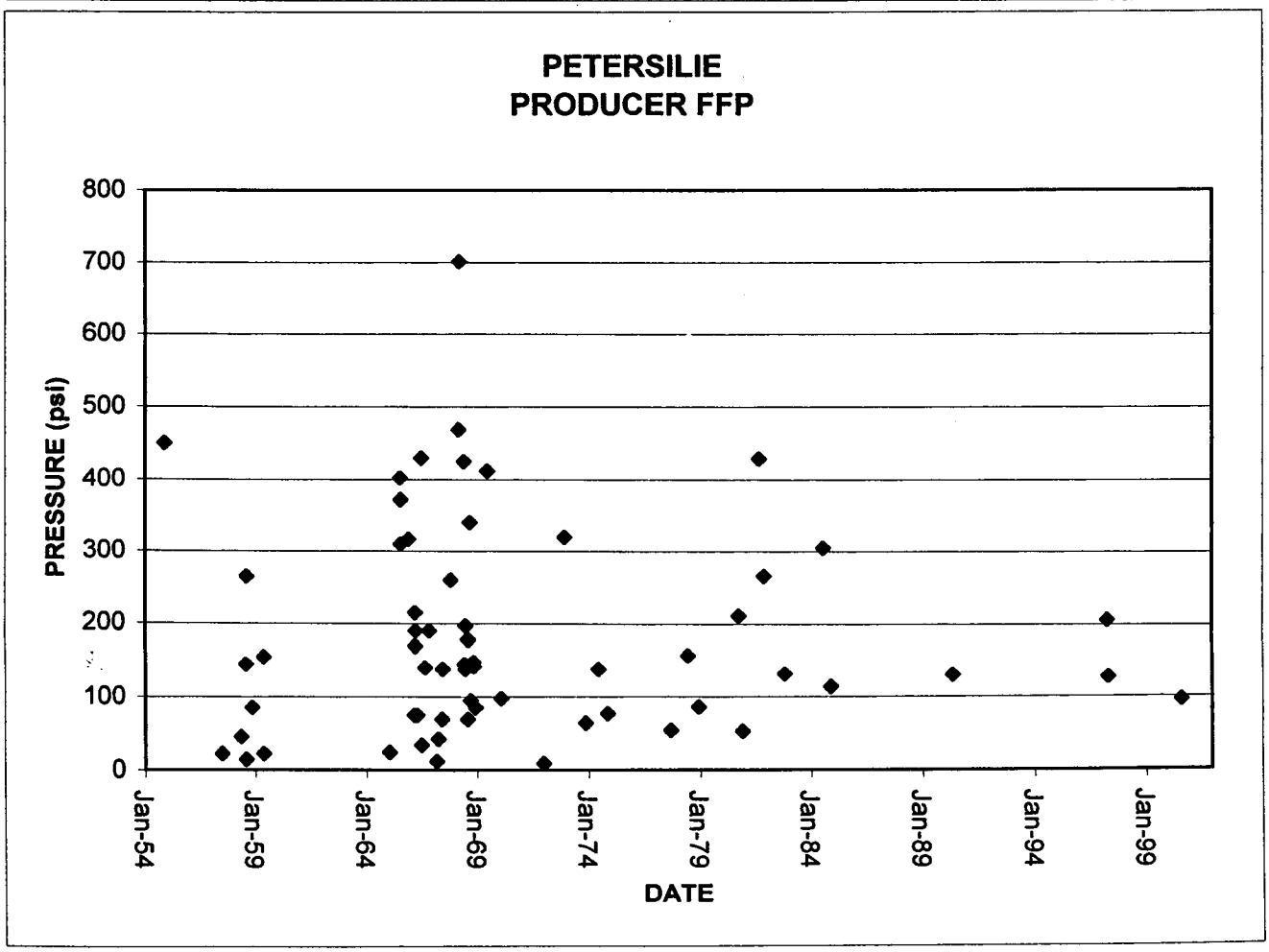
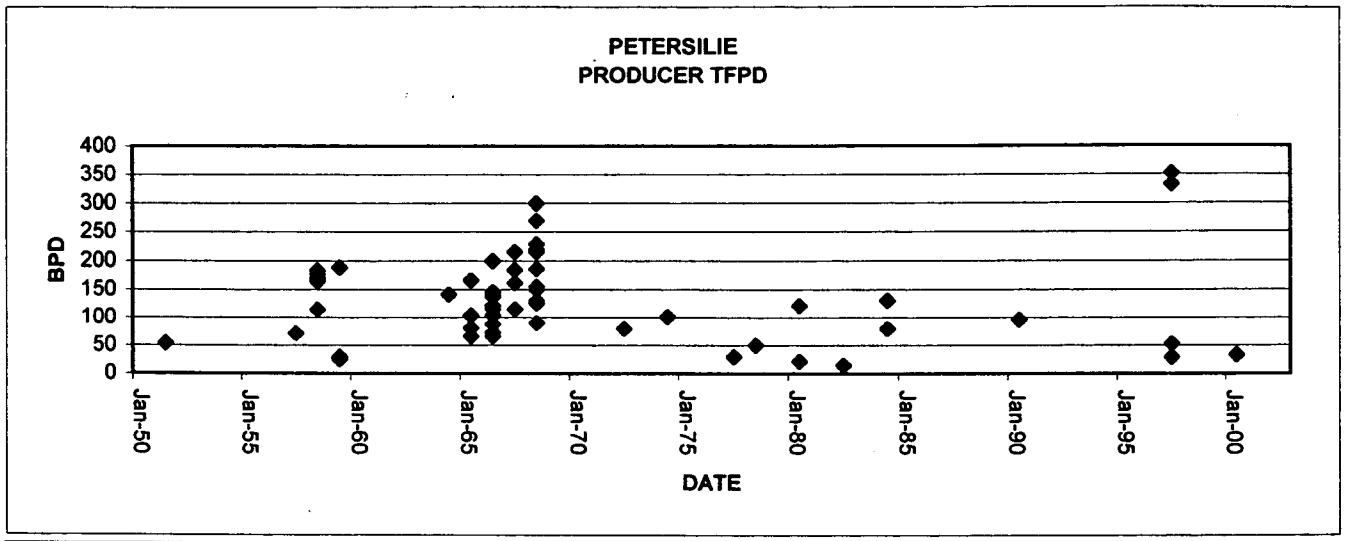
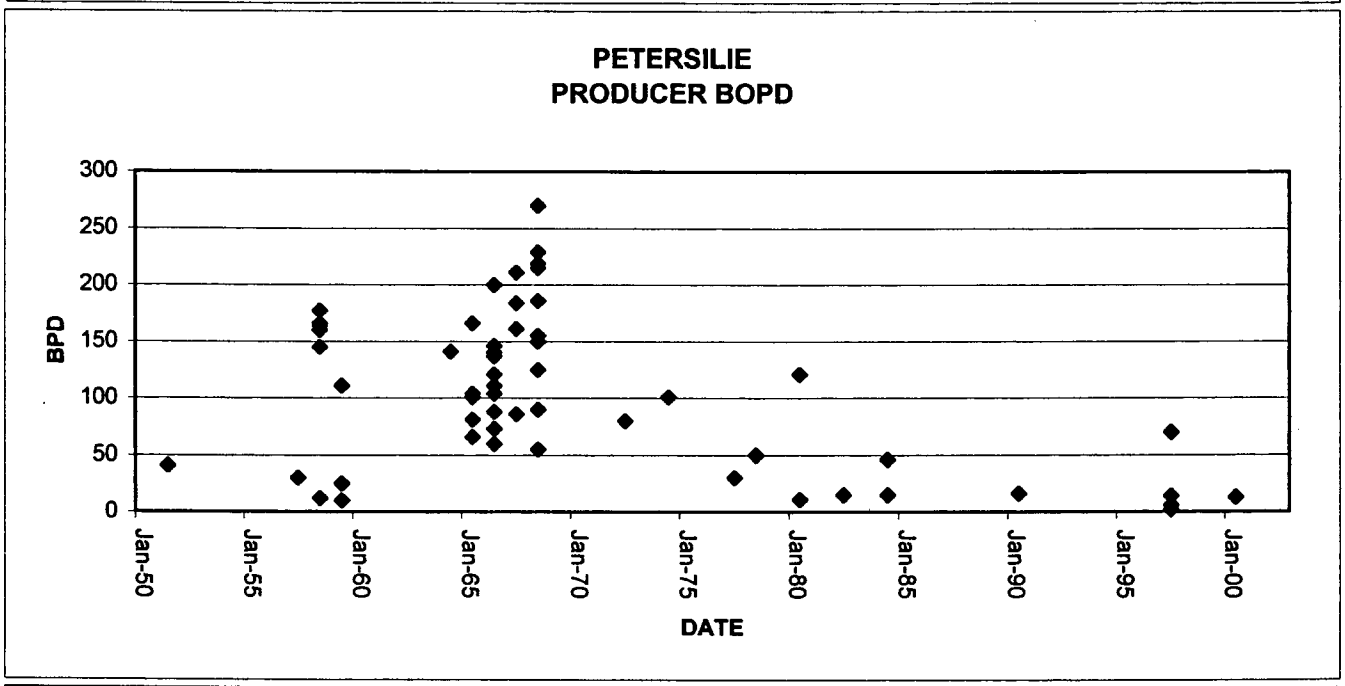
-2124
-2116
-2095

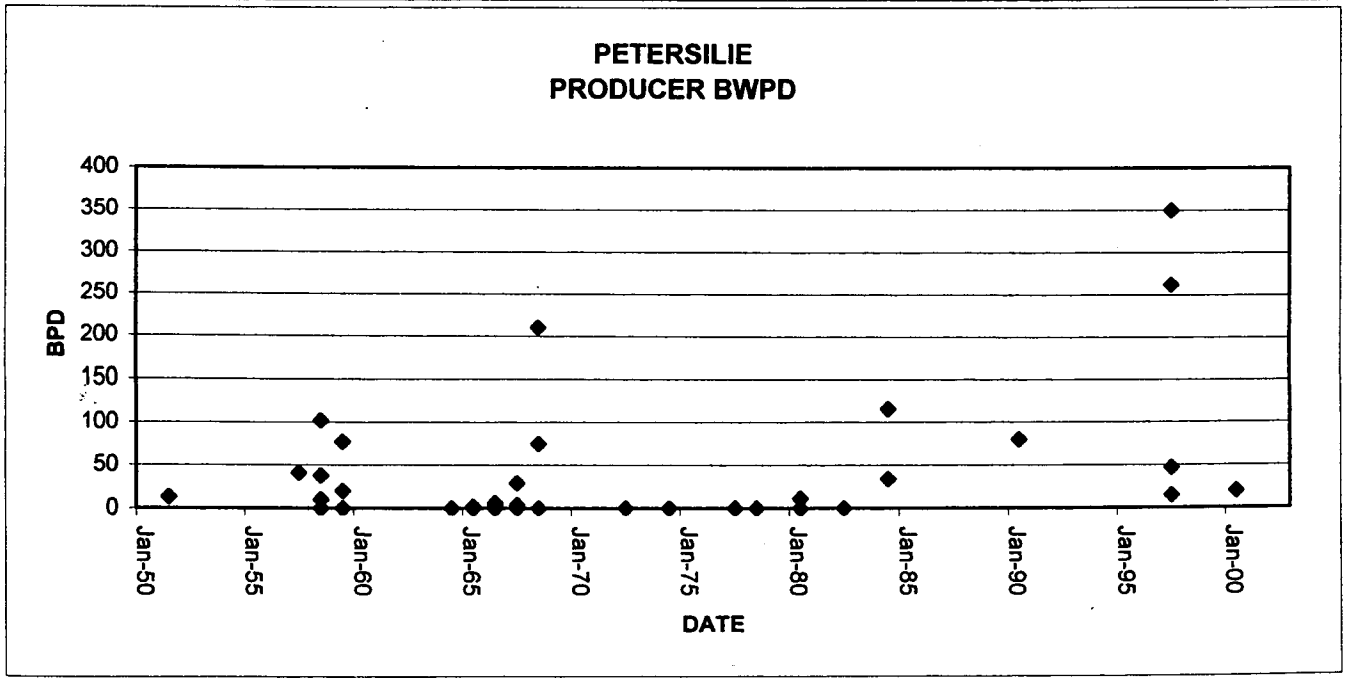

PETERSILIE FILED
FIELD OUTLINE
PAY HEIGHT ISOPACH
10
11
12
15
13
18
22
23
24
19
27
26
25
30


PETERSILIE
PRODUCER FSIP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-54
Jan-59
Jan-64
Jan-69
Jan-74
Jan-79
Jan-84
Jan-89
Jan-94
Jan-99
DATE


PETERSILIE
PRODUCER FFP
PRESSURE (psi)
800
700
600
500
400
300
200
100
0
Jan-54
Jan-59
Jan-64
Jan-69
Jan-74
Jan-79
Jan-84
Jan-89
Jan-94
Jan-99
DATE


PETERSILIE
PRODUCER TFPD
BPD
400
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


PETERSILIE
PRODUCER BOPD
BPD
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


PETERSILIE
PRODUCER BWPD
BPD
400
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

CONFIDENTIAL

15-135-24039

ELI WIRELINE SERVICES

COMPENSATED NEUTRON DENSITY LOG

COMPANY HUGOTON ENERGY CORPORATION
WELL LEHMER #21
FIELD KCC
COUNTY MESS. STATE KS.
LOCATION 1320' FEL & 2640' FNL CONFIDENTIAL
FEB 16
SEC. 24 TWP. 20S RGE. 24W
OTHER SERVICES: DIL MICRO

CPNY HUGOTON ENERGY CORPORATION
WELL LEHMER #21
FIELD
CO. MESS. ST. KS.

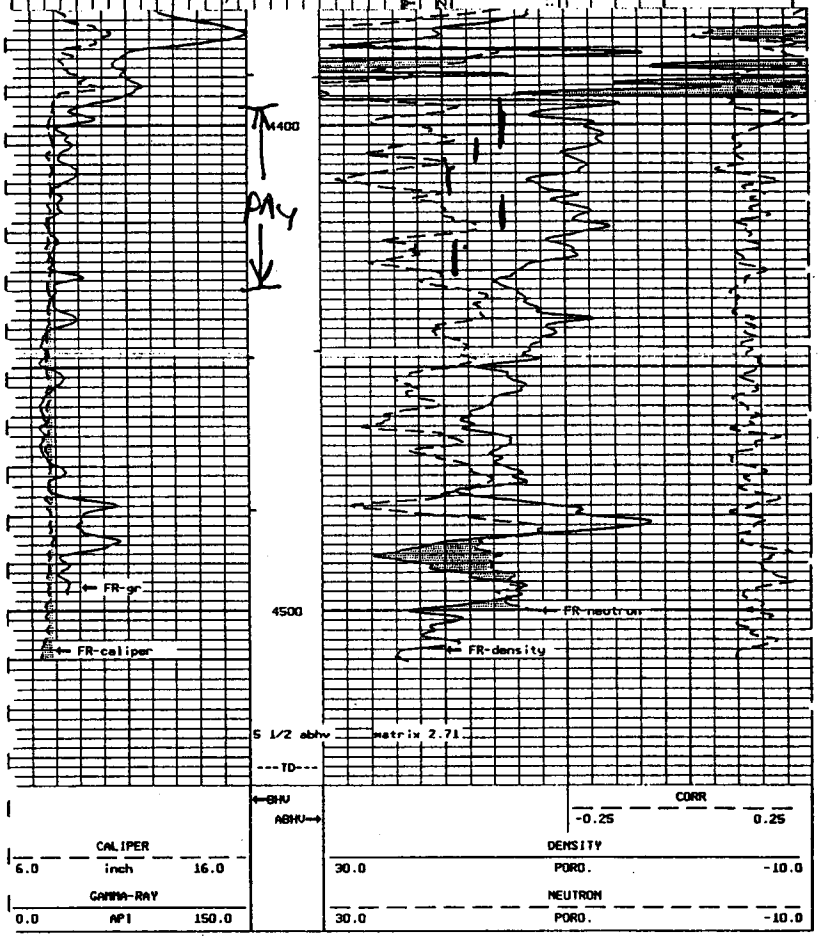
PERMANENT DATUM GROUND LEVEL ELEV. 2311
LOG MEASURED FROM K.B. 8 FT. ABOVE PERMANENT DATUM
DRILLING MEASURED FROM KELLY BUSHING
ELEV.: K.B. 2322
D.F.
G.L. 2314

DATE	11-23-97
RUN NO.	ONE
DEPTH-DRILLER	4530
DEPTH-LOGGER	4532
BTM. LOG INTER.	4508
TOP LOG INTER.	3700
CASING-DRILLER	310
CASING-LOGGER	310
BIT SIZE	7 7/8
FLUID TYPE	CHEMICAL
DENS. ; VISC.	MUD 9.3 - 46
PH : FLUID LOSS	10.5 - 10.6
SOURCE OF SAMPLE	FLOWLINE
RM @ MEAS. TEMP.	1.90 @ 75F
RMF @ MEAS. TEMP.	1.42 @ 75F
RMC @ MEAS. TEMP.	2.25 @ 75F
SOURCE: RMF/RMC	MEAS/MEAS
RM @ BHT	.625 @120F
TIME SINCE CIRC.	2 HOURS
MAX. REC. TEMP.	120F
EQUIP. ; LOCATION	1417/MVS
RECORDED BY	RUPP
WITNESSED BY	JIM GOMERS

RELEASED
APR 09 1999
FROM CONFIDENTIAL

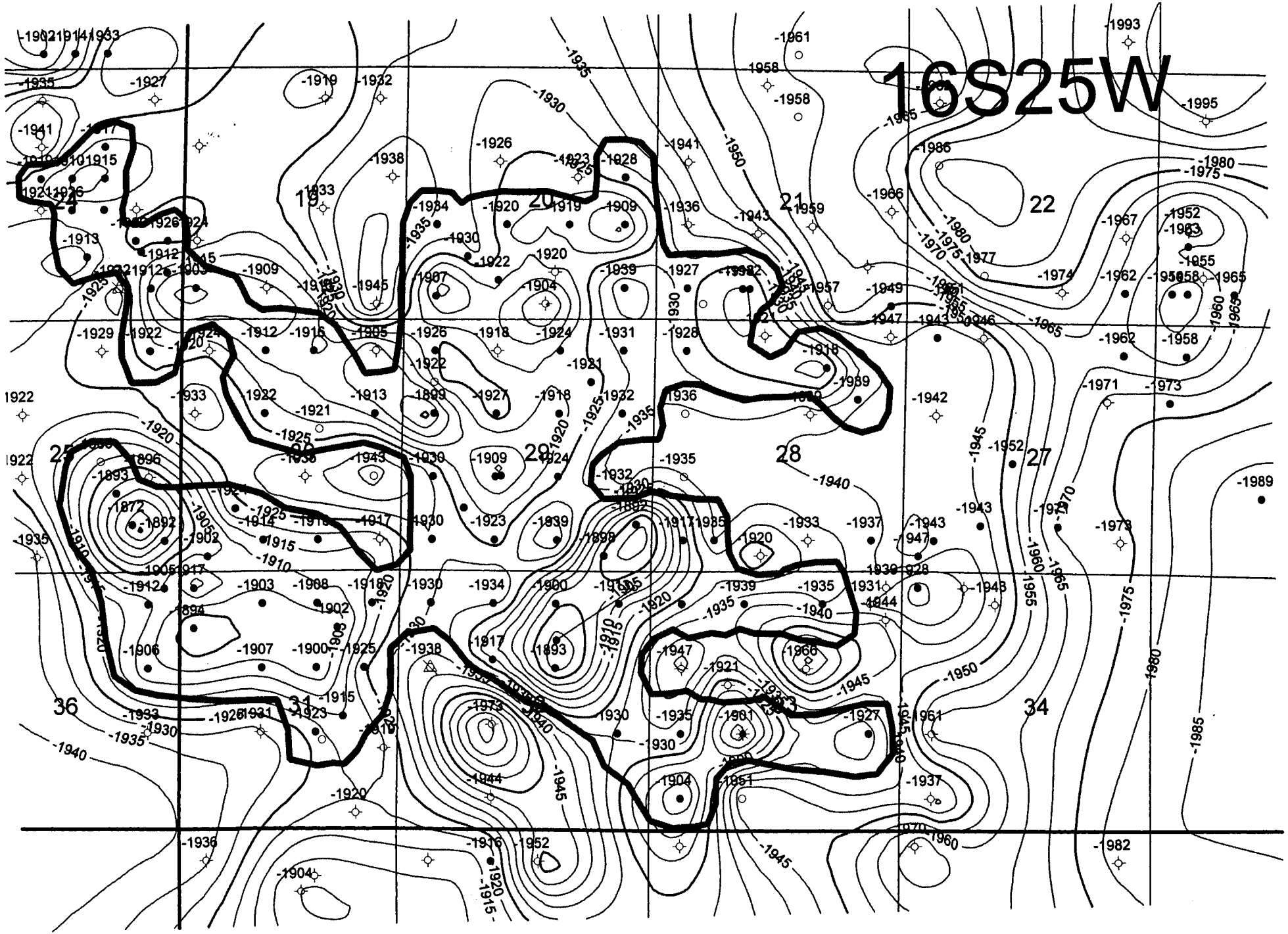
RECEIVED
FEB 17 1998
KCC WICHITA

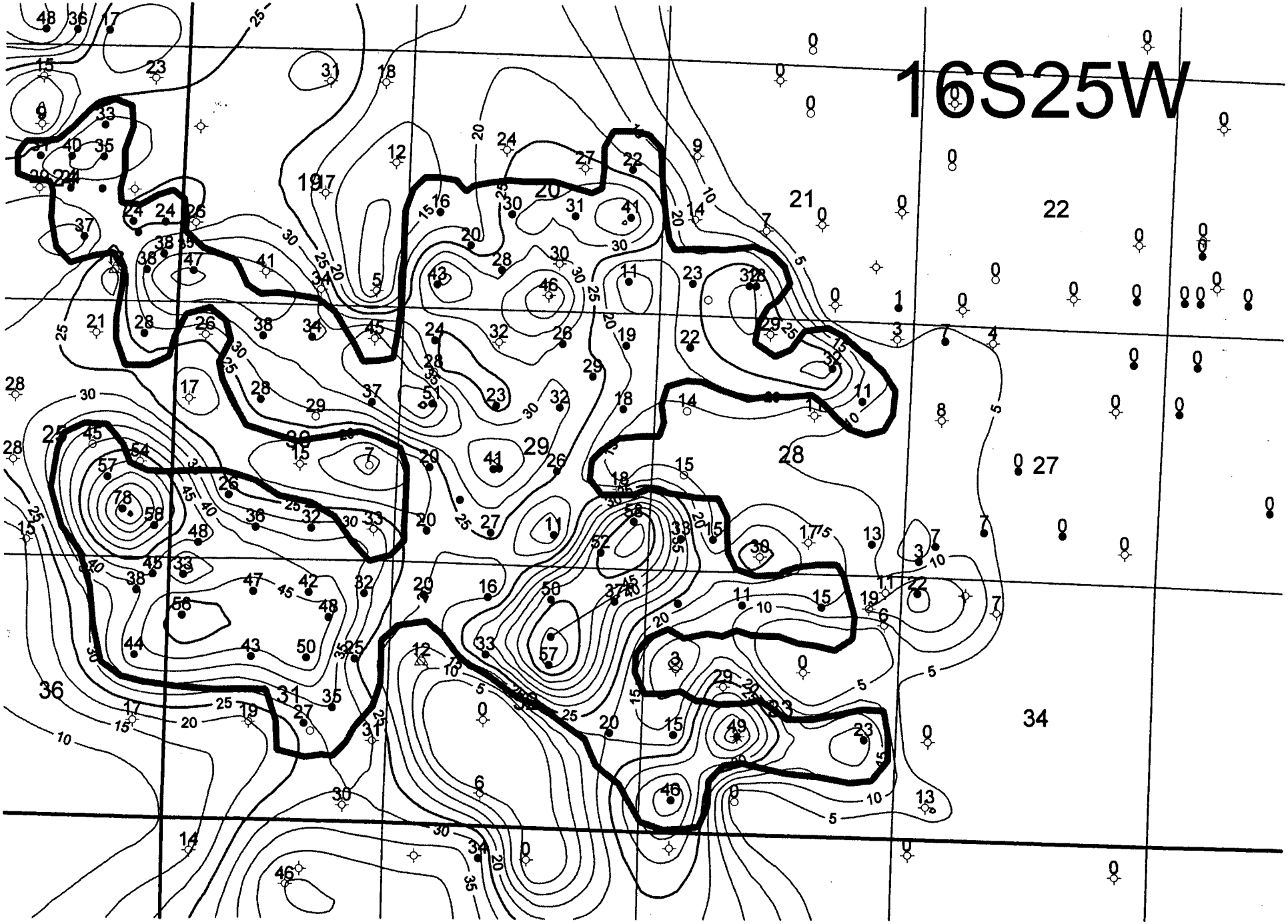
K.G.S. LIBRARY



START DEPTH: 4535.7 FEET FILE DATE: 11-23-1997 TIME: 17:36
DIRECTION: UP PLOT DATE: 11-23-1997 TIME: 18:17 FILE: 1657814.PIS

STOP DEPTH: 4338.2 FEET FILE DATE: 11-23-1997 TIME: 17:36

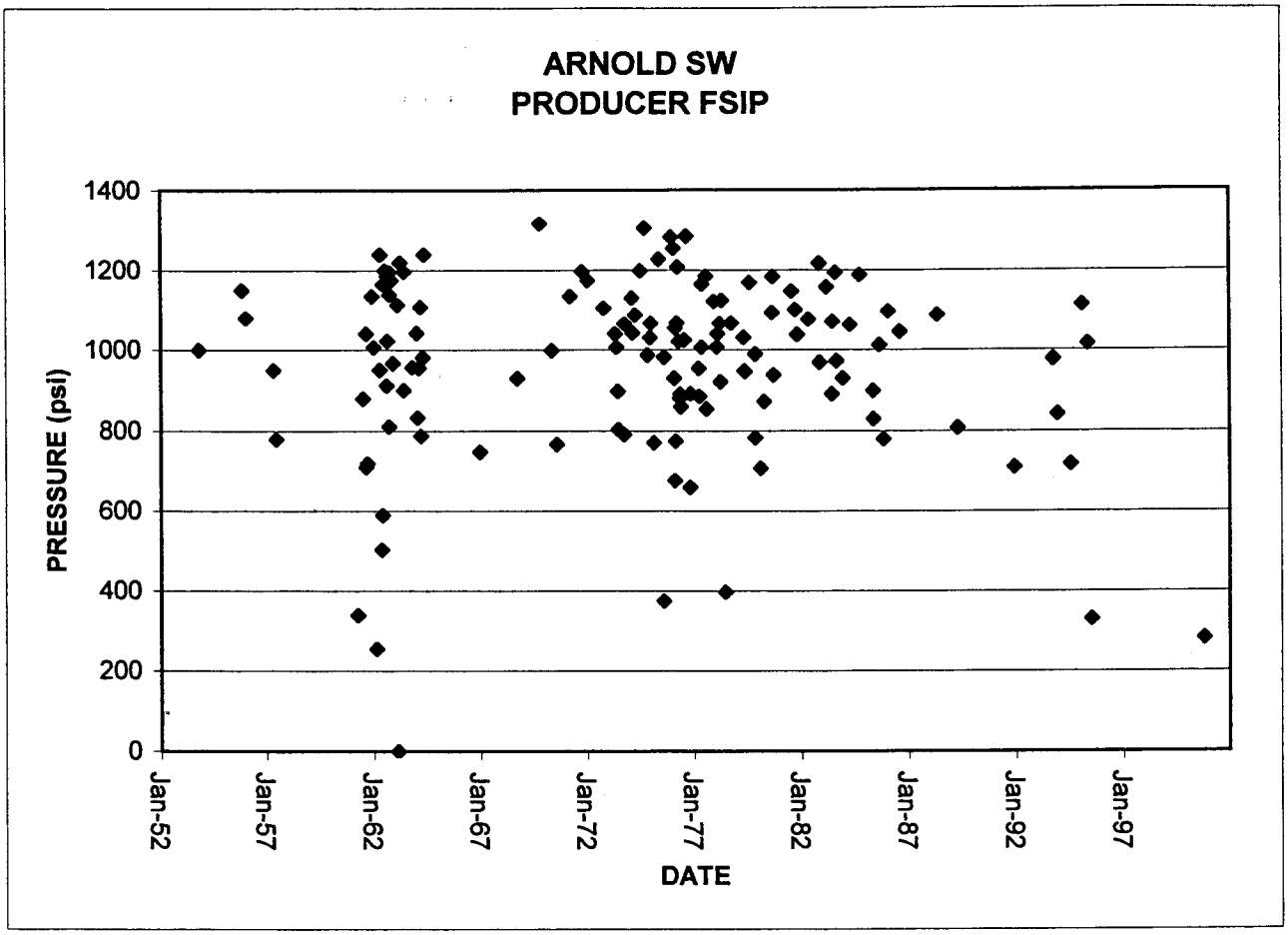

16S25W
ARNOLD SW FIELD
MISS SUBSEA
FIELD OUTLINE

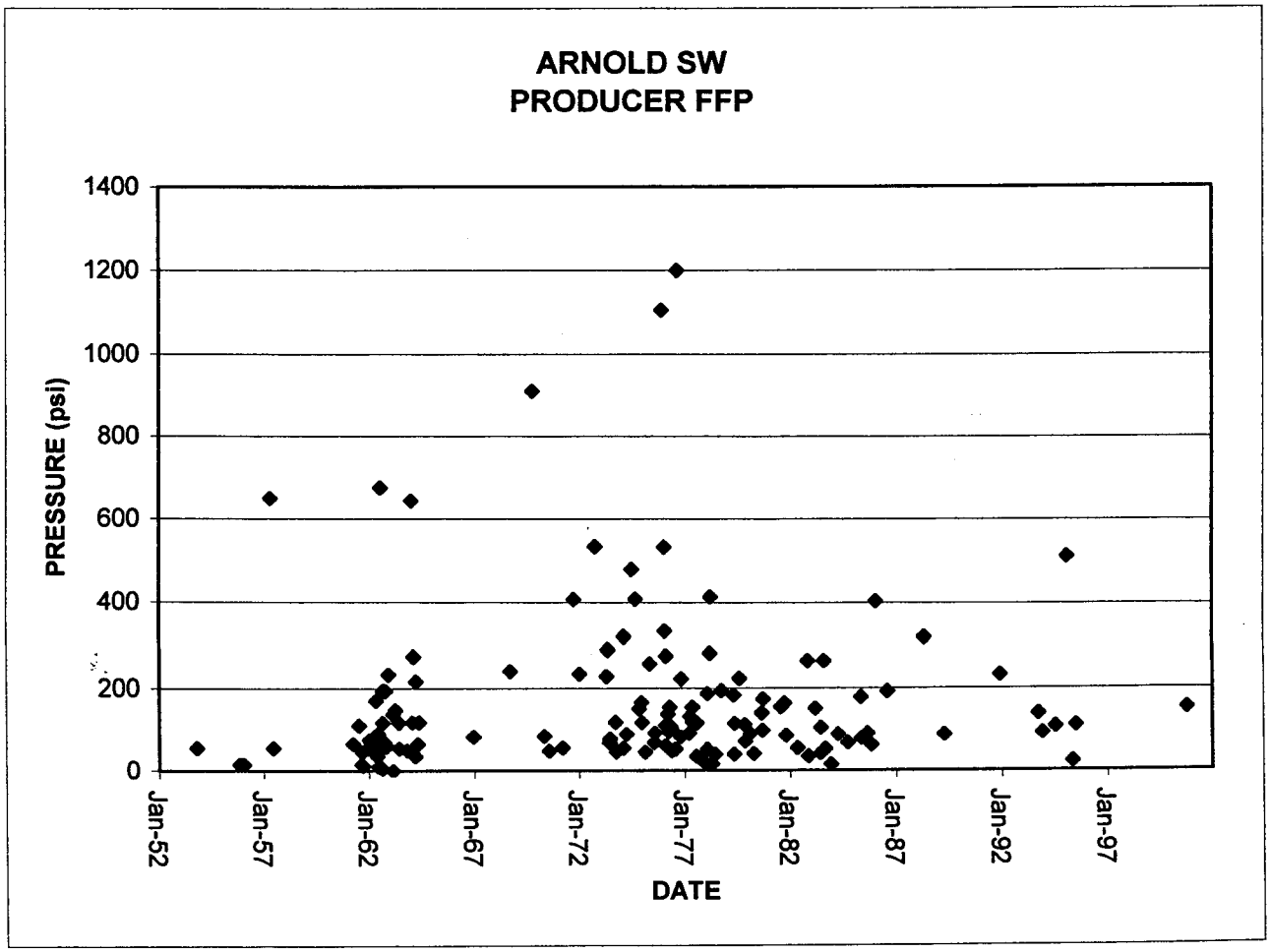


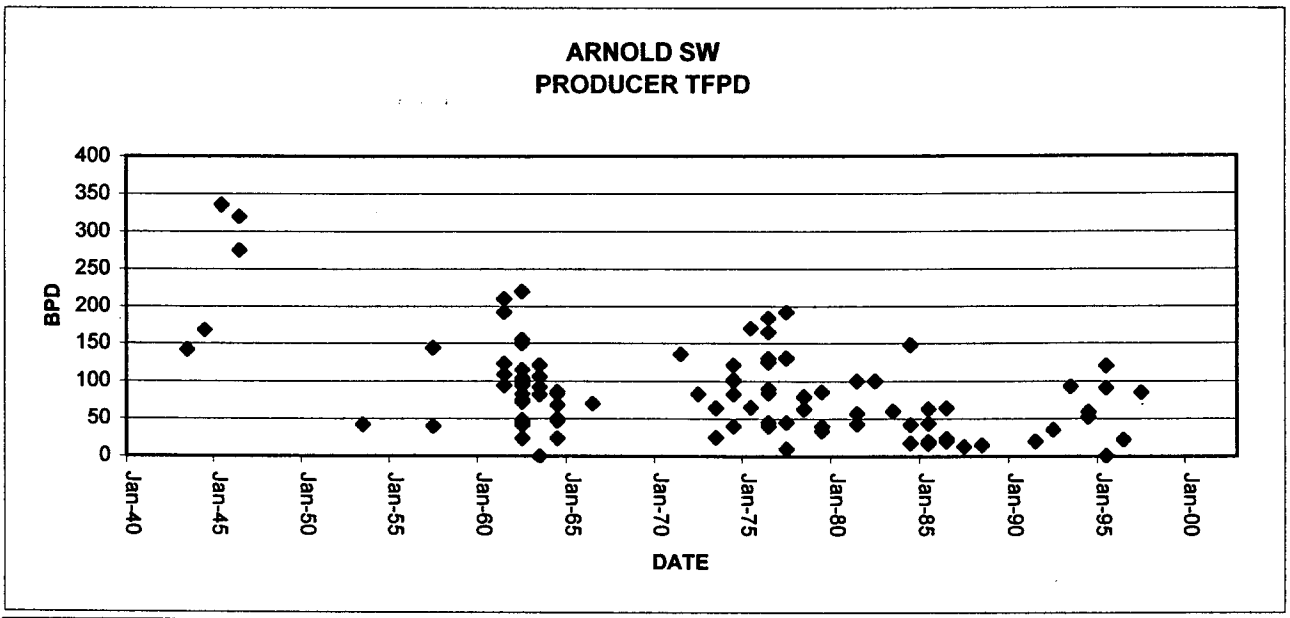
ARNOLD SW FIELD

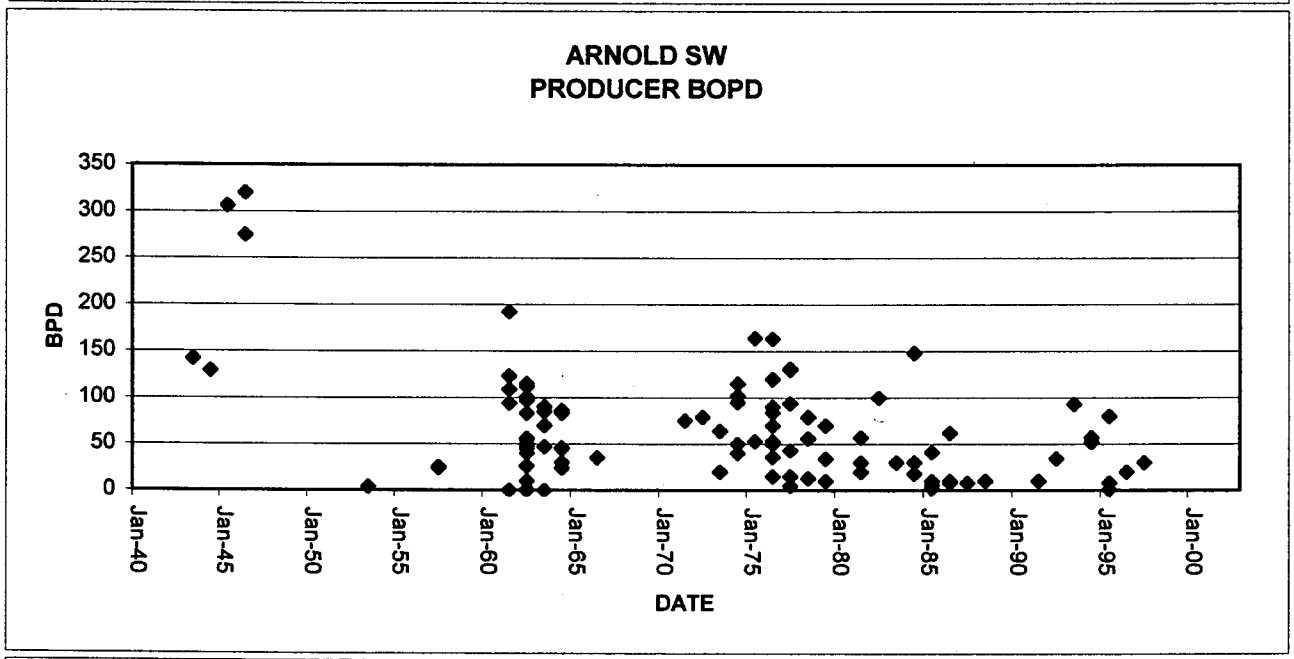
FIELD OUTLINE

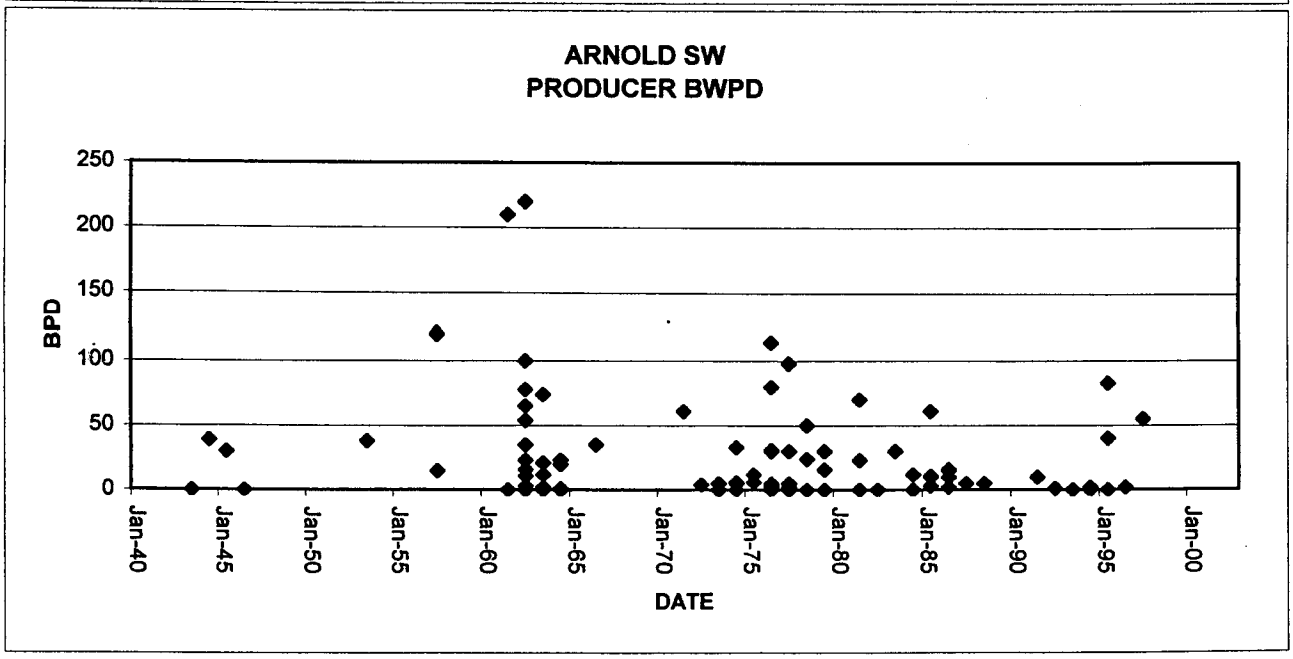
PAY ISOPACH


ARNOLD SW
PRODUCER FSIP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE


ARNOLD SW
PRODUCER FFP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE


ARNOLD SW
PRODUCER TFPD
BPD
400
350
300
250
200
150
100
50
0
Jan-40
Jan-45
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


ARNOLD SW
PRODUCER BOPD
BPD
350
300
250
200
150
100
50
0
Jan-40
Jan-45
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


ARNOLD SW
PRODUCER BWPD
BPD
250
200
150
100
50
0
Jan-40
Jan-45
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

NPHI 22%
DPHI 10%
AVG 16%

ATLAS WIRELINE SERVICES
Western Atlas International

COMPENSATED Z-DENSILOG MINILOG®
COMPENSATED NEUTRON SPECTRALOG™

FILE NO.

API NO. 15-135-23688

FINAL PRINT

COMPANY LARSON OPERATING COMPANY
WELL BURGESS NO. 1-29
FIELD ARNOLD SOUTHWEST
COUNTY NESS STATE KANSAS

LOCATION:
SW-SE-SE
330' FSL & 990' FEL

SEC. 29 TWP. 16S RGE. 25W

OTHER SERVICES
DIFL/GR/CAL
MINILOG
CALIPER PLOT

PERMANENT DATUM GROUND LEVEL ELEV. 2578
LOGGING MEASURED FROM K.B. NINE FT. ABOVE P.D.
DRILLING MEASURED FROM KELLY BUSHING

ELEVATIONS
KB 2587
DF -----
GL 2578

DATE	29 MAY 92		
RUN	1		
SERVICE ORDER	116796		
DEPTH-DRILLER	4596		
DEPTH-LOGGER	4596		
BOTTOM LOGGED INTERVAL	4588		
TOP LOGGED INTERVAL	3600		
CASING - DRILLER	@ 5/8" @ 218		
CASING - LOGGER	NOT LOGGED		
BIT SIZE	7 7/8"		
TYPE FLUID IN HOLE	CHEMICAL		
DENSITY / VISCOSITY	9.14	42	
PH / FLUID LOSS	10.8	10.8	
SOURCE OF SAMPLE	FLOW LINE		
RM AT MEAS. TEMP.	1.11 @ 67 F		@
RMF AT MEAS. TEMP.	0.83 @ 67 F		@
RMC AT MEAS. TEMP.	1.39 @ 67 F		@
SOURCE OF RMF / RMC	MEASURED	MEASURED	
RM AT BHT	0.652 @ 114 F		@
TIME SINCE CIRCULATION	3 HOURS		
MAX. REC. TEMP. DEG. F	114 F		
EQUIP. NO. / LOC.	ML 6313	GREAT BEND	
RECORDED BY	HEIKKILA & KELLY		
WITNESSED BY	TOM LARSON		

K.G.S. LIBRARY

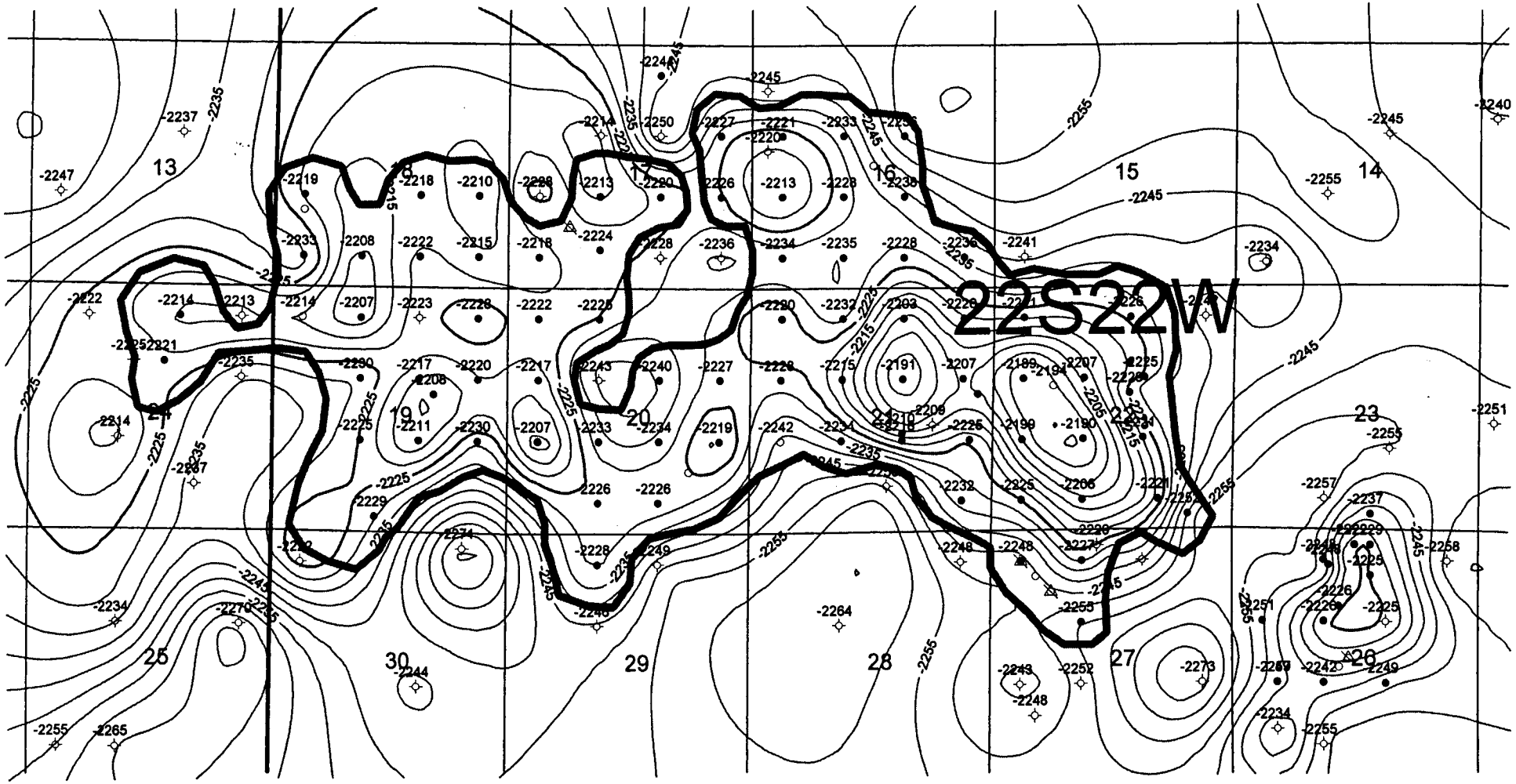
04500 DRY 04600

BOREHOLE VOLUME
TOTAL COUNTS
MICRO-CALIPER
DENSITY CAL

POR2(%) -10 30
PE(BAE) 0 20
CNC(%) -10 30
RLA1(OHMM) 0 20
RXO(OHMM) 0 20
KTH(API) 0
VOL(CUFT) 135
GR(API) 0 150
C24(INCH) 6 16
C13(INCH) 6 16

REPEAT SECTION

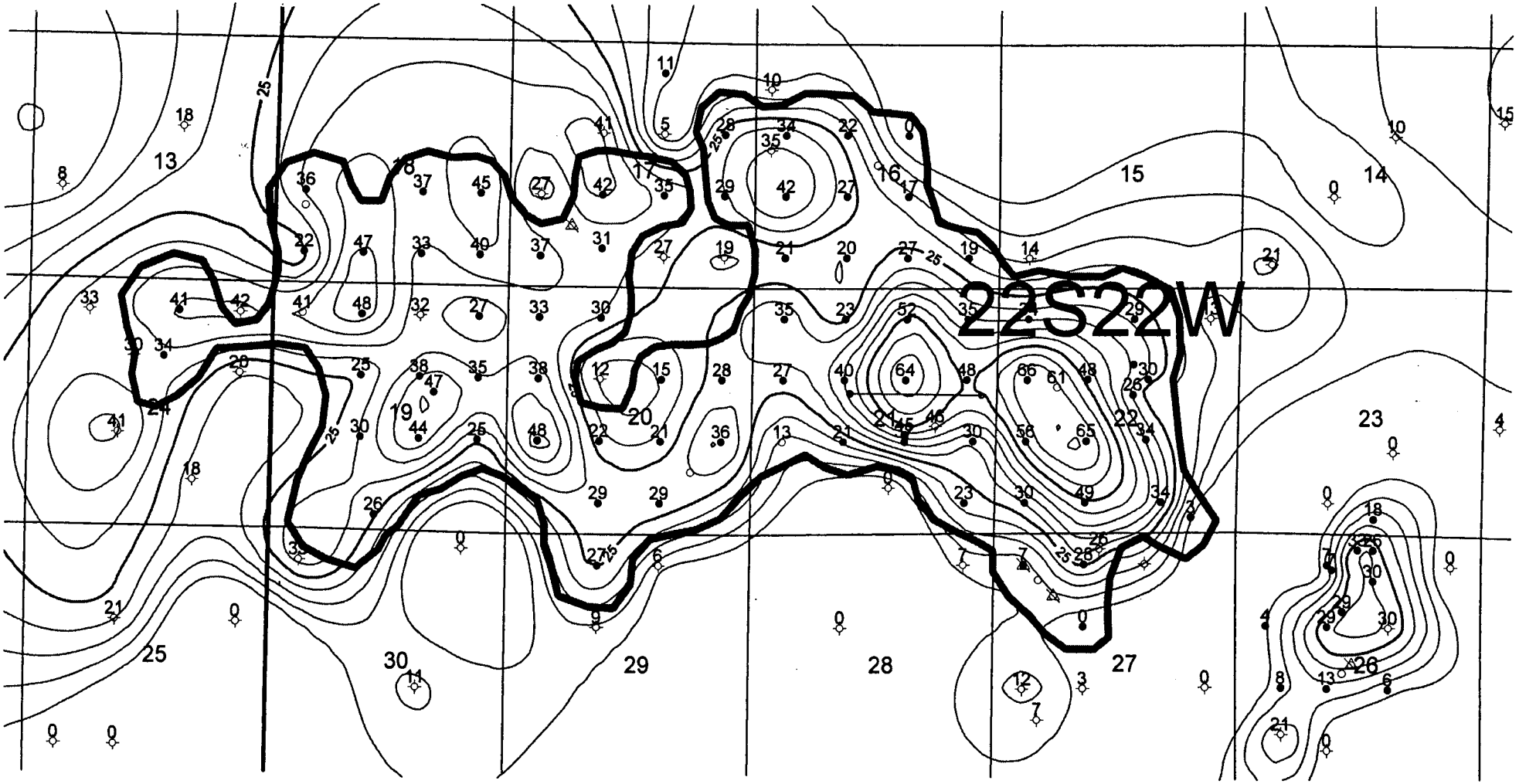
FILE: 1



HANSTON-OPPY FIELD

FIELD OUTLINE

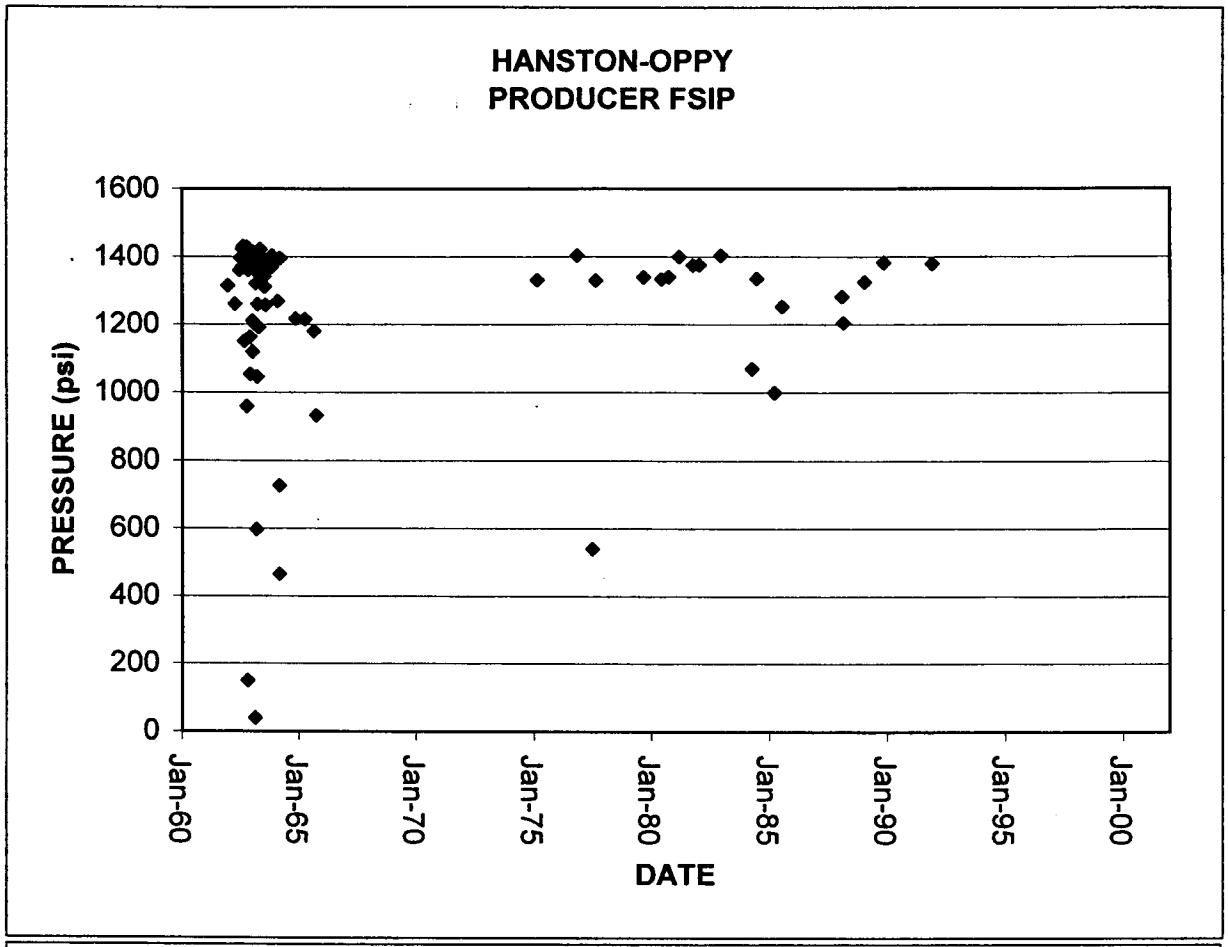
MISS SUBSEA

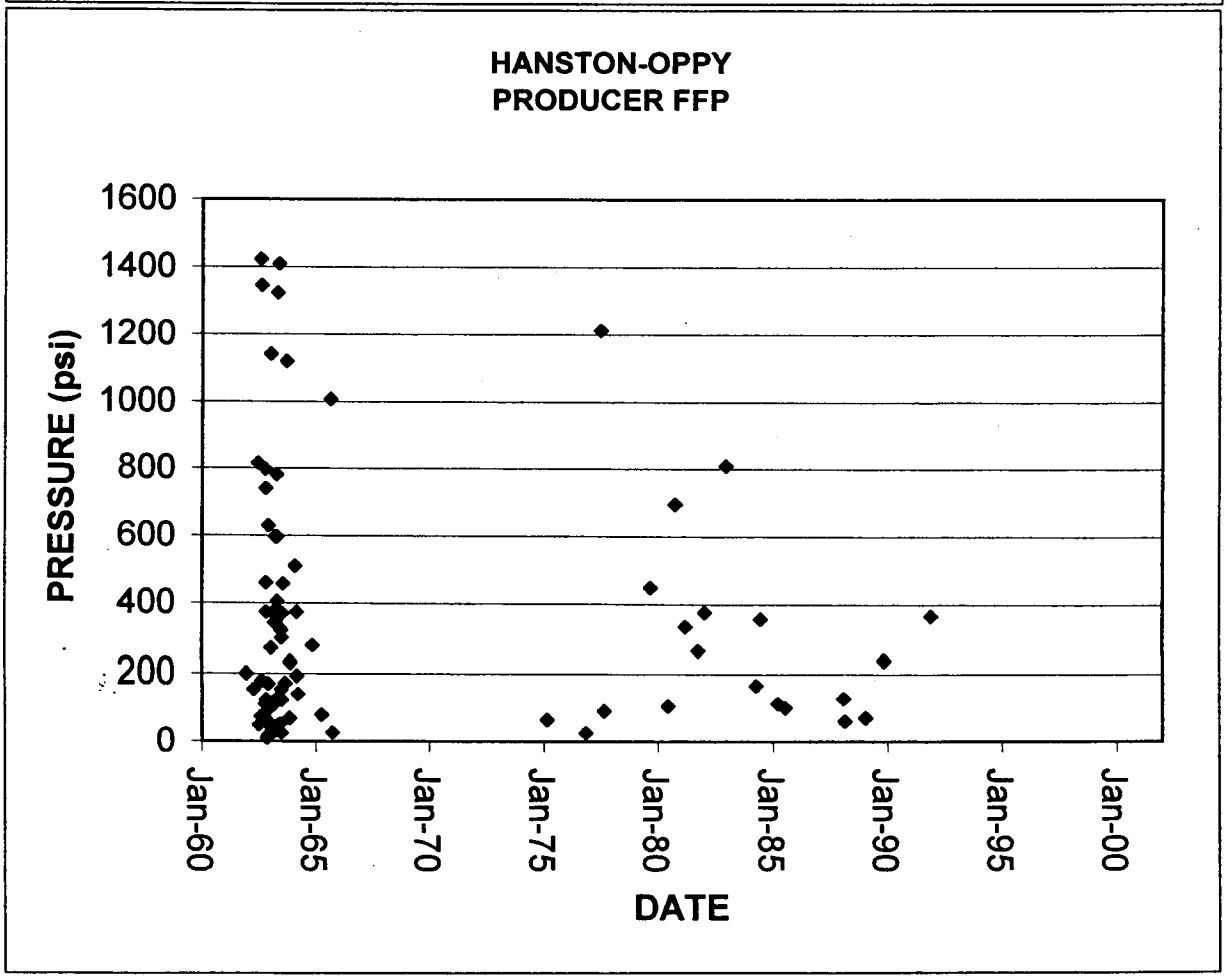


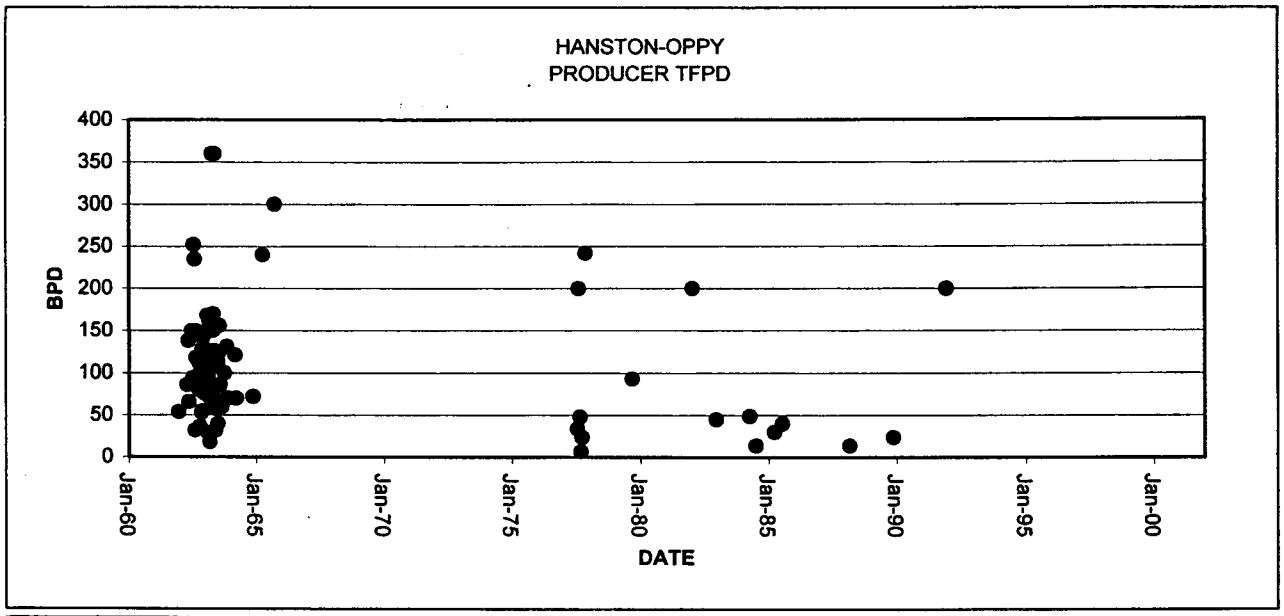
HANSTON-OPPY FIELD

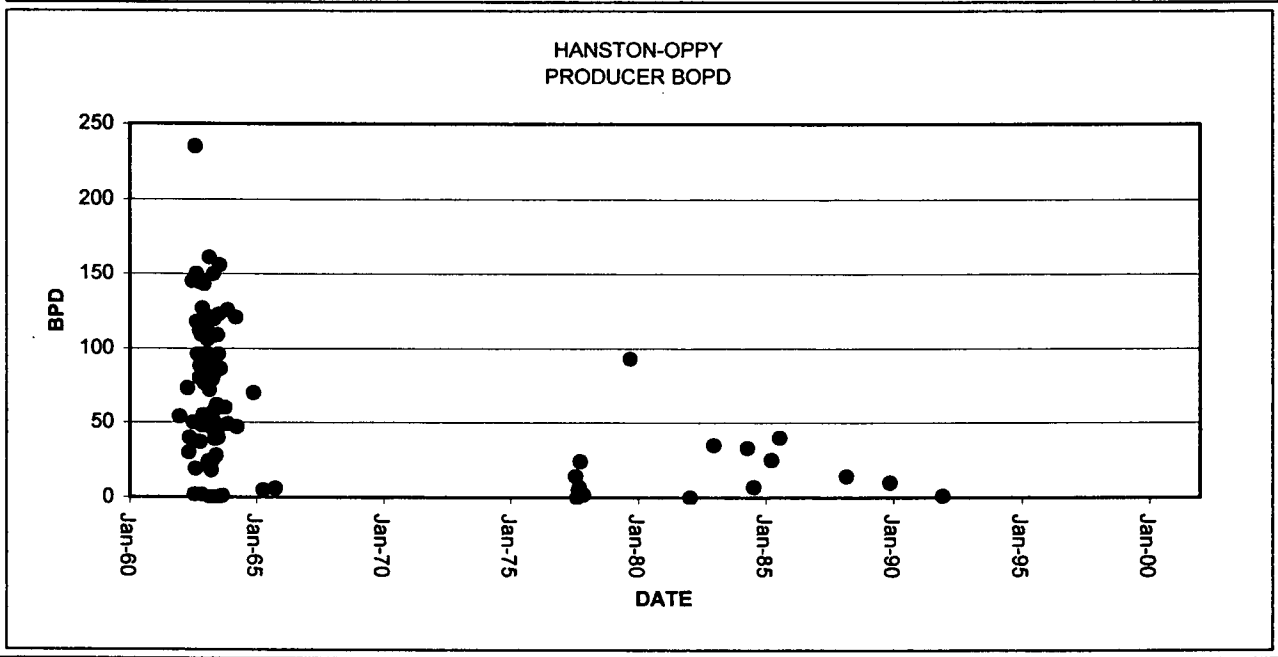
FIELD OUTLINE

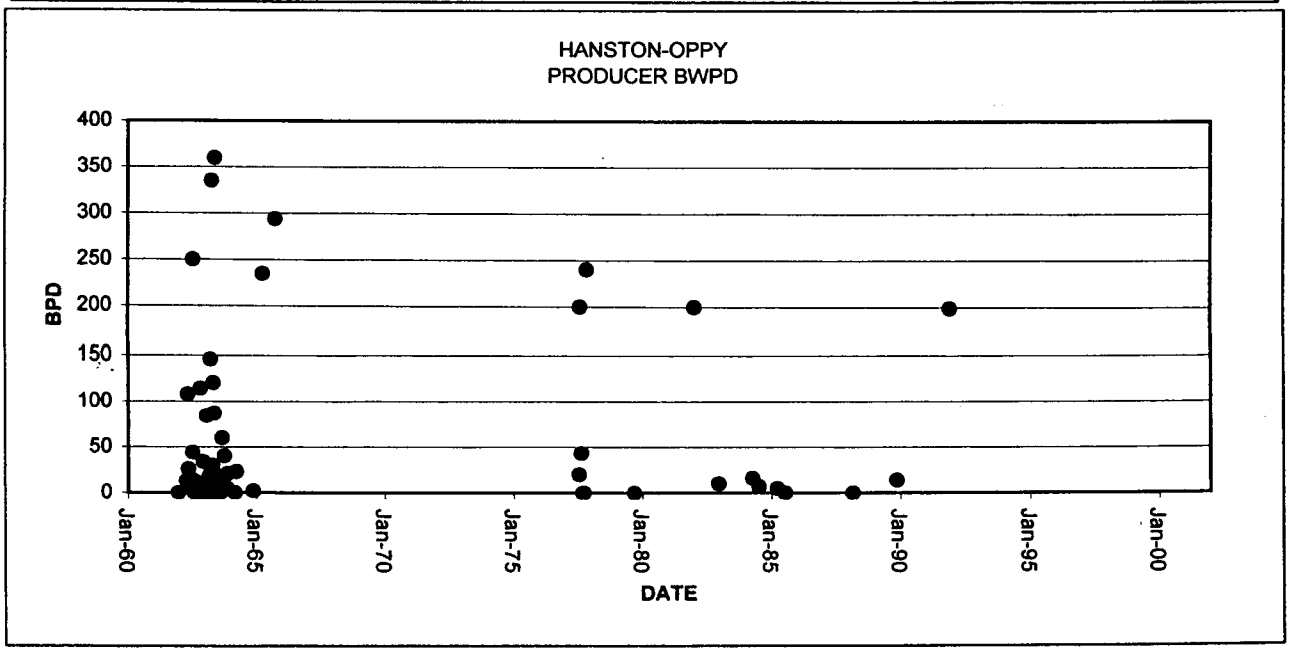
PAY HEIGHT ISOPACH


HANSTON-OPPY
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HANSTON-OPPY
PRODUCER FFP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HANSTON-OPPY
PRODUCER TFPD
BPD
400
350
300
250
200
150
100
50
0
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HANSTON-OPPY
PRODUCER BOPD
BPD
250
200
150
100
50
0
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HANSTON-OPPY
PRODUCER BWPD
BPD
400
350
300
250
200
150
100
50
0
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

Osage D

NDG 21%

DF 14%

GREAT GUNS Digital Log

DUAL COMPENSATED POROSITY LOG

COMPANY: RON & DAN OIL CO.
WELL: SIPES#1
FIELD:
COUNTY: HODGEMAN

FILE NO.: H-065760
STATE: KANSAS
COUNTRY: U.S.A.

LOCATION: 150'S OF C S/2 NW/4

SEC: 22 TWP: 22S RGE: 22W

DATE: 11/27/91
RUN NO.: 1

PERMANENT DATUM: GL
DRILLING MEASURED FROM: KB
LOG MEASURED FROM: KB
ABOVE PERMANENT DATUM: 9.0

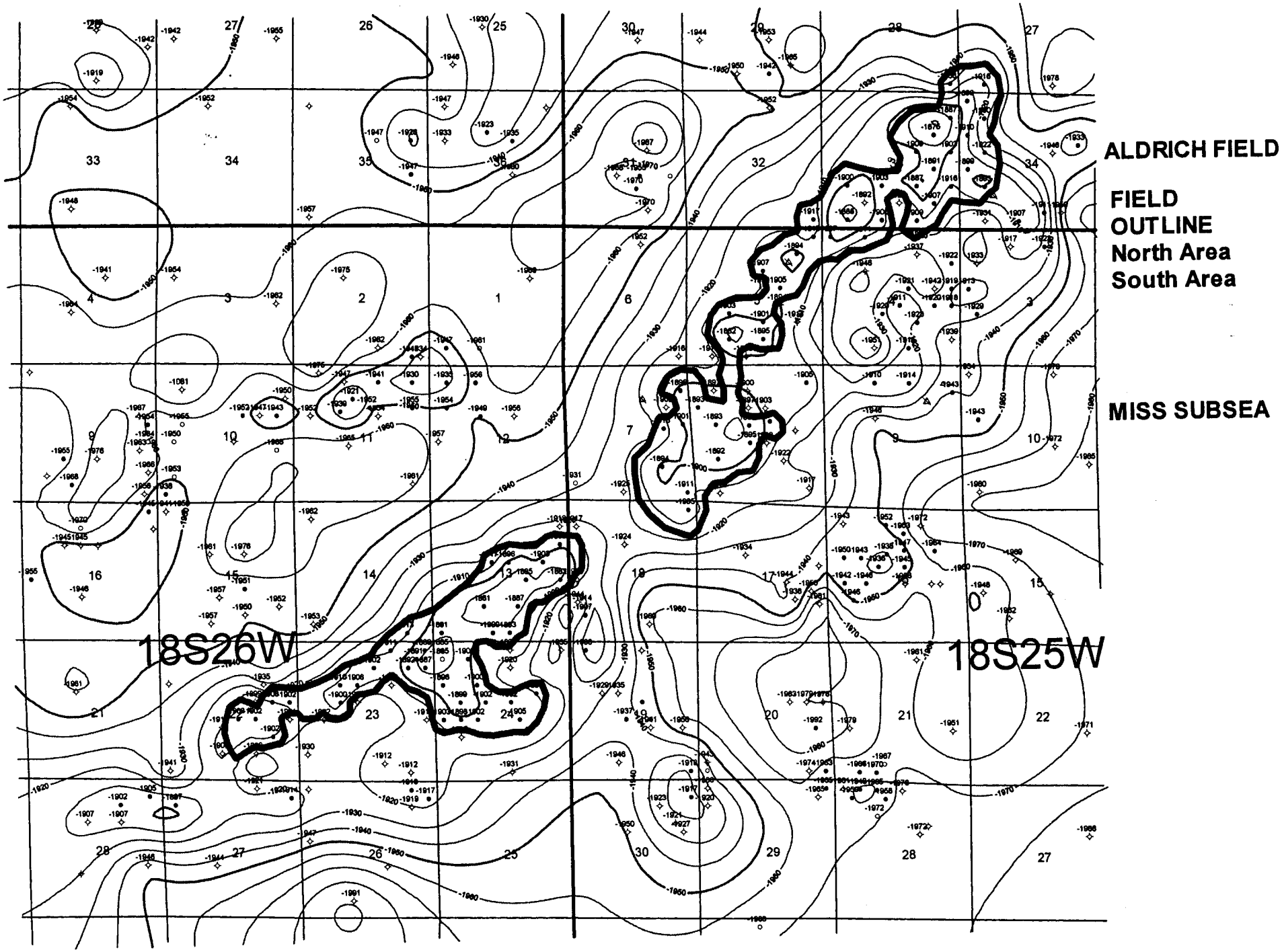
DEPTH--DRILLER: 4557.0
DEPTH--LOGGER: 4459.0
BOTTOM LOG INTERVAL: 4438.0
TOP LOG INTERVAL: 3500.0

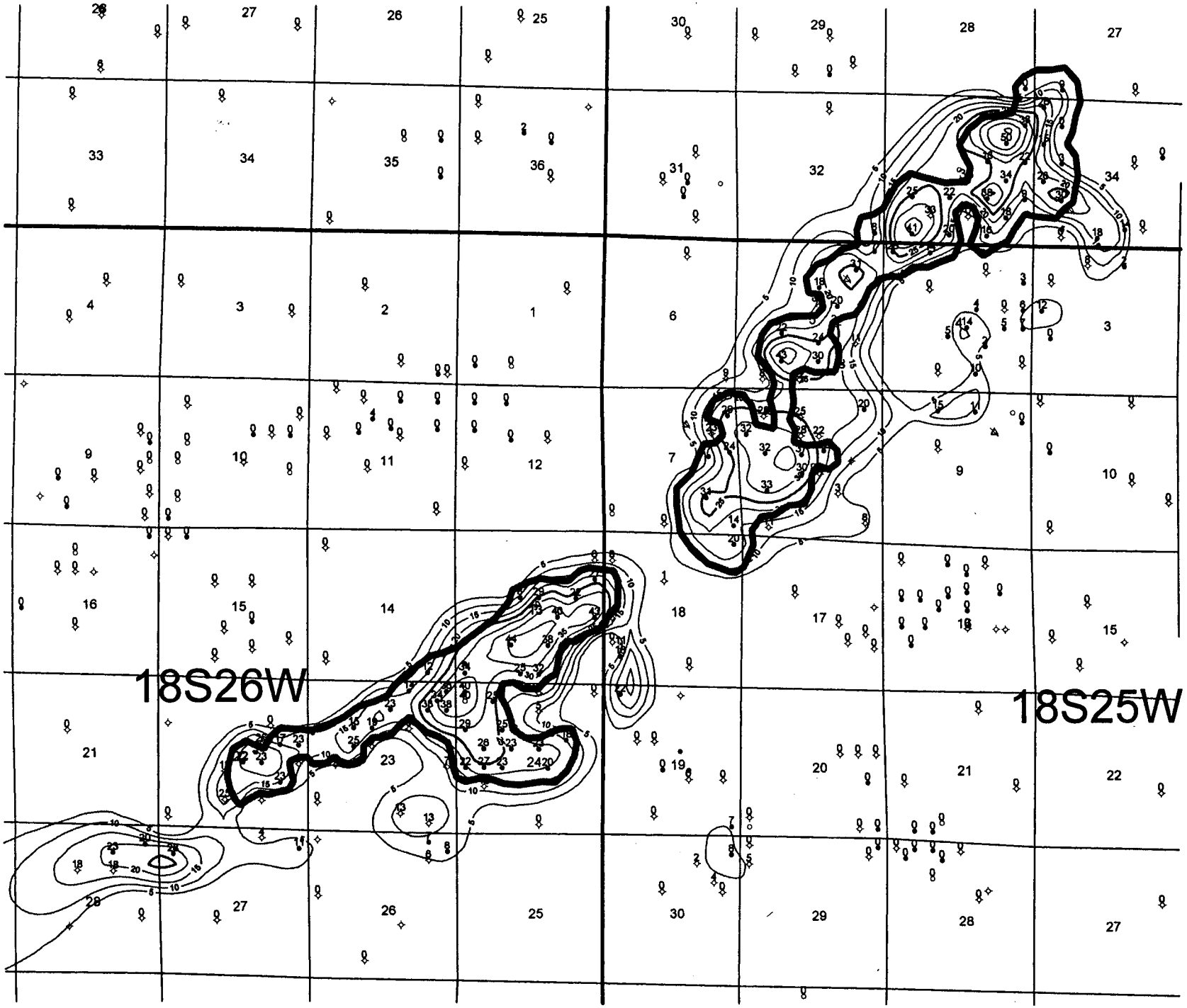
CASING DEPTH--DRILLER: 1338.0
CASING DEPTH--LOGGER: 1338.0
CASING DIAMETER: 8.625
MUD SIZE: 7.875
UNIT NO.: 75
LOCATION: HAYS,KS.
RECORDED BY: D.GOTTSCHALK
WITNESSED BY: JIM THOMPSON

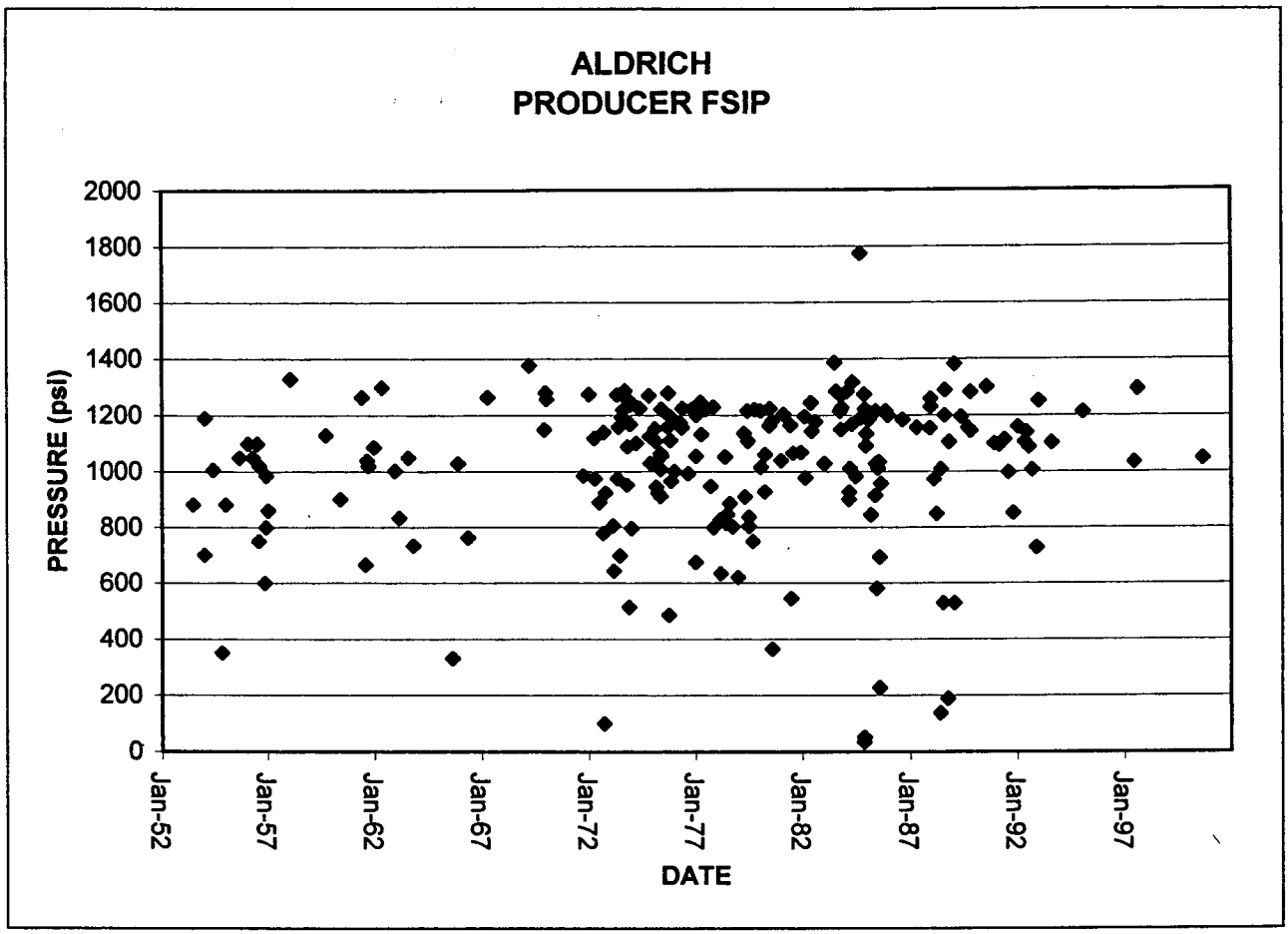
ELEVATIONS:
KB: 2195.0
DF: .0
GL: 2186.0

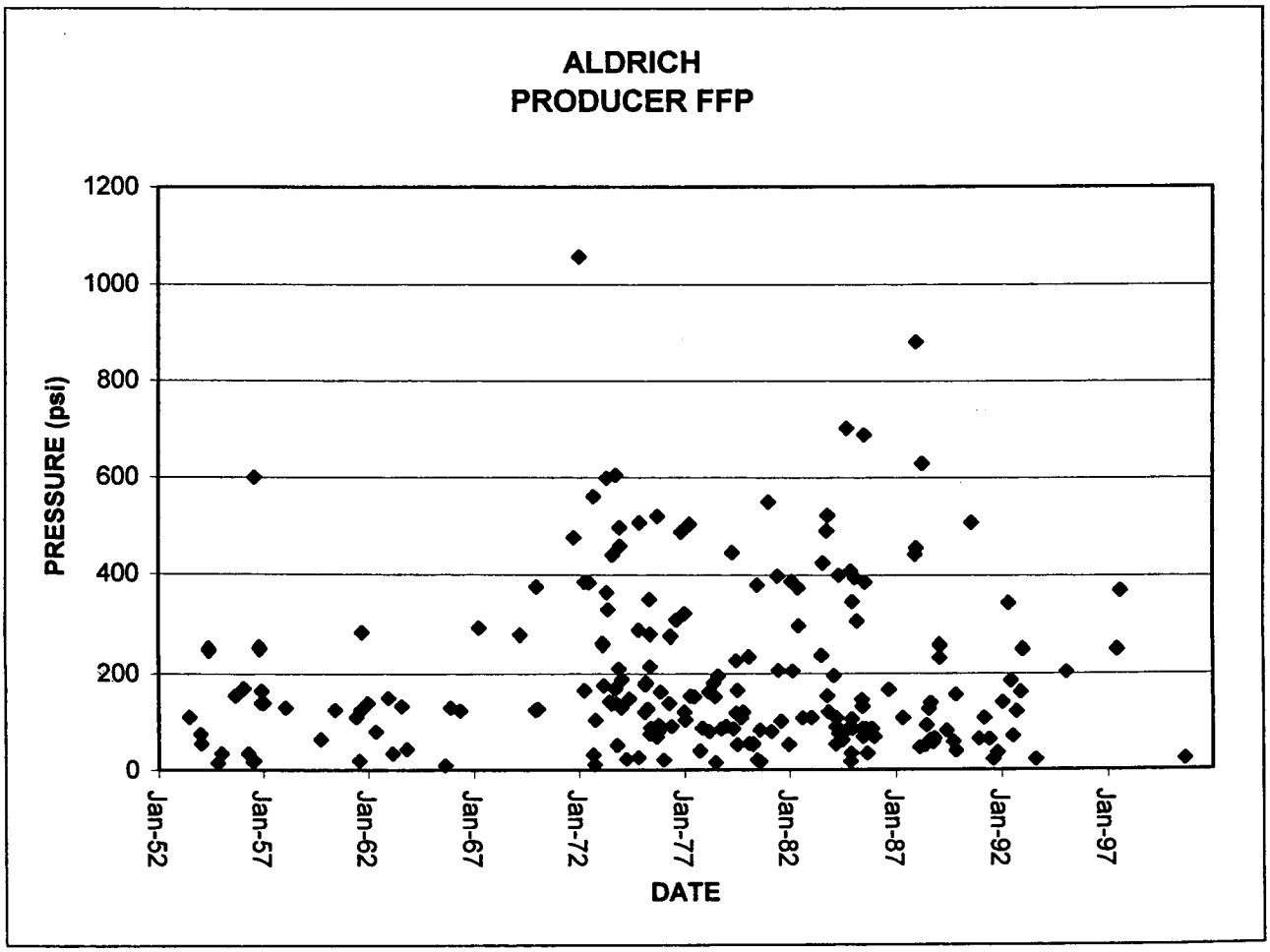
SERVICES:
GR09
BCN
DENS
DIN

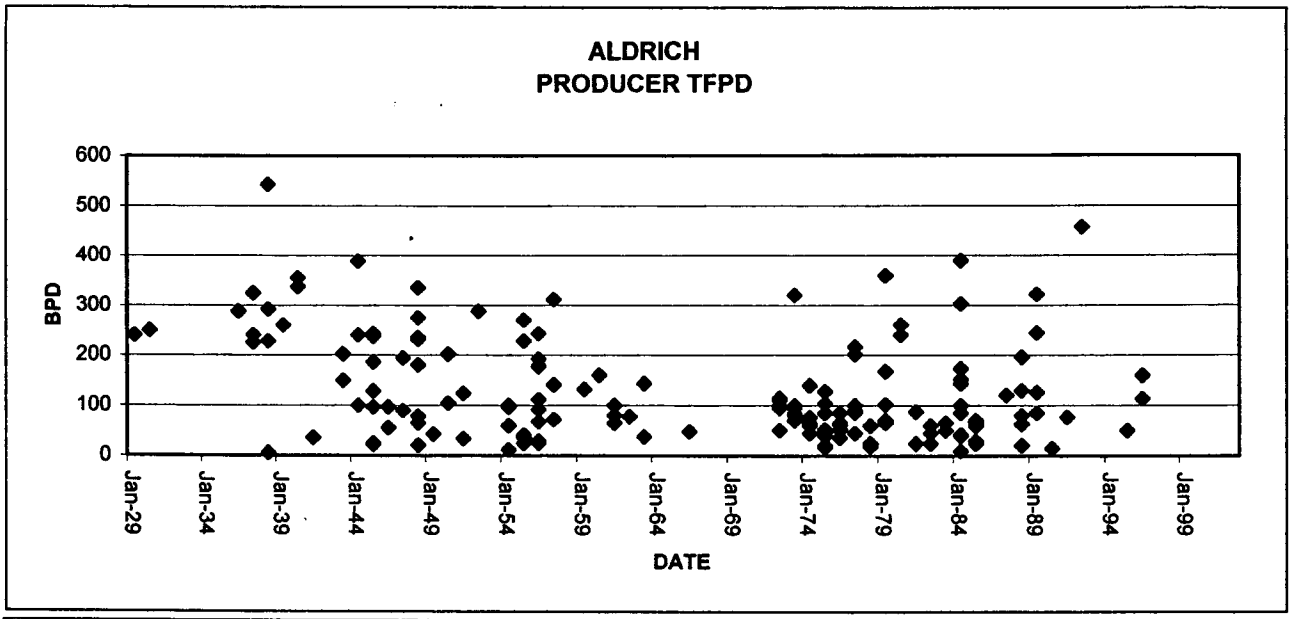
SOFTWARE VERSION:
413

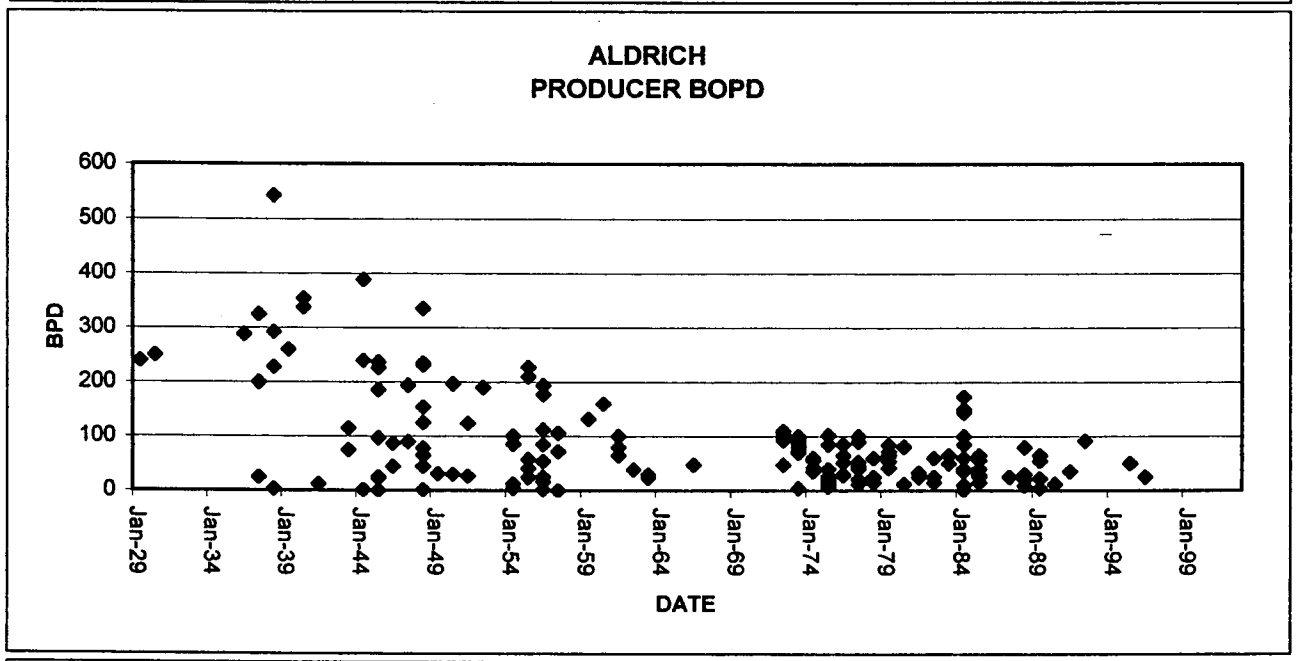

ALDRICH FIELD
FIELD
OUTLINE
North Area
South Area
MISS SUBSEA
18S26W
18S25W

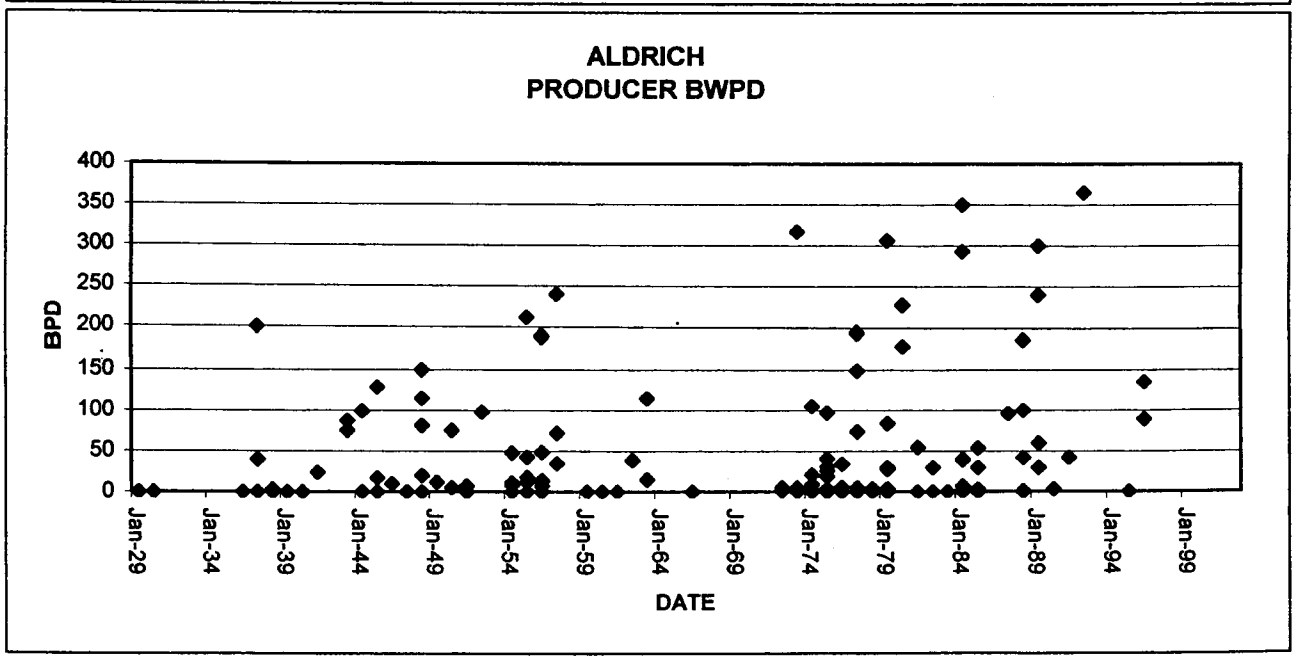

ALDRICH FIELD
FIELD
OUTLINE
North Area
South Area
PAY HEIGHT
ISOPACH
18S26W
18S25W


ALDRICH
PRODUCER FSIP
PRESSURE (psi)
2000
1800
1600
1400
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE


ALDRICH
PRODUCER FFP
PRESSURE (psi)
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE


ALDRICH
PRODUCER TFPD
600
500
400
300
200
100
0
BPD
Jan-29
Jan-34
Jan-39
Jan-44
Jan-49
Jan-54
Jan-59
Jan-64
Jan-69
Jan-74
Jan-79
Jan-84
Jan-89
Jan-94
Jan-99
DATE


ALDRICH
PRODUCER BOPD
600
500
400
300
200
100
0
BPD
Jan-29
Jan-34
Jan-39
Jan-44
Jan-49
Jan-54
Jan-59
Jan-64
Jan-69
Jan-74
Jan-79
Jan-84
Jan-89
Jan-94
Jan-99
DATE


ALDRICH
PRODUCER BWPD
400
350
300
250
200
150
100
50
0
BPD
Jan-29
Jan-34
Jan-39
Jan-44
Jan-49
Jan-54
Jan-59
Jan-64
Jan-69
Jan-74
Jan-79
Jan-84
Jan-89
Jan-94
Jan-99
DATE

Dresser Atlas

DRESSER

COMPENSATED DENSILOG® NEUTRON GAMMA RAY

Aug 1996

ILE NO.	C
PI NO.	1513522740
Company	VINCENT OIL CORPORATION
Well	SHINER NO. 1
Field	ALDRICH POOL
County	NESS
State	KANSAS

FINAL PRINT

Location: I55' N. OF C-E/2-SE-NE

Sec 13 Twp 18 S Rge 26 W

OTHER SERVICES: LL-GR-N

RELEASED NO SMALL SCALE

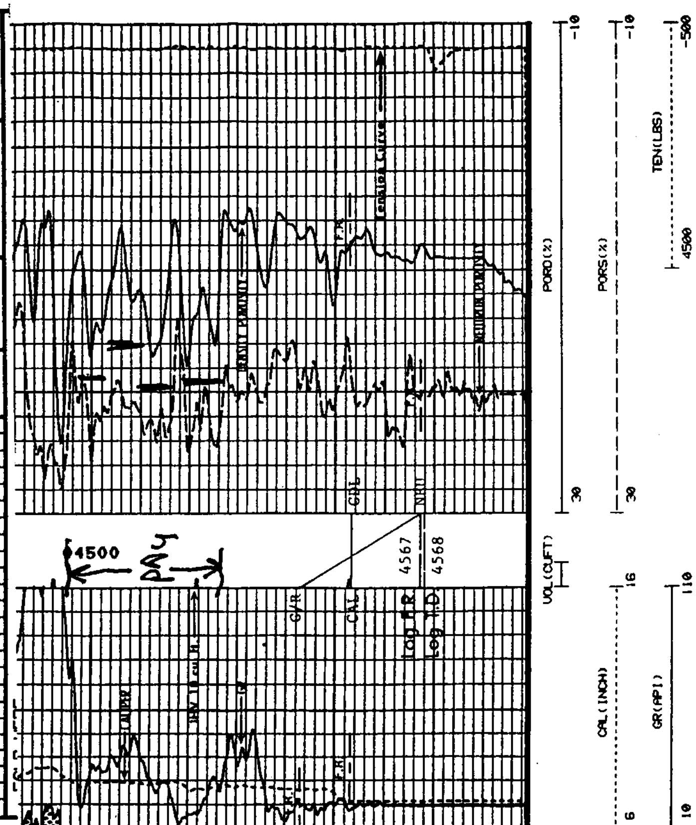
ERMANENT DATUM GROUND LEVEL ELEV. 2594

OGGING MEASURED FROM K. B. 5 FT. ABOVE P.D.

RILLING MEASURED FROM KELLY BUSHING

ELEVATIONS: KB 2599; DF; GL 2594

DATE	MARCH 19, 1985		
RUN	1		
SERVICE ORDER	78049		
DEPTH-DRILLER	4570		
DEPTH-LOGGER	4568		
BOTTOM LOGGED INTERVAL	4567		
TOP LOGGED INTERVAL	3720		
CASING - DRILLER	8 5/8	@ 388	@
CASING - LOGGER	NOT RECORDED		
BIT SIZE	7 7/8		
TYPE FLUID IN HOLE	DRISPAC		
DENSITY AND VISCOSITY	9.6	48	
PH AND FLUID LOSS	11.0	7.2	
SOURCE OF SAMPLE	FLOWLINE		
RM AT MEAS. TEMP.	.631	@ 68	@
RMF AT MEAS. TEMP.	.473	@ 68	@
RMC AT MEAS. TEMP.	.789	@ 68	@
SOURCE OF RMF / RMC	M.	M.	
RM AT BHT	.361	@ 119	@
TIME SINCE CIRCULATION	2.5 HRS		
MAX. REC. TEMP. DEG. F	119		
EQUIP. NO. / LOC.	ML 6340	GREAT BEND	
RECORDED BY	JAMES SEMMELROTH		
WITNESSED BY	LARRY FRIEND		



PARAMETERS

NAME	DEPTH INTERVAL	VALUE	UNITS
BIT SIZE	4589 TO 372	7.875	INCH
O.D.	4589 TO 372	0.000	INCH
RHO F	4589 TO 372	1.000	G/CC
RHO M	4589 TO 372	2.710	G/CC
MATRIX	4589 TO 372	LIMESTONE	

AUG 15 96

LOG-TECH

DIGITAL LOG (913)625-3858

Neutron/Density Porosity Log

FILE NO.

COMPANY LARSON OPERATING COMPANY, INC.

WELL NORTON NO. 3

FIELD ALDRICH

COUNTY NESS STATE KANSAS

LOCATION: NE NW SE

SEC. 5 TWP. 18s RGE. 25w

OTHER SERVICES: DUAL INDUCTION

Permanent Datum GROUND LEVEL Elev. 2393

Log Measured from K.B. 5 Ft. Above Permanent Datum

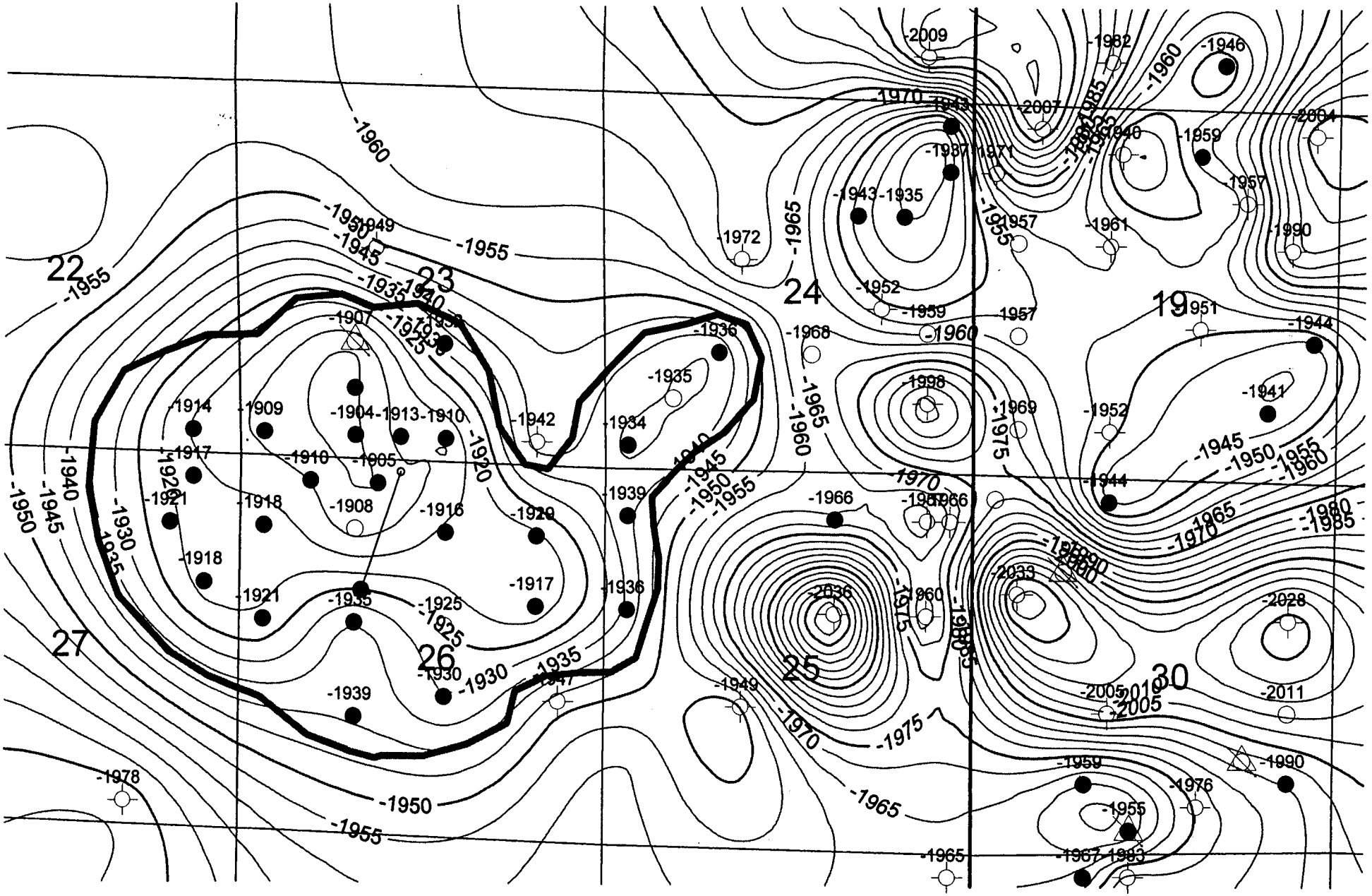
Drilling Measured from KELLY BUSHING

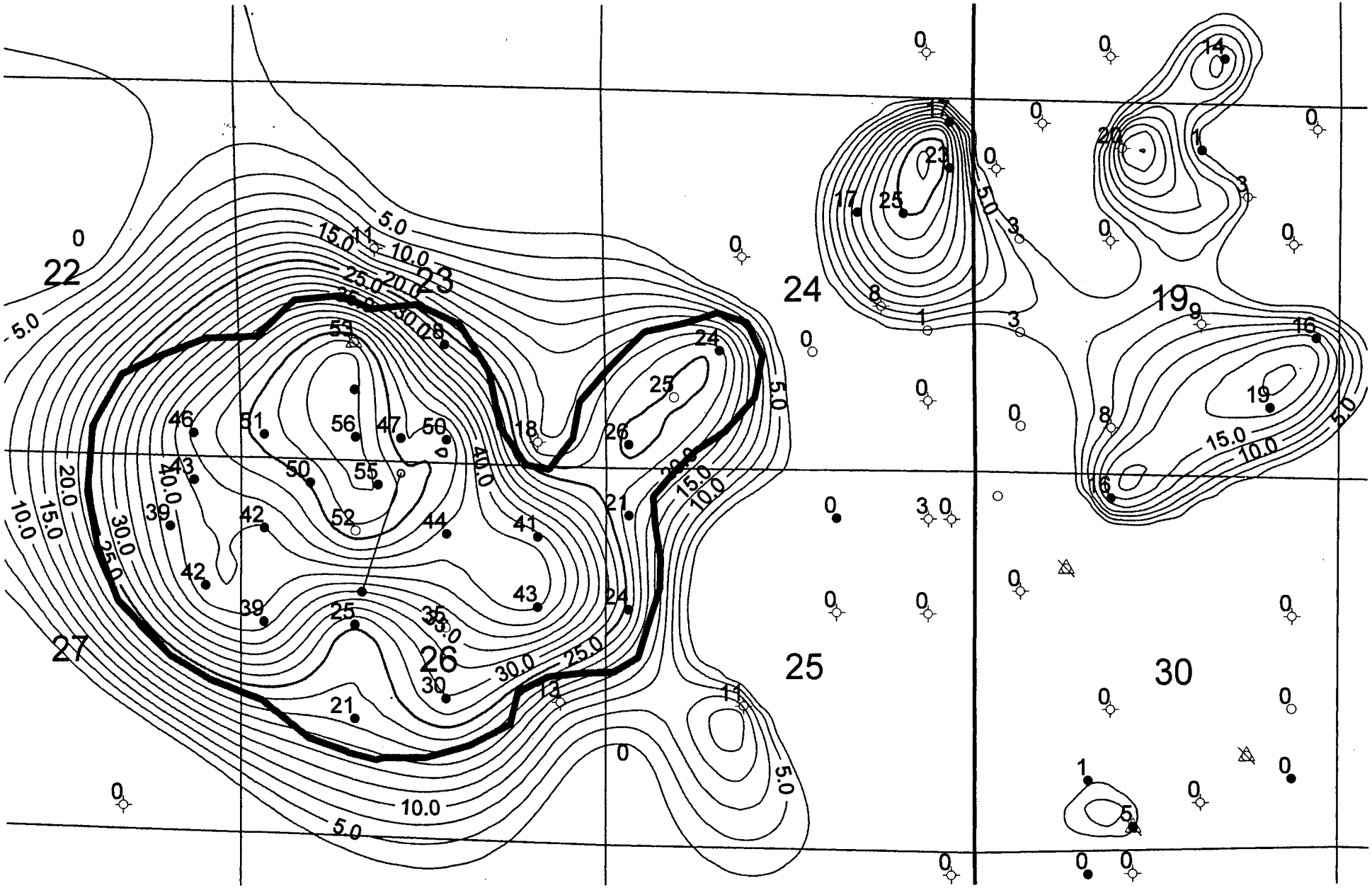
Elevations: KB 2398, DF, GL 2393

Date	DEC. 23, 1994
Run No.	TWO
Type Log	DUAL Ø
Depth—Driller	4350
Depth—Logger	4356
Bottom Logged Interval	4354
Top Logged Interval	3500
Type Fluid in Hole	CHEMICAL
Salinity, PPM CL	8000ppm
Density	9.4 48
Fluid Level	FULL
Max Rec. Temp., Deg F.	123°
Operating Rig Time	1.5 HOURS
Recorded By	SCHMEIDLER
Witnessed By	ROBERT STOLZLE

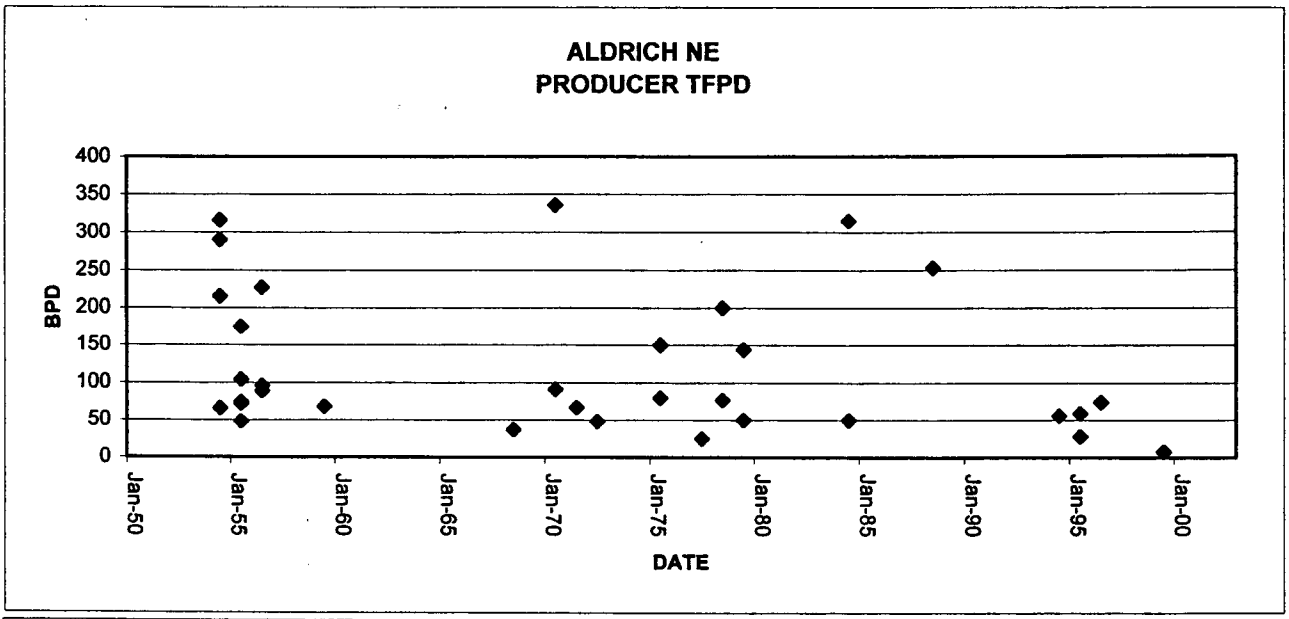
Run No.	Bore-Hole Record Bit	From	To	Casing Record Size	Wgt.	From	To
	121/4	0	202	85/8		0	201
	77/8	201	4350				

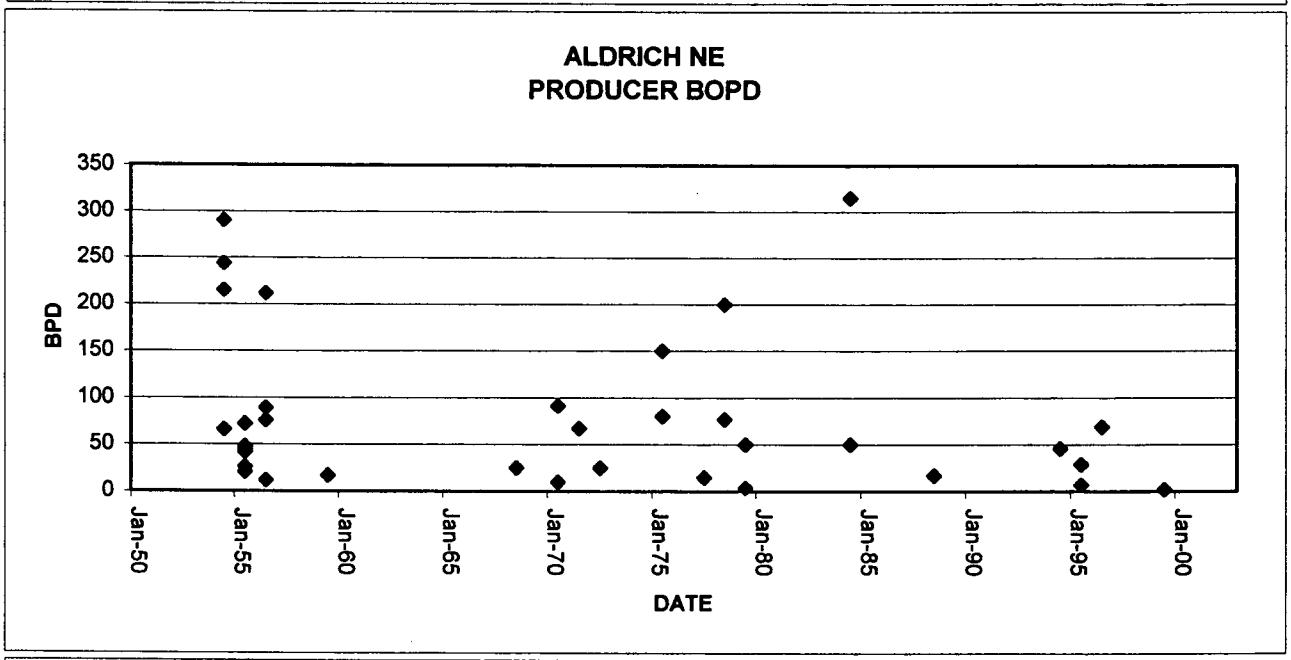
REPEAT SECTION

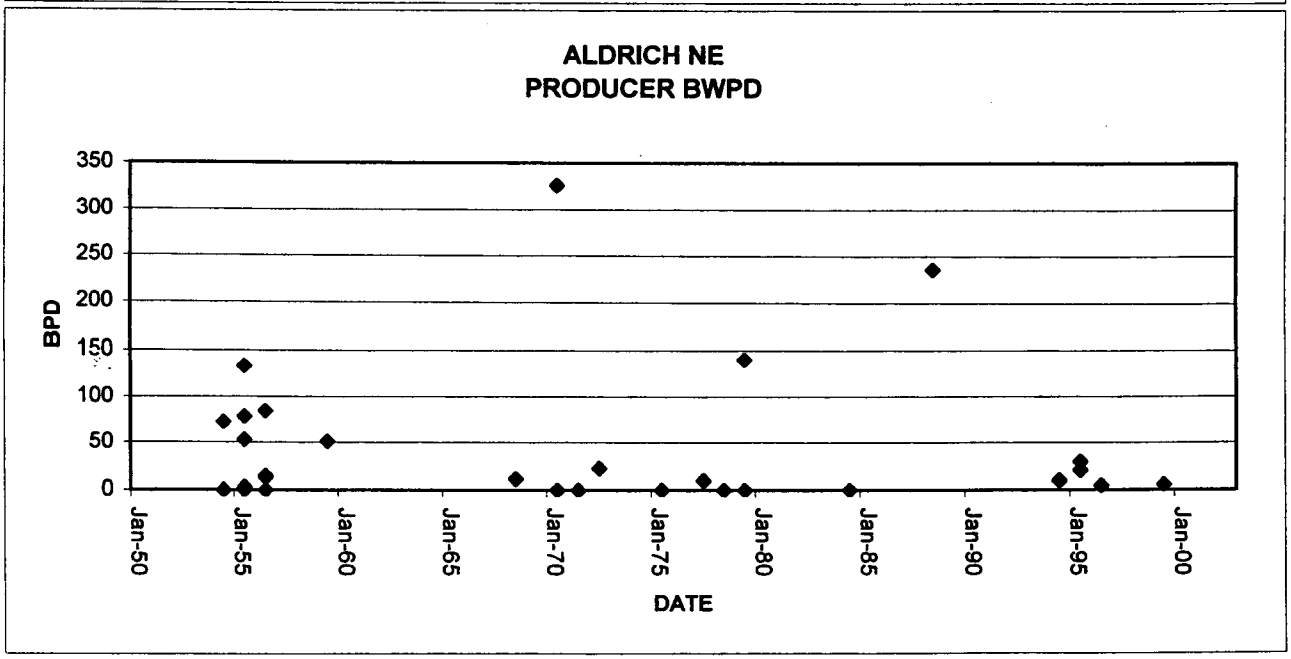

ALDRICH NE FIELD
MISS SUBSEA
FIELD OUTLINE
17S 25W

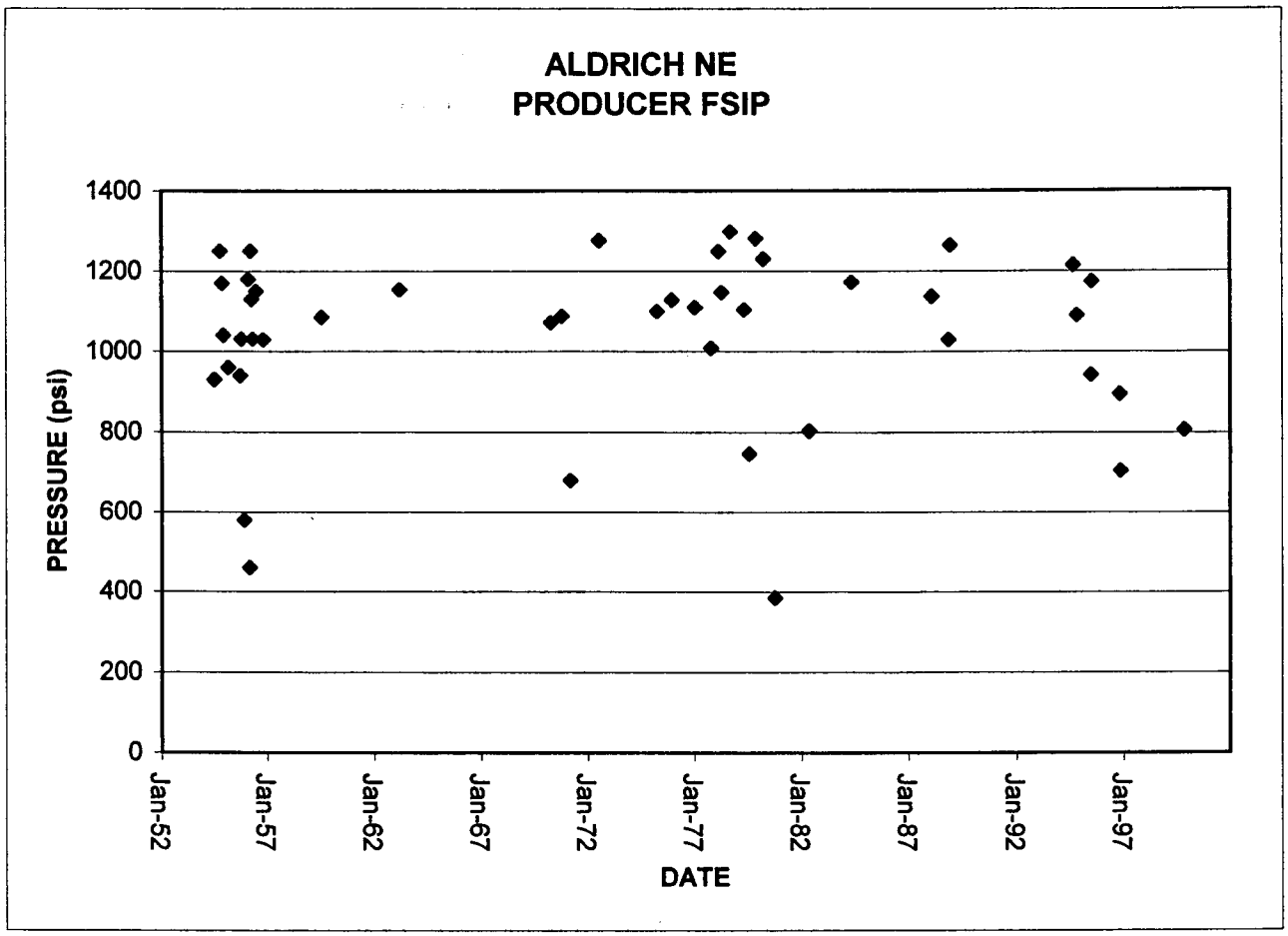


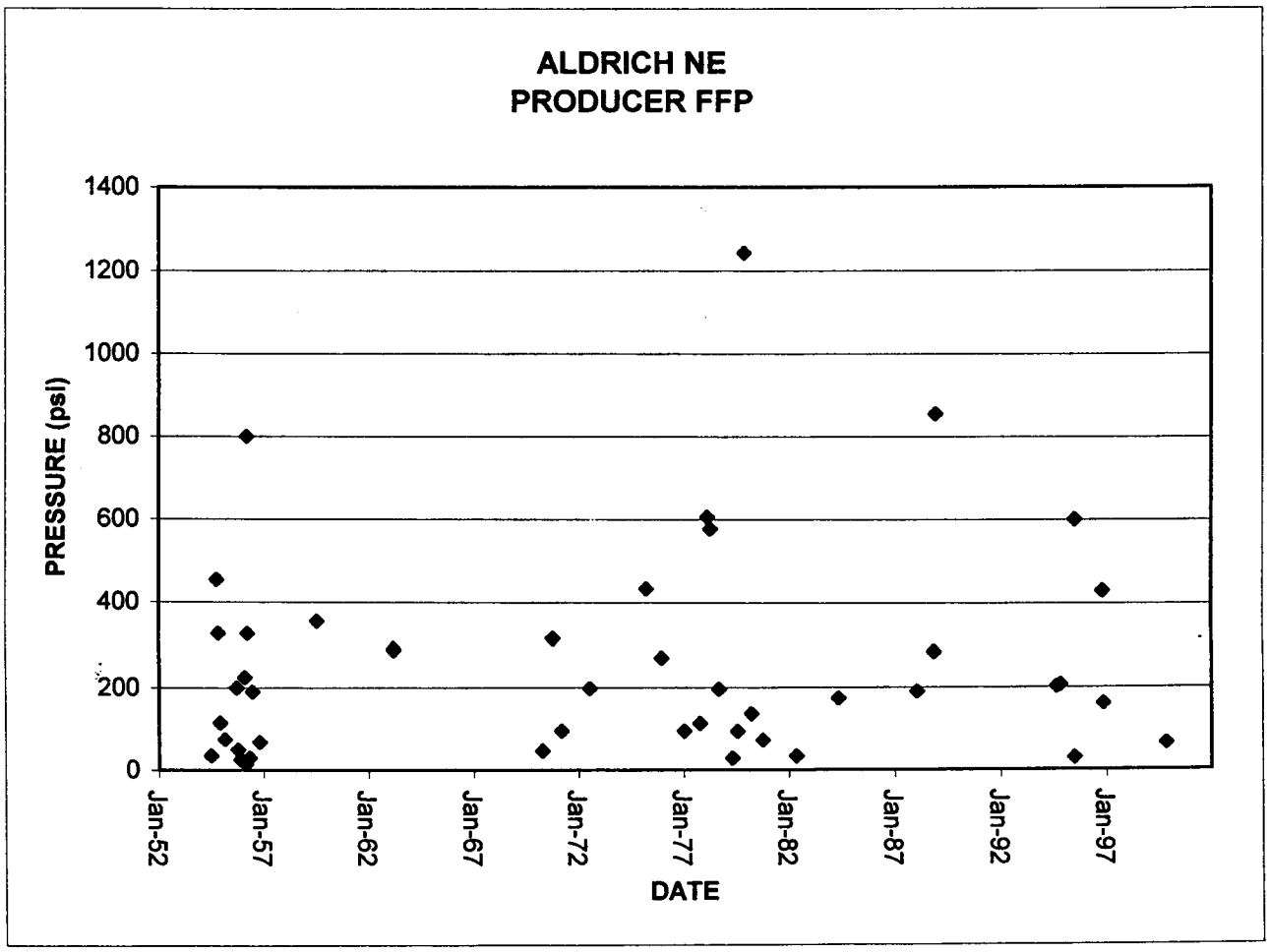
ALDRICH NE FIELD **PAY ISOPACH** **FIELD OUTLINE**


ALDRICH NE
PRODUCER TFPD
BPD
400
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


ALDRICH NE
PRODUCER BOPD
BPD
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


ALDRICH NE
PRODUCER BWPD
BPD
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


ALDRICH NE
PRODUCER FSIP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE


ALDRICH NE
PRODUCER FFP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE

Halliburton

OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

RADIATION — GUARD

Natural Gamma Radiation — Induced Gamma Radiation — Focused Resistivity

COMPANY MAGNOLIA PET. CO. FILE
WELL SHAERER #1
FIELD Aldrich N.E.
County Ness State Kansas

COMPANY MAGNOLIA PETROLEUM CO.

FILE

WELL SHAERER #1

FIELD Aldrich N.E.

COUNTY Ness STATE Kansas

SEC. 23 (17) TWP. 17S (28S) RGE. 25W

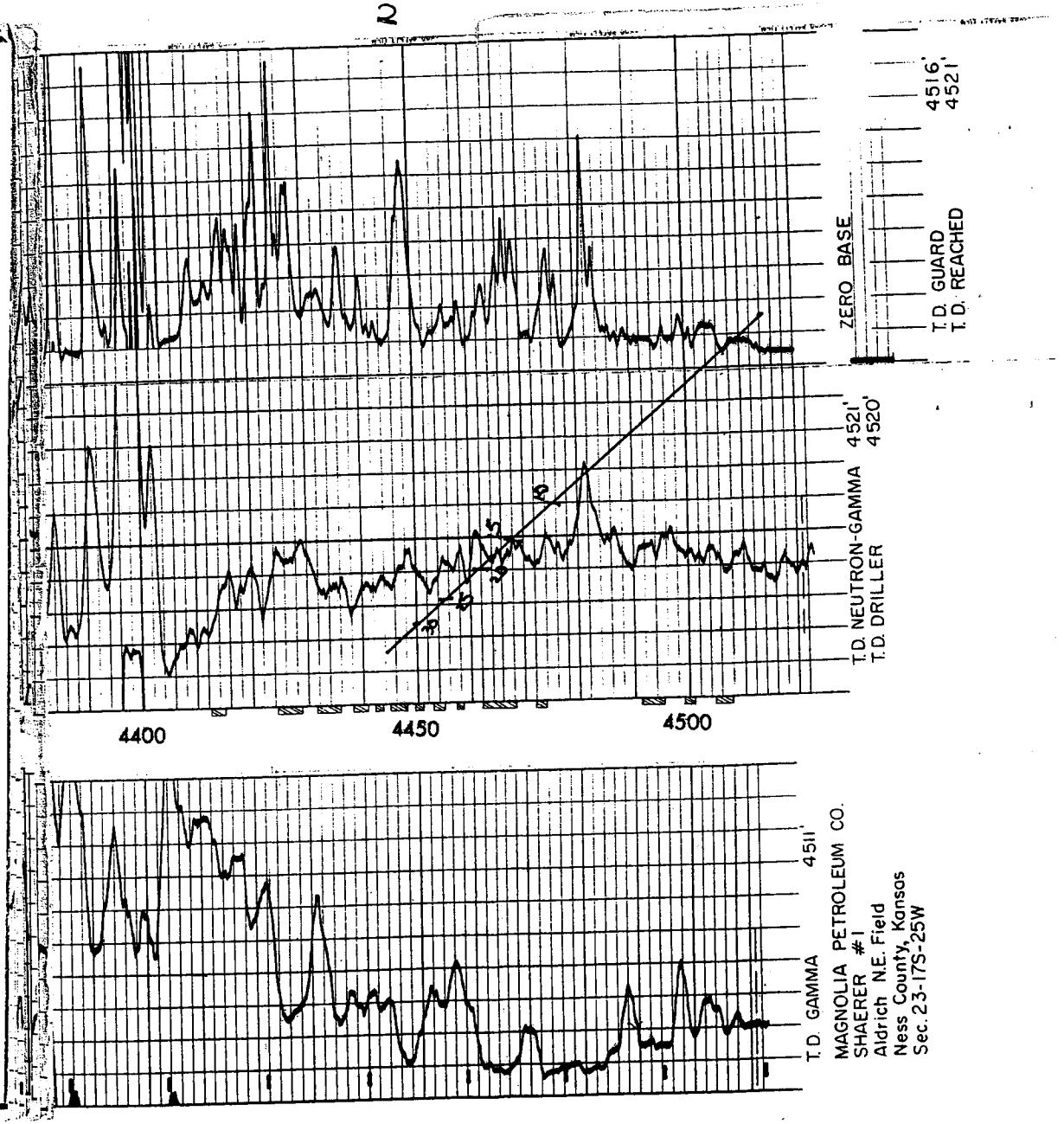
SURVEY

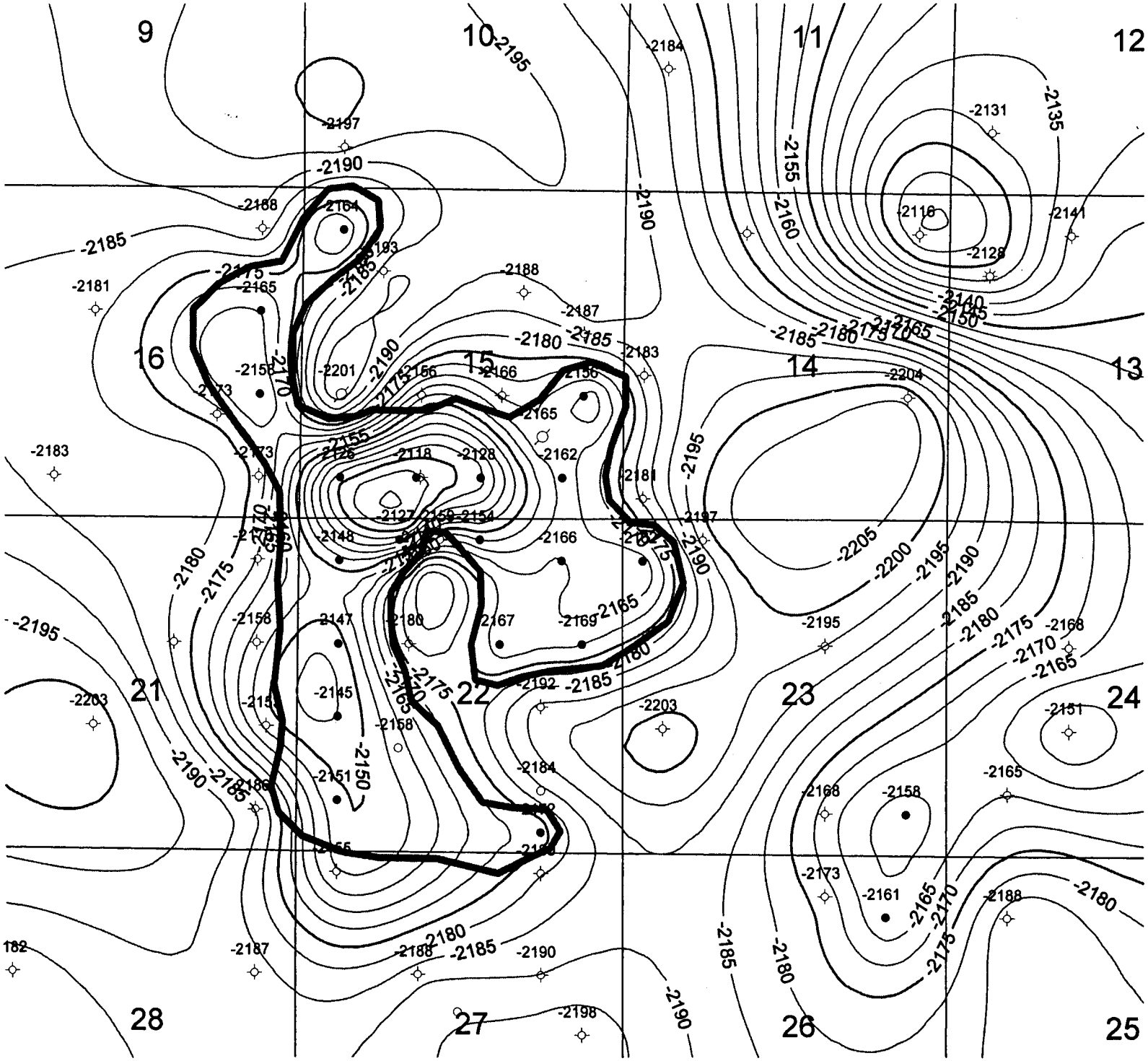
Location
PROPERTY OF
K. G. S. LIBRARY
540 Petroleum Bldg.
Wichita, Kansas 67201
SW-SE-SW

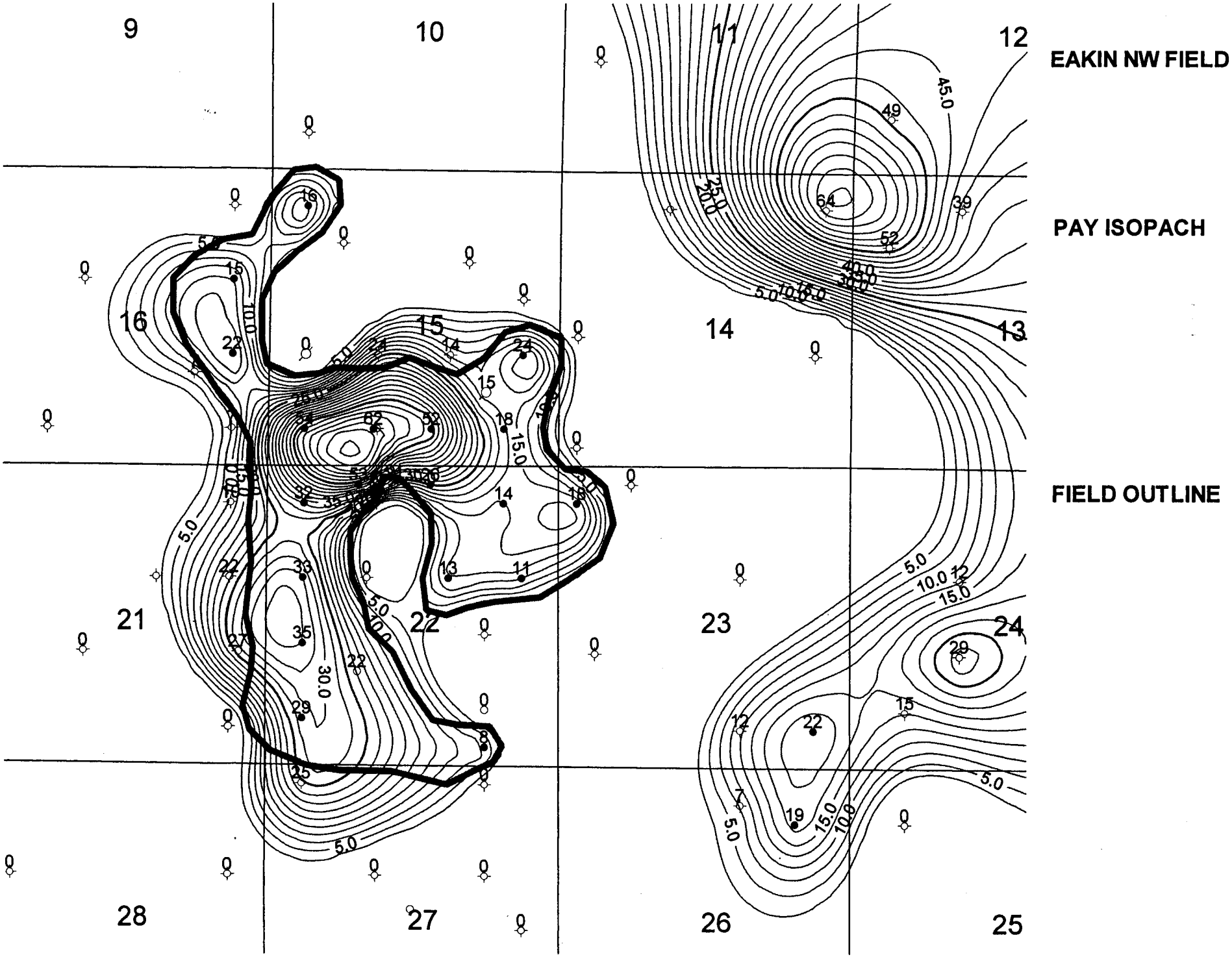
Elev. D.F. 2521'
K.B. 2523'
Grd. 2519'

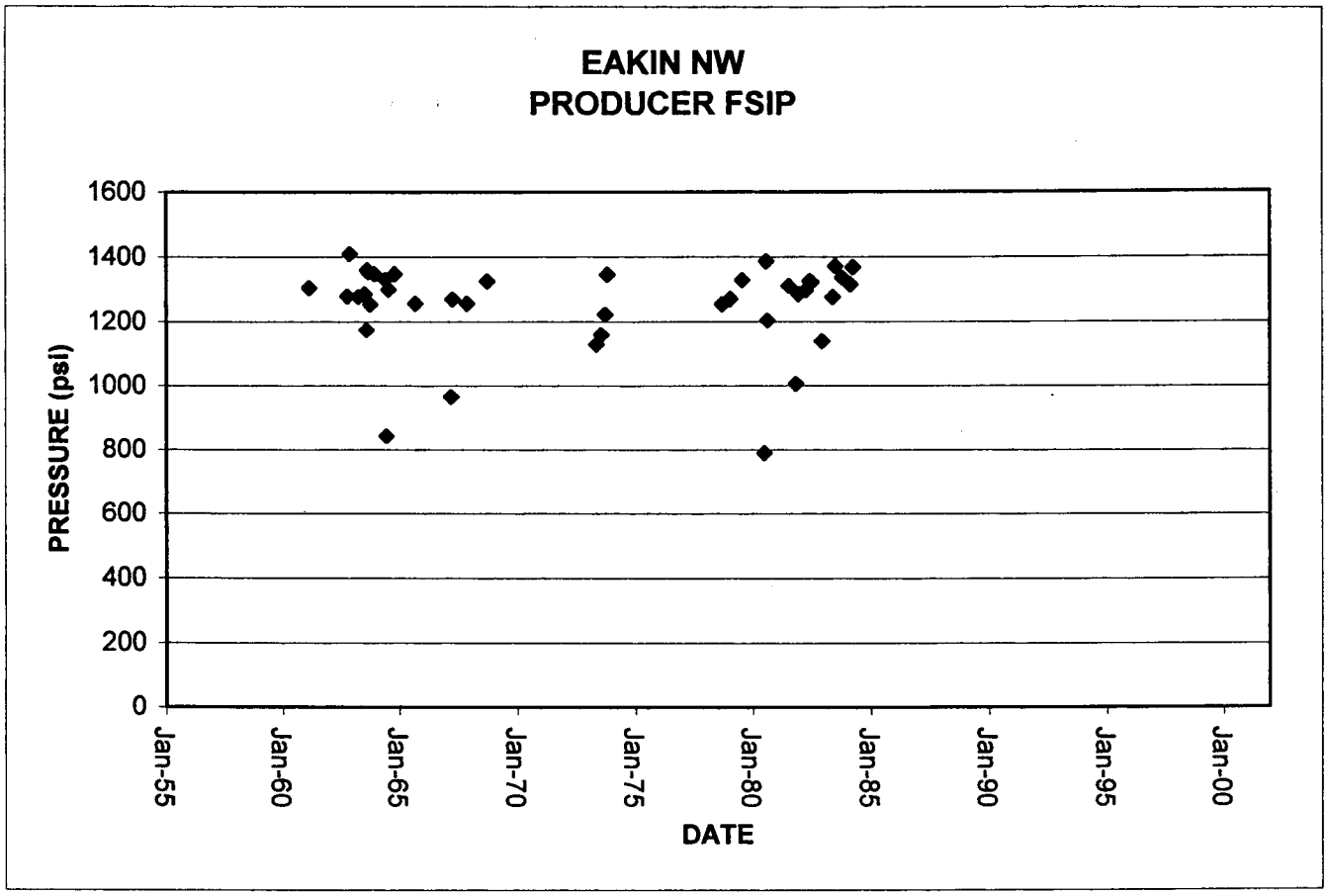
Log Measured From	Kelly Bushing	Elevation	2523'
Drilling Measured From	" "	Elevation	2523'
Permanent Datum	Ground Level	Elevation	2519'

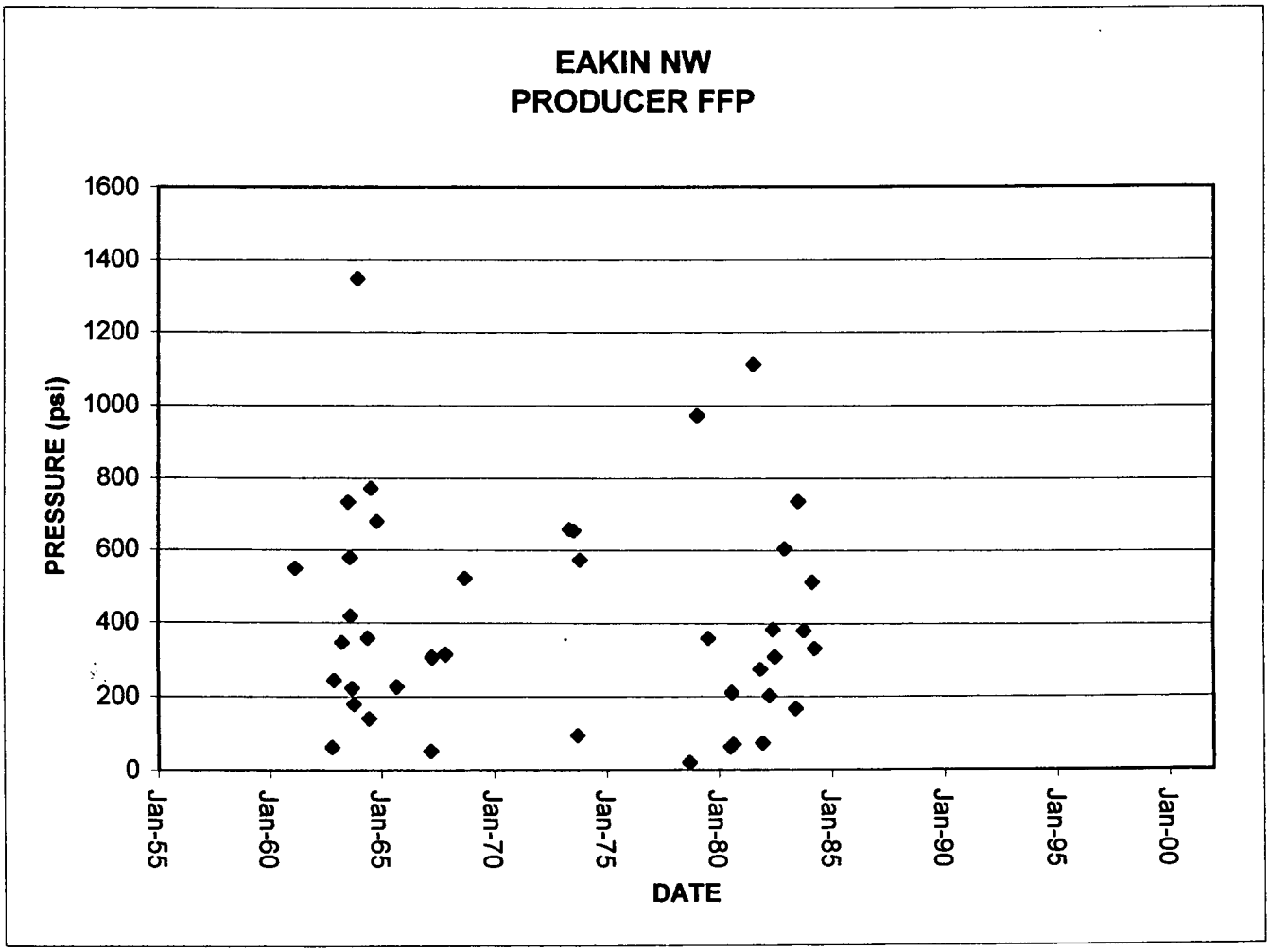
Type Log	GAMMA	NEUTRON	GUARD	
Run No.	One	One	One	
Date	10-12-54	10-12-54	10-12-54	
Type of Fluid in Hole	Mud	Mud	Mud	
Fluid Level	Surface	Surface	Surface	
Neutron Source Strength		400 mg		
Source to Bottom of Counter	106"	12"		
Length Meas. Device—in.	28"	14"		
O.D. of Instrument—in.	3-5/8"	3-5/8"	3-7/8"	
Time Constant sec.	2	2		
Logging Speed Ft. min.	See Logging Speed Indication on Left Side of Log.			
Mud — Kind			Water Base	
Treatment			Starch	
Weight			9.95	
Viscosity			44	
ph	@ °F	@ °F	6 @ °F	@ °F
Loss ml./min.	@ °F	@ °F	3.8 @ °F	@ °F
Res. Ohm m²/m	@ °F	@ °F	.3 @ 84 °F	@ °F
Max. Temp.	°F	°F	— °F	°F
Source Mud Sample			Sample Box	

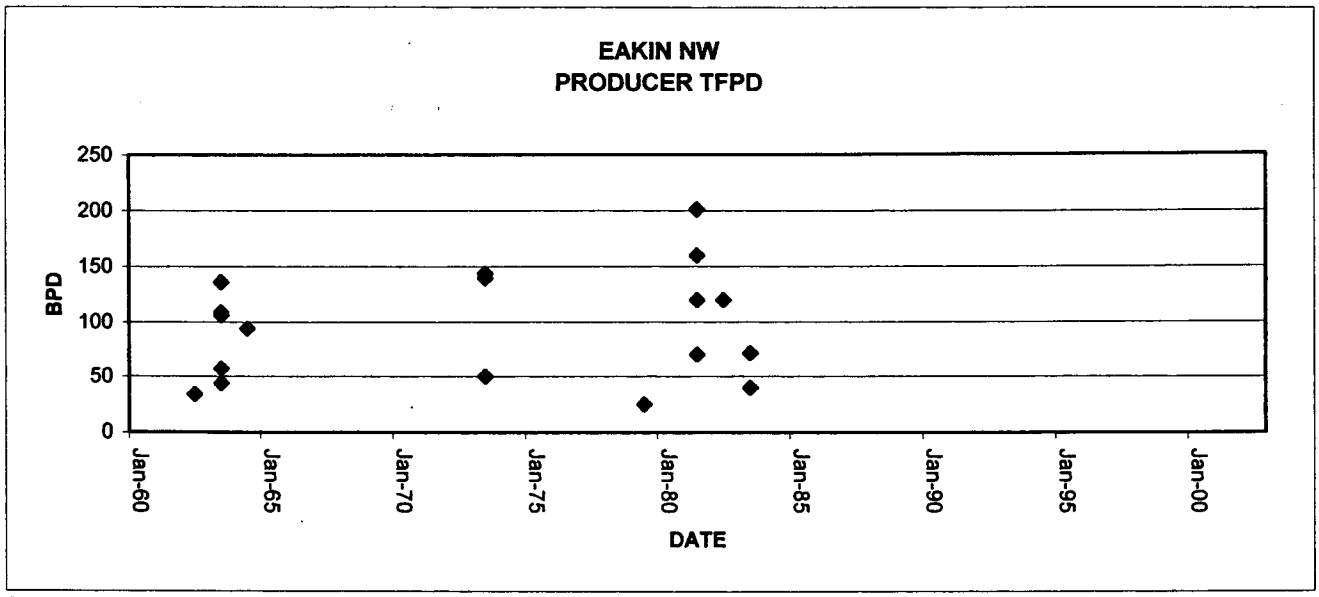


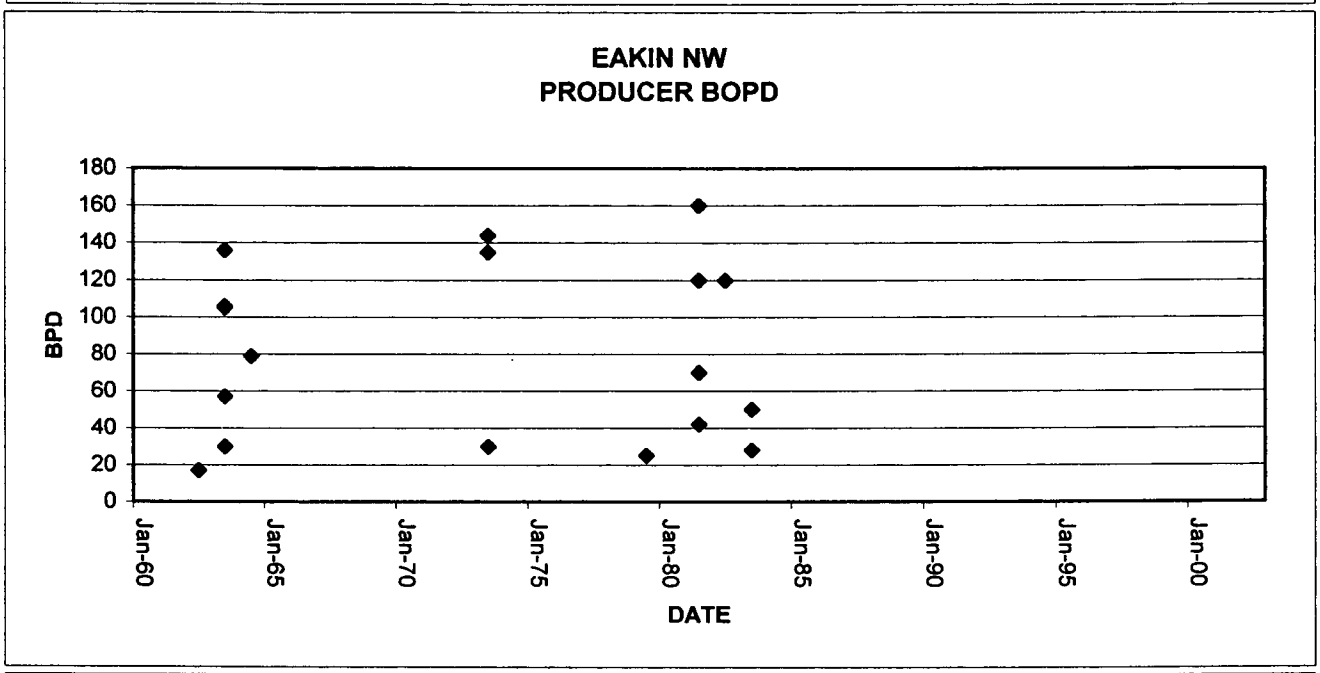

EAKIN NW FIELD
215 | 213
MISS SUBSEA
FIELD OUTLINE
9
10
11
12
16
15
14
13
21
22
23
24
28
27
26
25

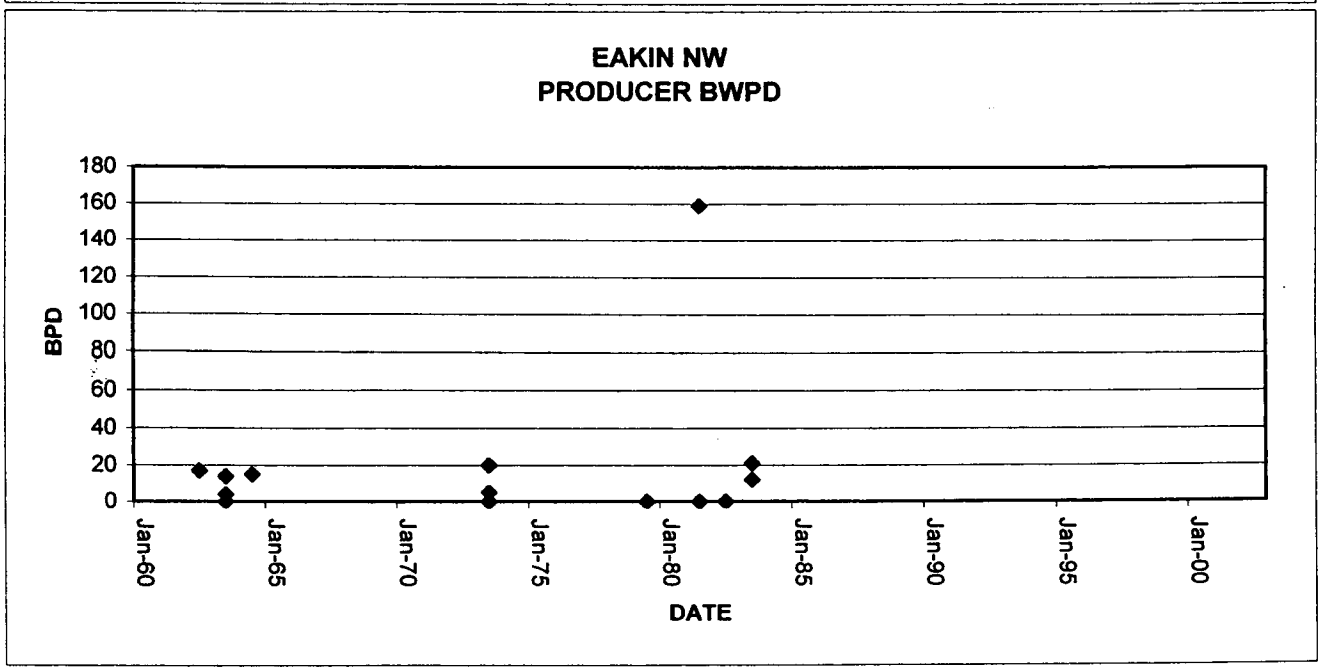

EAKIN NW FIELD
PAY ISOPACH
FIELD OUTLINE
9
10
11
12
16
15
14
13
21
22
23
24
28
27
26
25


EAKIN NW
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


EAKIN NW
PRODUCER FFP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


EAKIN NW
PRODUCER TFPD
250
200
150
100
50
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


EAKIN NW
PRODUCER BOPD
180
160
140
120
100
80
60
40
20
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


EAKIN NW
PRODUCER BWPD
180
160
140
120
100
80
60
40
20
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

15-21-21W
C-NW/4

Dresser Atlas

DRESSER

COMPENSATED DENSILOG®
COMPENSATED NEUTRON
GAMMA RAY

FILE NO. C

API NO. 1508321120

FINAL PRINT

Company GENERAL ATLANTIC ENERGY
Well NO. 1 SALMANS
Field EAKIN NW
County HODGEMAN State KANSAS

Location:
C-NW/4
Sec 15 Twp 21S Rge 21W

OTHER SERVICES
DIFL-GR-SP

PERMANENT DATUM GROUND LEVEL ELEV. 2141
LOGGING MEASURED FROM K.B. 5 FT. ABOVE P.D.
DRILLING MEASURED FROM KELLY BUSHING

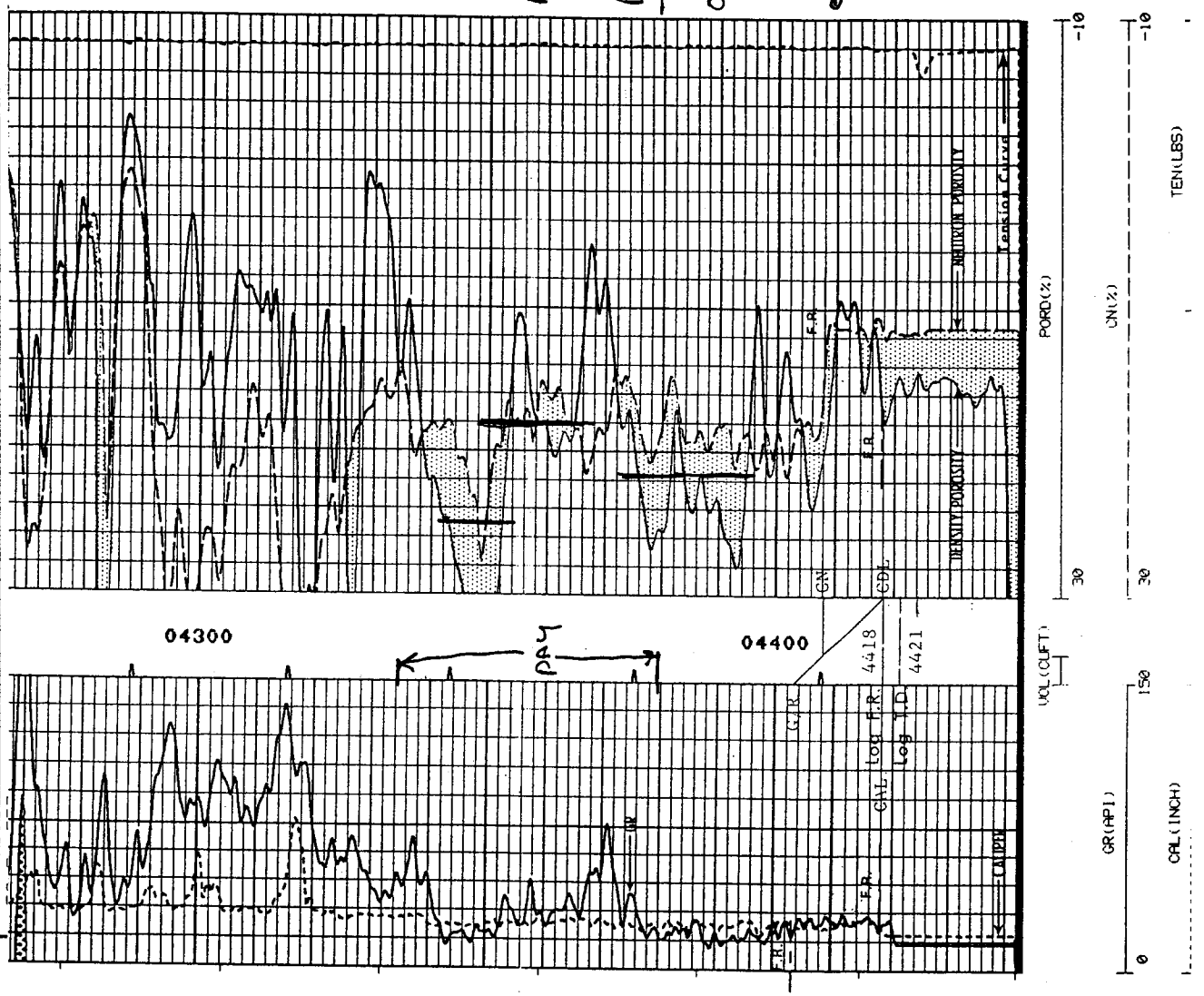
ELEVATIONS
KB 2146
DF
GL 2141

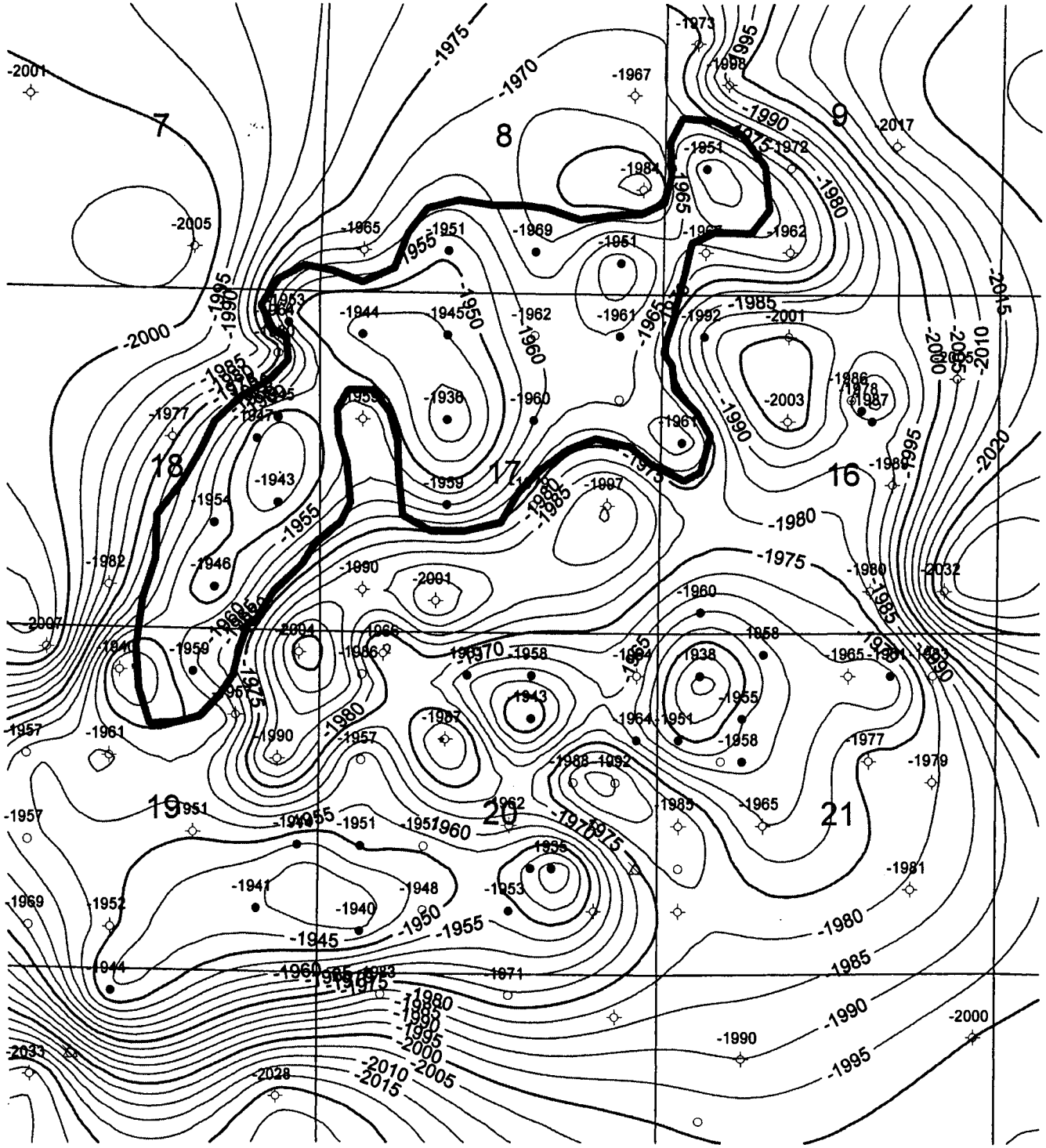
DATE	02/28/84		
RUN	1		
SERVICE ORDER	38529		
DEPTH-DRILLER	4420		
DEPTH-LOGGER	4421		
BOTTOM LOGGED INTERVAL	4418		
TOP LOGGED INTERVAL	3500		
CASING - DRILLER	8 5/8 @ 1295		@
CASING - LOGGER	NOT RECORDED		
BIT SIZE	7 7/8		
TYPE FLUID IN HOLE	DRISPAC		
DENSITY AND VISCOSITY	9.3	45	
PH AND FLUID LOSS	11	11.2	
SOURCE OF SAMPLE	FLOWLINE		
RM AT MEAS. TEMP.	.218 @ 59		@
RMF AT MEAS. TEMP.	.163 @ 59		@
RMC AT MEAS. TEMP.	.272 @ 59		@
SOURCE OF RMF / RMC	M	M	
RM AT BHT	.109 @ 118		@
TIME SINCE CIRCULATION	4.5 HRS.		
MAX. REC. TEMP. DEG. F	118		
EQUIP. NO. / LOC.	HL 6340	GREAT BEND	
RECORDED BY	DIRK BECKER		
WITNESSED BY	TERRY MCLEOD		

OSAGE

Avg φ 25%
Avg φ 18%
Avg φ 22%

OVERALL 22%
AVG
φ 15%



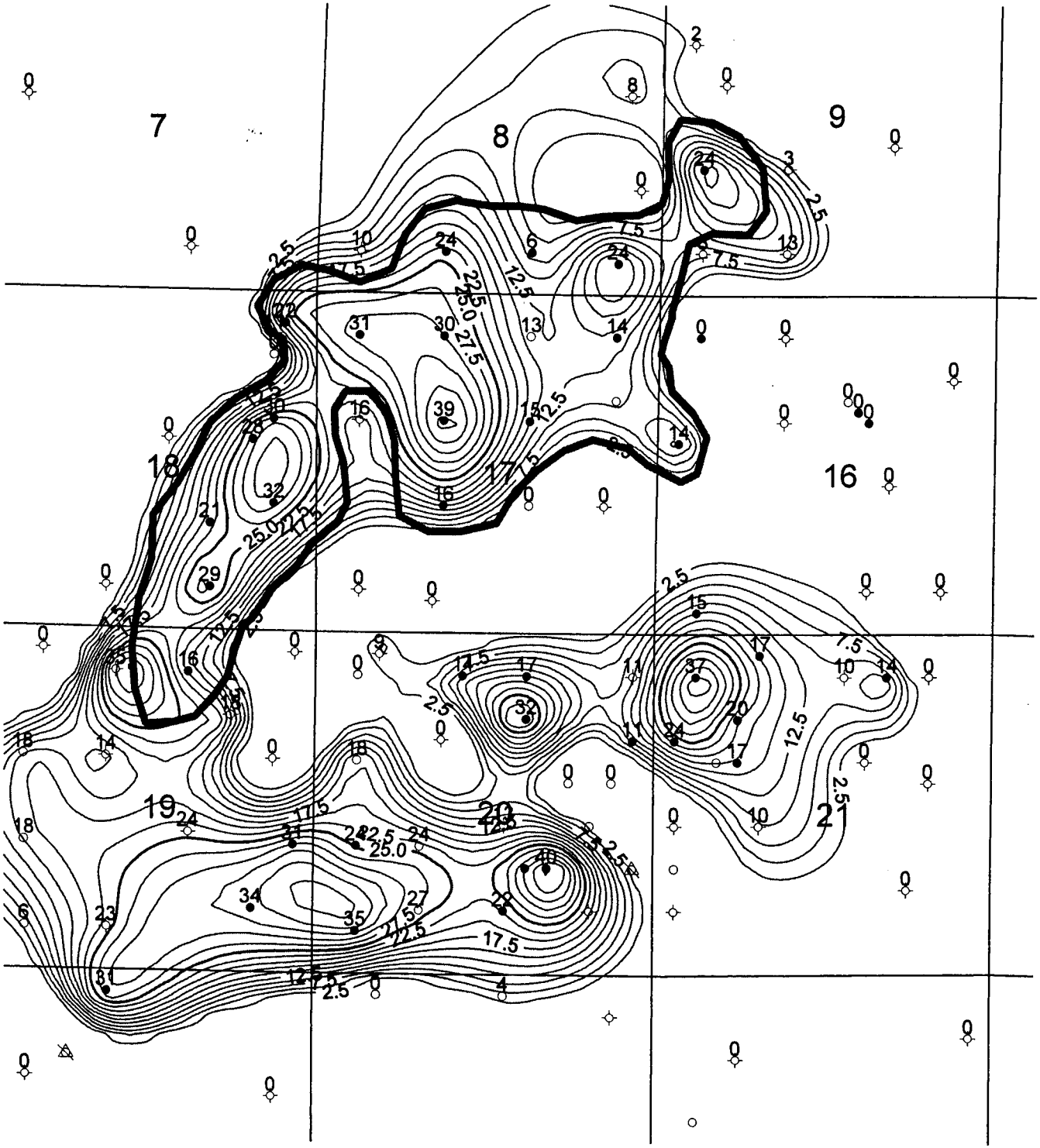


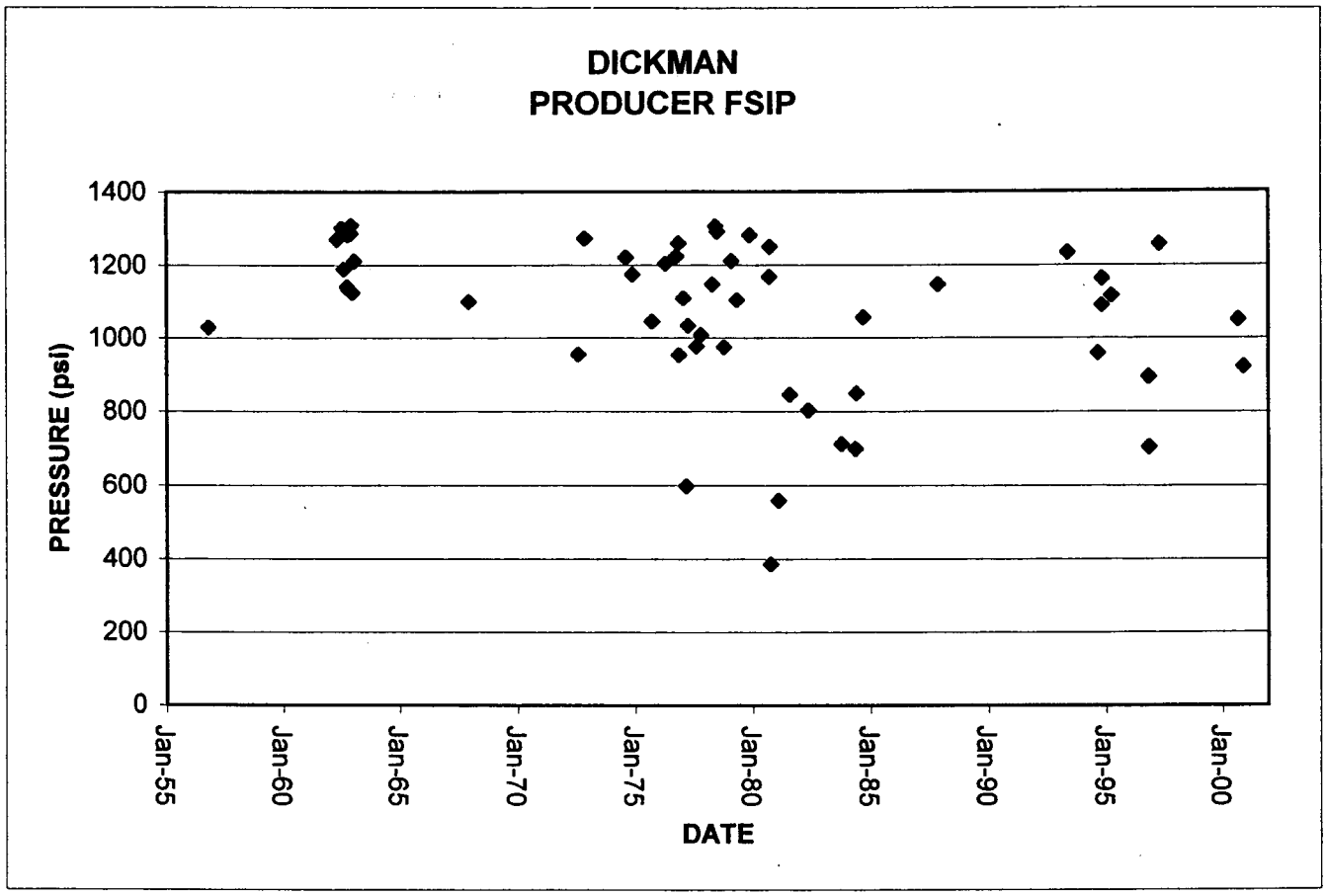
DICKMAN FIELD

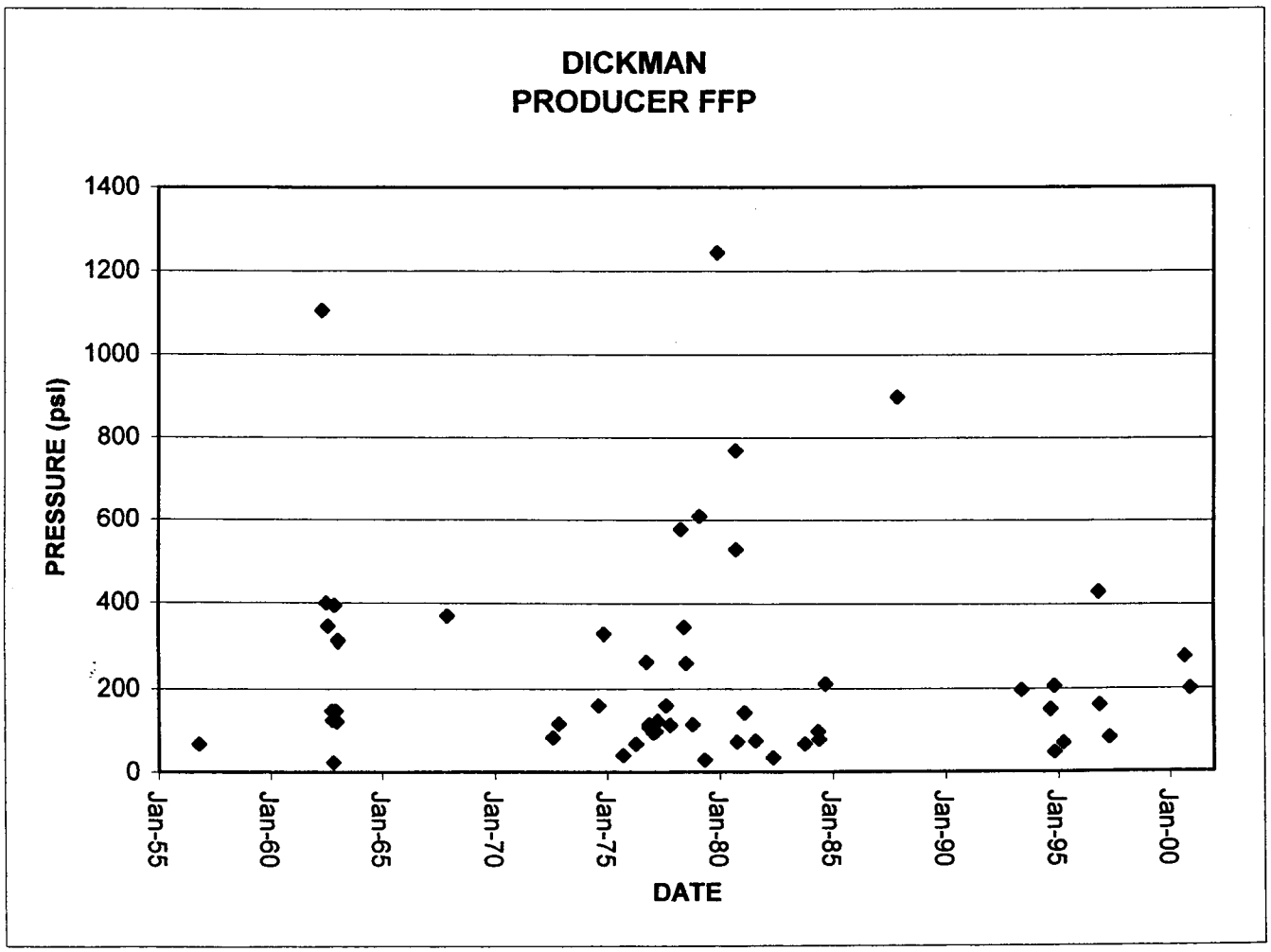
175/24W

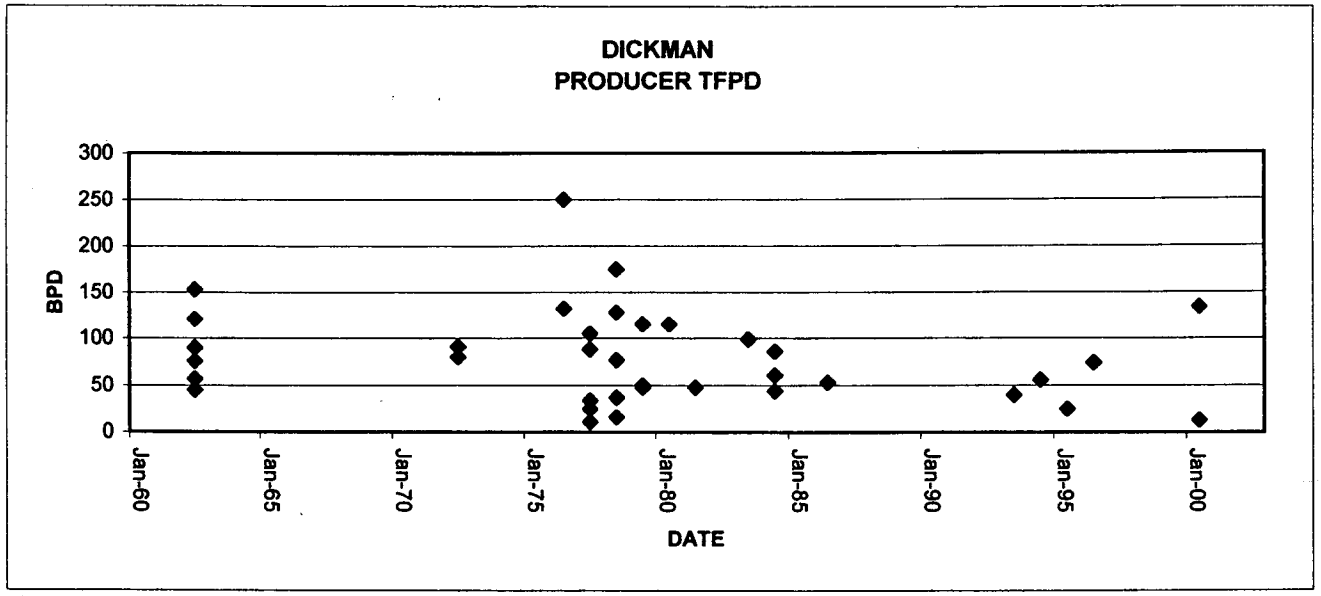
MISS SUBSEA

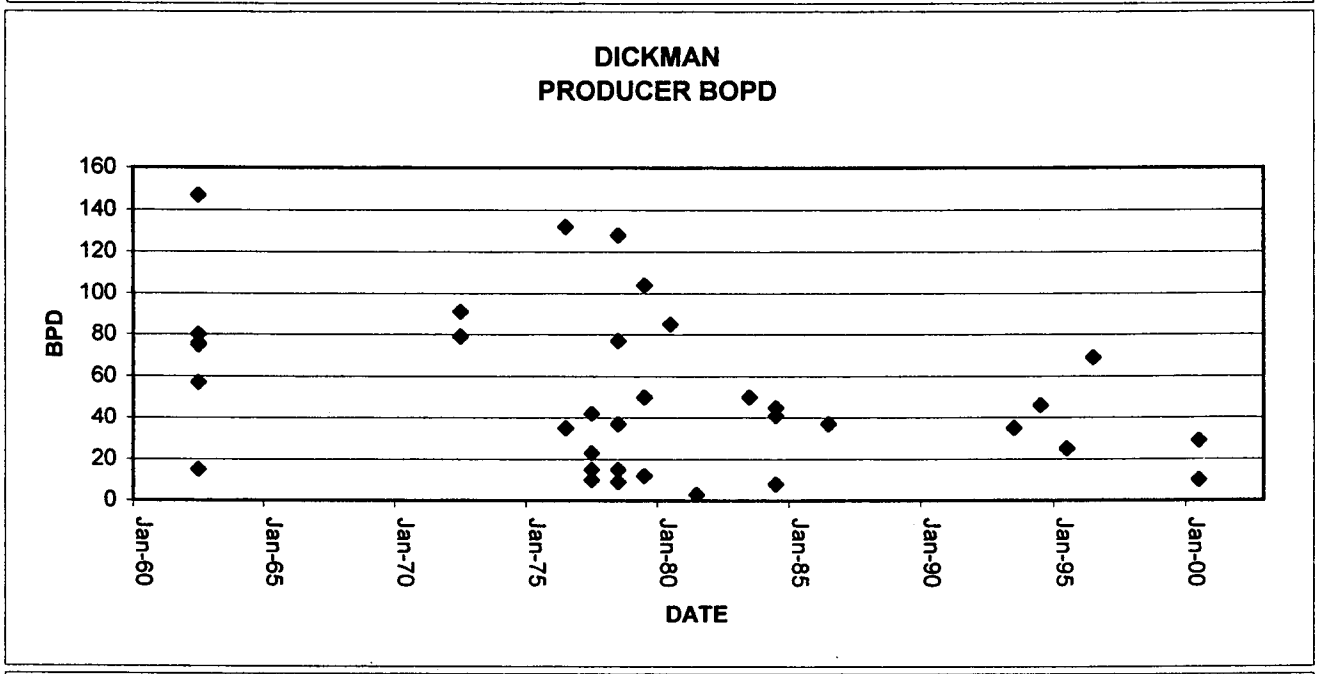
FIELD OUTLINE

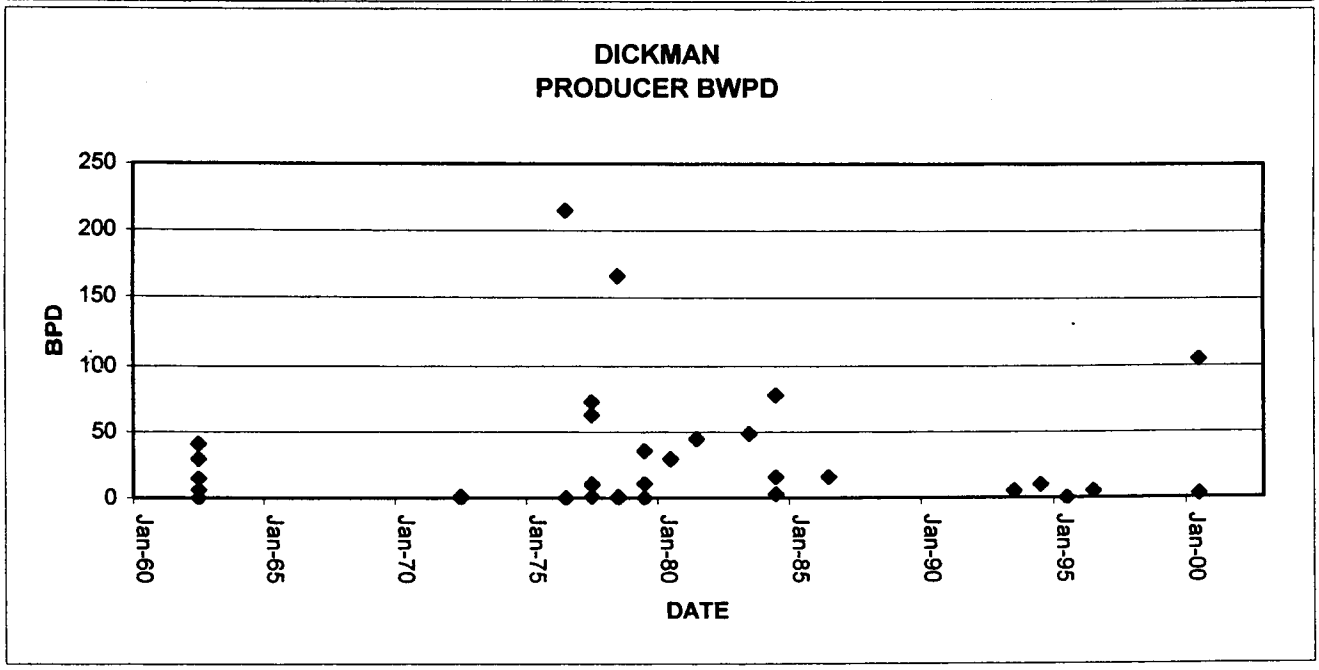

7
8
9
18
17
16
19
20
2
DICKMAN
PAY ISOPACH
FIELD OUTLINE


DICKMAN
PRODUCER FSIP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


DICKMAN
PRODUCER FFP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


DICKMAN
PRODUCER TFPD
300
250
200
150
100
50
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


DICKMAN
PRODUCER BOPD
160
140
120
100
80
60
40
20
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


DICKMAN
PRODUCER BWPD
250
200
150
100
50
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

SPNT 13-16°b

SCHLUMBERGER

SONIC LOG

SCHLUMBERGER WELL SURVEYING CORPORATION
Houston, Texas

COUNTY NESS
FIELD or LOCATION WILDCAT
WELL SEC. 17-17S-24W DICKMAN NO. 1
COMPANY WALTERS DRILLING CO.

COMPANY WALTERS DRILLING COMPANY
WELL DICKMAN NO. 1
FIELD WILDCAT
LOCATION SEC. 17-17S-24W C NE NW
COUNTY NESS
STATE KANSAS

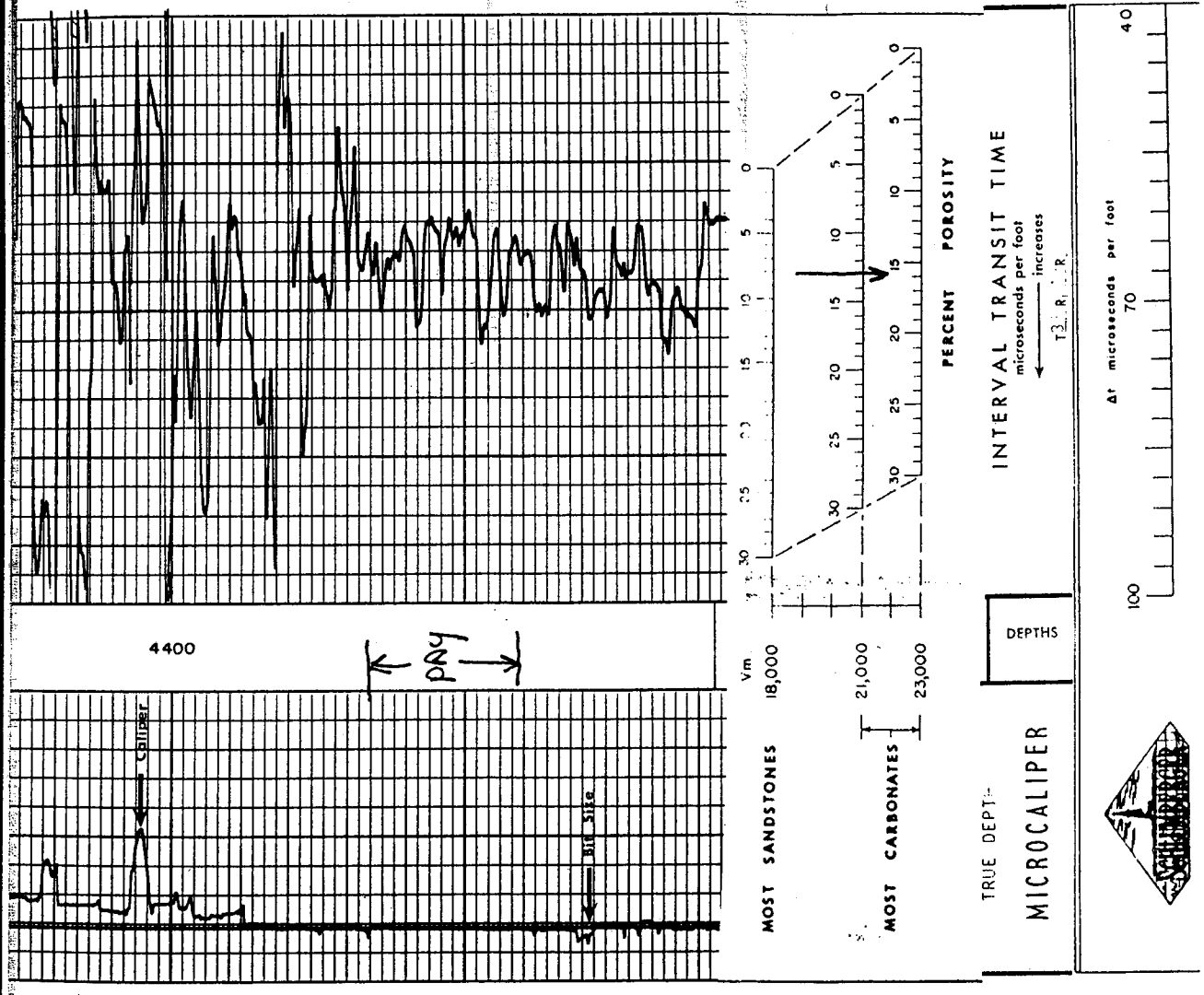
Other Surveys
LGR - FT

Location of Well
PROPERTY 18662
K. G. S. LIBRARY
540 Petroleum Bldg.
Wichita, Kansas 67202

Elevation: K.B.: 2479
D.F.: 2476
or G.L.: 2474

Log Depths Measured From KB 5 Ft. above GL 02.394

RUN No.	ONE		
Date	5-6-62		
First Reading	4493		
Last Reading	152		
Feet Measured	4341		
Csg. Schlum.	152		
Csg. Driller	152		
Depth Reached	4500		
Bottom Driller	4500		
Mud Nat.	GEL		
Dens. | Visc.	10.0 | 40	|	|
Mud Resist.	.429 @ 68 °F	@ °F	@ °F
" Res. BHT	.265 @ 113 °F	@ °F	@ °F
" pH	6.5 @ °F	@ °F	@ °F
" Wtr. Loss	10.2 CC 30 min	CC 30 min	CC 30 min
" Rmf (M)	.244 @ 72 °F	.159 @ 113 °F	@ °F
Bit Size	7 7/8"		
Spacing:			
T3'R1'R2	152 To 4493	To	To
T3'R1'R2	2450 To 4493	To	To
Opr. Rig Time	3-HOURS		
Truck No.	2922-GREAT BEND		
Recorded By	HALL & HARPER		
Witness	MR. JAMES		



Rw. .12

SCHLUMBERGER

LATEROLOG

SCHLUMBERGER WELL SURVEYING CORPORATION
Houston, Texas

COUNTY NESS
FIELD or LOCATION WILDCAT
WELL SEC. 17-17S-24W
COMPANY DICKMAN NO. 1
COMPANY WALTERS DRILLING CO.

COMPANY WALTERS DRILLING COMPANY
WELL DICKMAN NO. 1
FIELD WILDCAT
LOCATION SEC. 17-17S-24W C NE NW
COUNTY NESS
STATE KANSAS

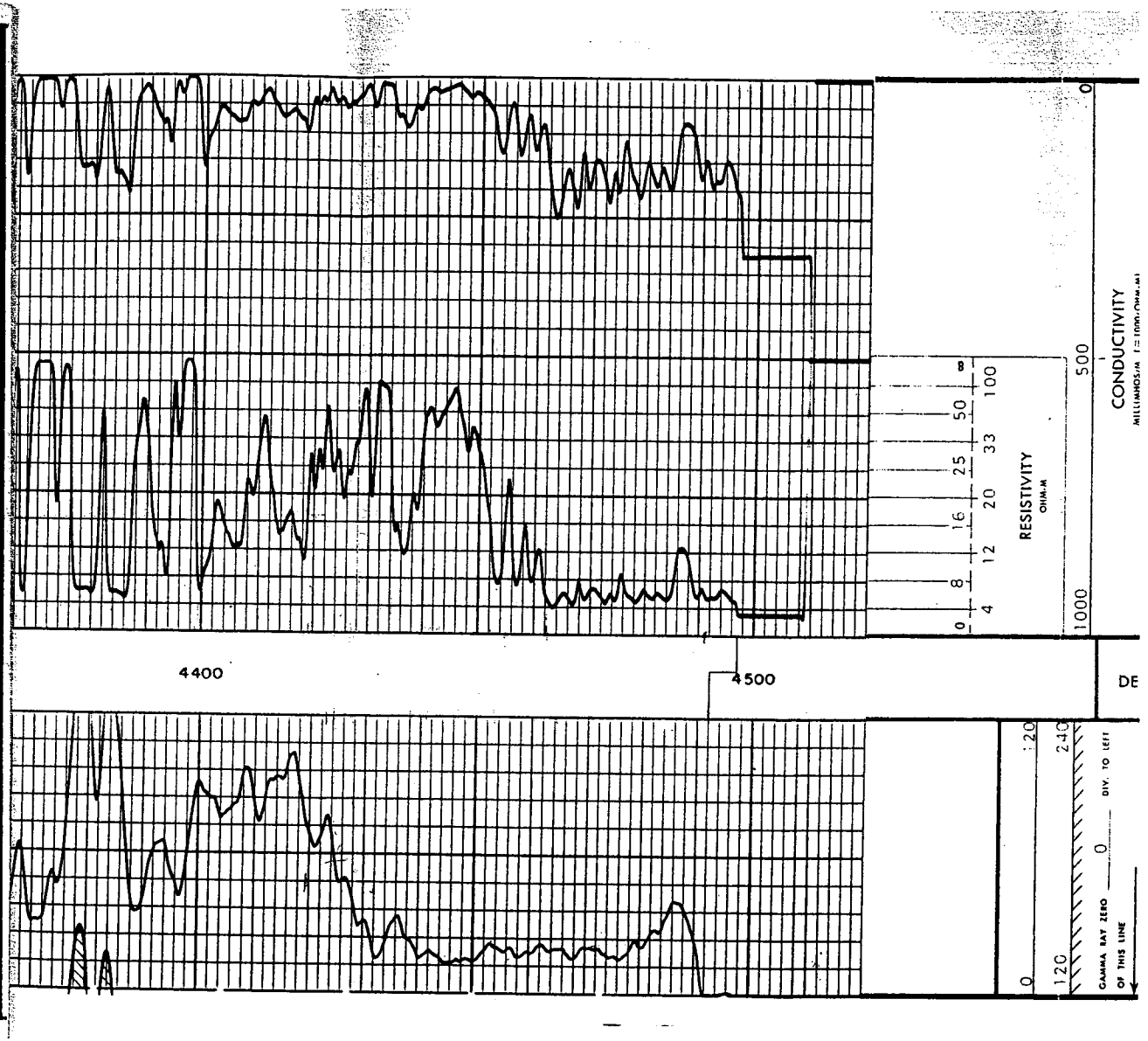
Other Surveys
INTEG. SONIC-CAL.
FT

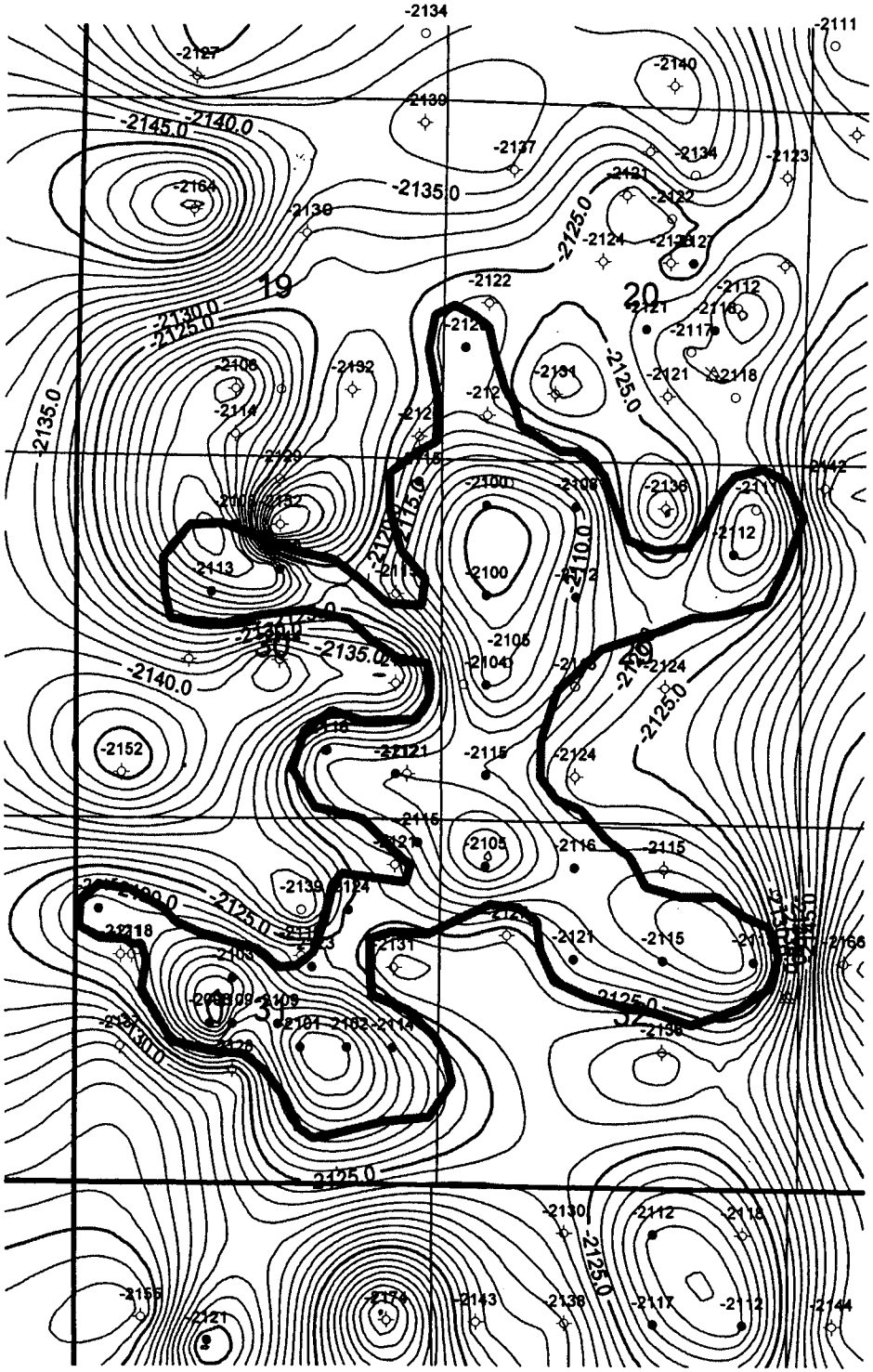
Location of Well
43661
PROPERTY OF
K. G. S. LIBRARY
540 Petroleum Bldg.
Wichita, Kansas 67[illegible]

Elevation: K.B.: 2479
D.F.: 2476
or G.L.: 2474

Log Depths Measured From KB 5 Ft. above GL

RUN No.	ONE		
Date	5-6-62		
First Reading	4497		
Last Reading	152		
Feet Measured	3345		
Csg. Schlum.			
Csg. Driller	152		
Depth Reached	4500		
Bottom Driller	4500		
Mud Nat.	GEL		
Dens. | Visc.	10.0 | 40	|	|
Mud Resist.	.429 @ 68 °F	@ °F	@ °F
" Res. BHT	.265 @ 113 °F	@ °F	@ °F
" pH	6.5 @ °F	@ °F	@ °F
" Wtr. Loss	10.2 CC 30 min	CC 30 min	CC 30 min
" Rmf (M)	.244 @ 72 °F	.159 @113 °F	@ °F
" Rmc	@ °F	@ °F	@ °F
Bit Size	7 7/8"		
Laterolog 3	a= 6" ;L= 3'	a= ;L=	a= ;L=
Laterolog 7	a= ;n=	a= ;n=	a= ;n=
Opr. Rig Time	3-HOURS		
Truck No.	2922-GREAT BEND		
Recorded By	HALL & HARPER		
Witness	MR. JAMES		



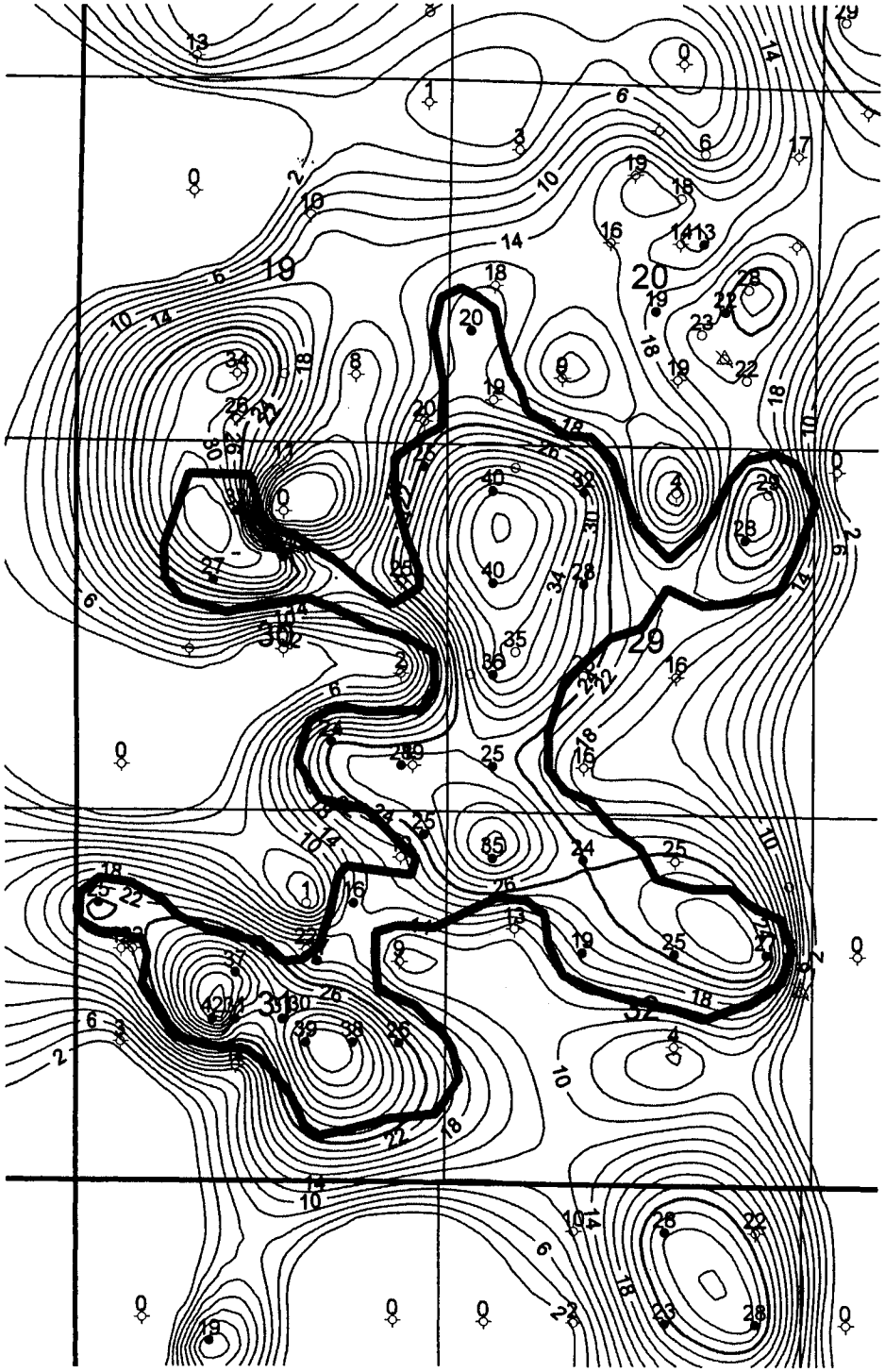


SCHADEL & SCHADEL NE

19S|20W

MISS SUBSEA

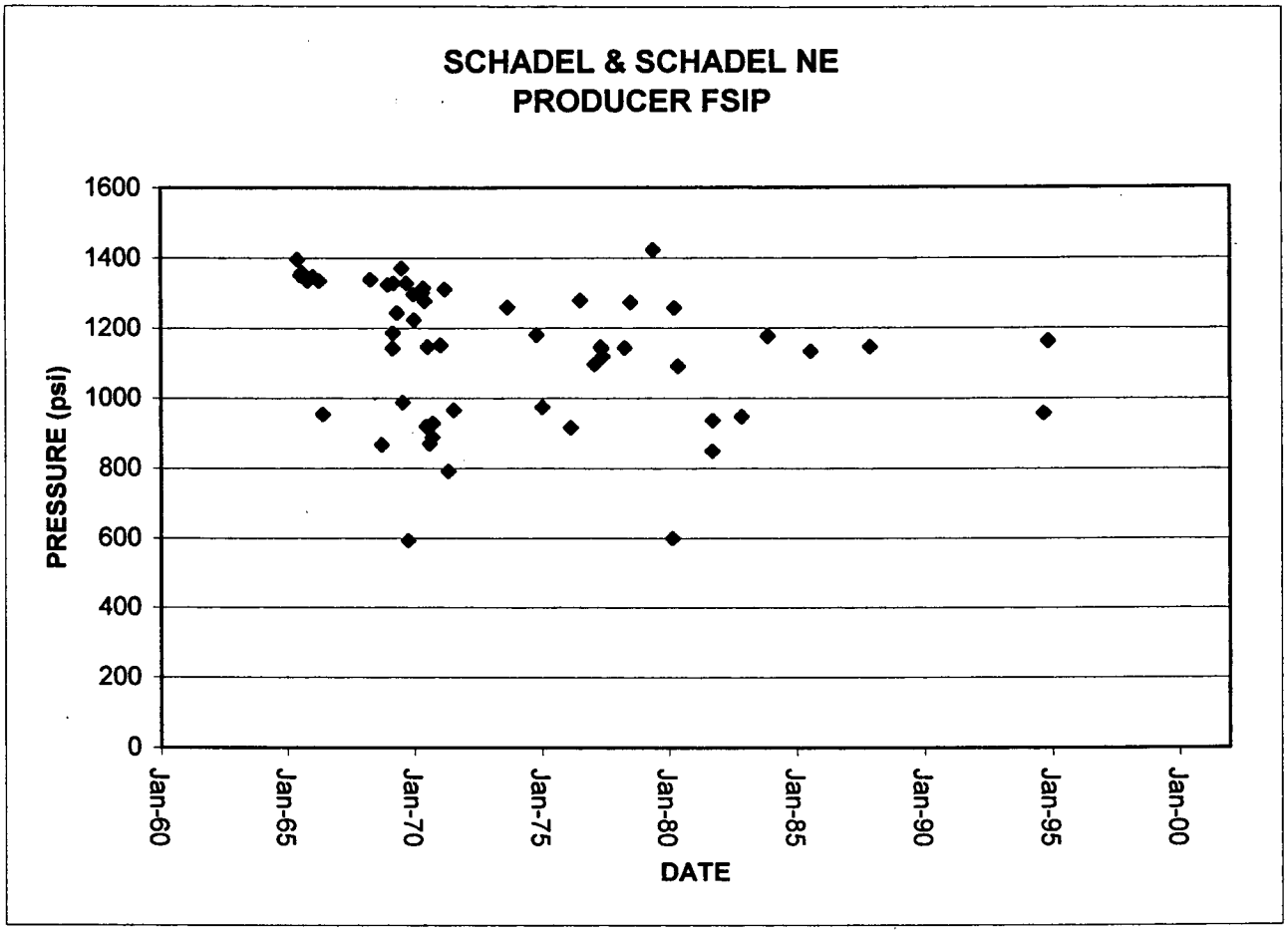
FIELD OUTLINE

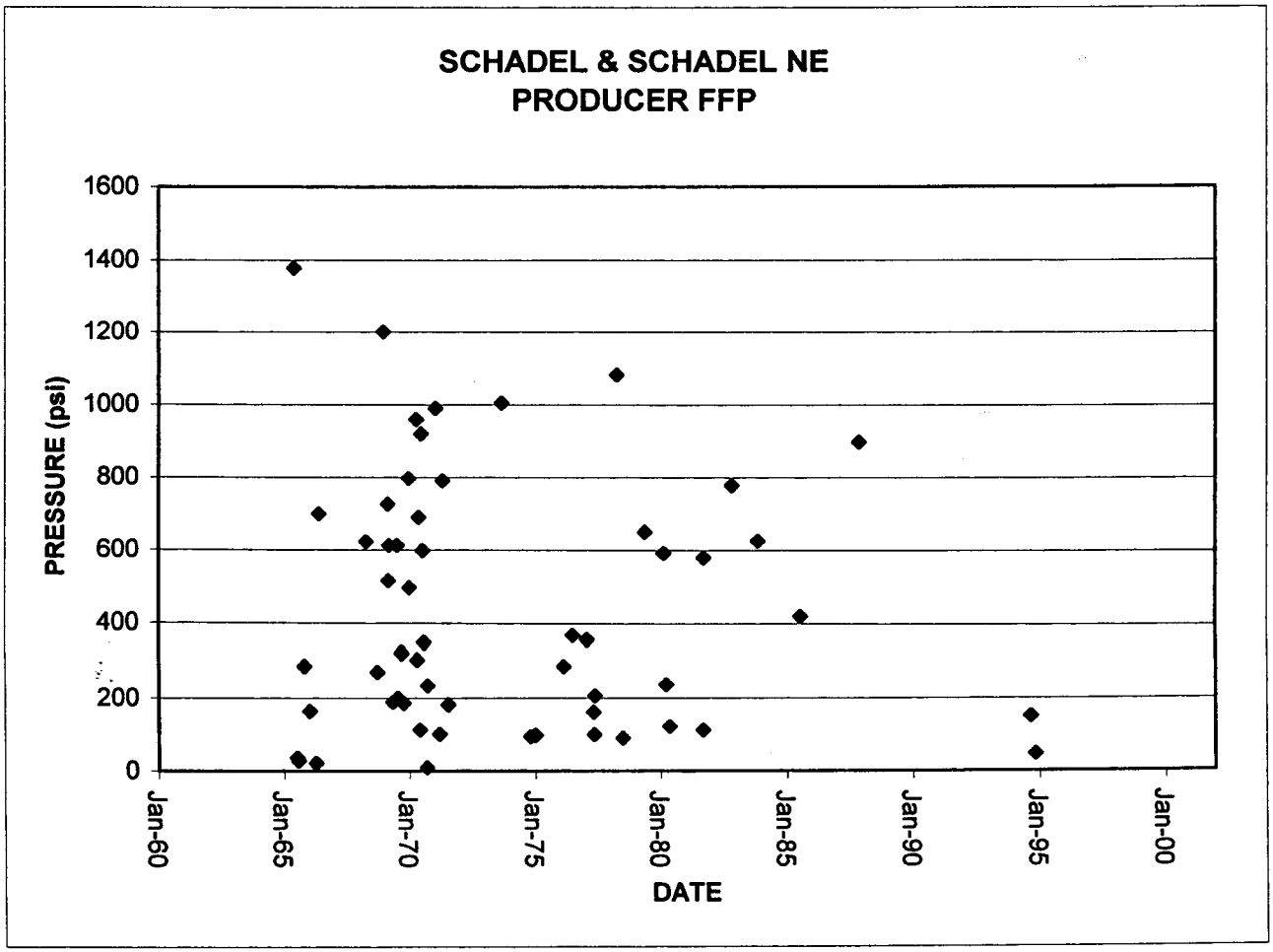


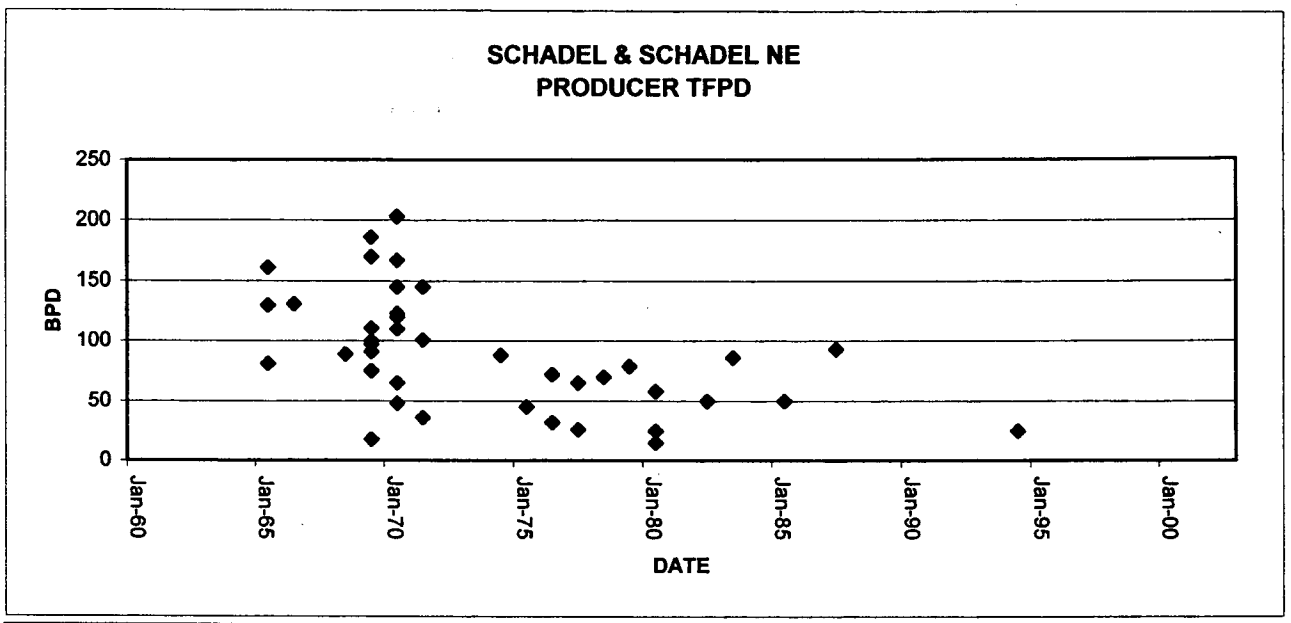
SCHADEL & SCHADEL NE

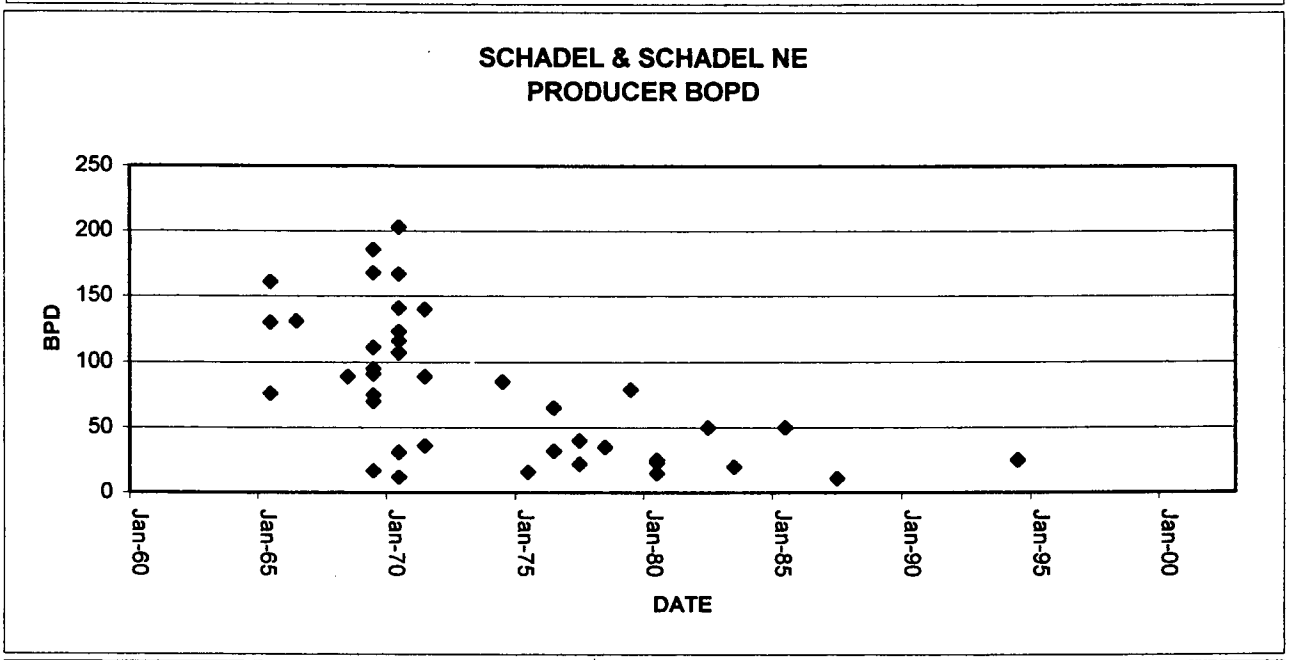
PAY ISOPACH

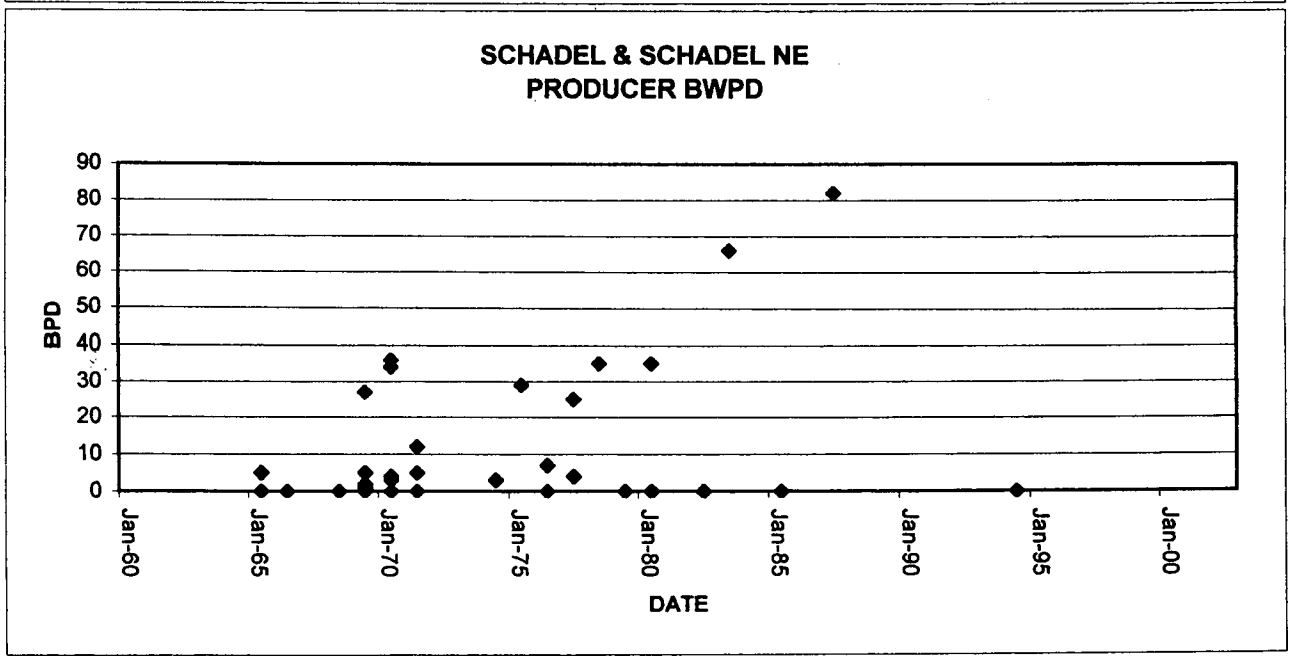
FIELD OUTLINE


SCHADEL & SCHADEL NE
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


SCHADEL & SCHADEL NE
PRODUCER FFP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


SCHADEL & SCHADEL NE
PRODUCER TFPD
250
200
150
100
50
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


SCHADEL & SCHADEL NE
PRODUCER BOPD
250
200
150
100
50
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


SCHADEL & SCHADEL NE
PRODUCER BWPD
90
80
70
60
50
40
30
20
10
0
BPD
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

SCHLUMBERGER

COMPENSATED FORMATION DENSITY LOG
Gamma-Gamma

COUNTY RUSH
FIELD or LOCATION SCHADEL N.E. SEC. 29-19S-20W
WELL WELLS NO. 29-6
COMPANY PUBCO PETROLEUM CORPORATION

COMPANY PUBCO PETROLEUM CORPORATION

WELL WELLS NO. 29-6

FIELD SCHADEL N.E.

COUNTY RUSH STATE KANSAS

Property of ~~Kansas Geological Society~~ 540 Petroleum Bldg. ~~Wichita, Kansas~~

Location: 100'S & 100'W OF CENTER SE-NW

Sec. 29 Twp. 19S Rge. 20W

Other Services: DIL-GR SYNERGETIC

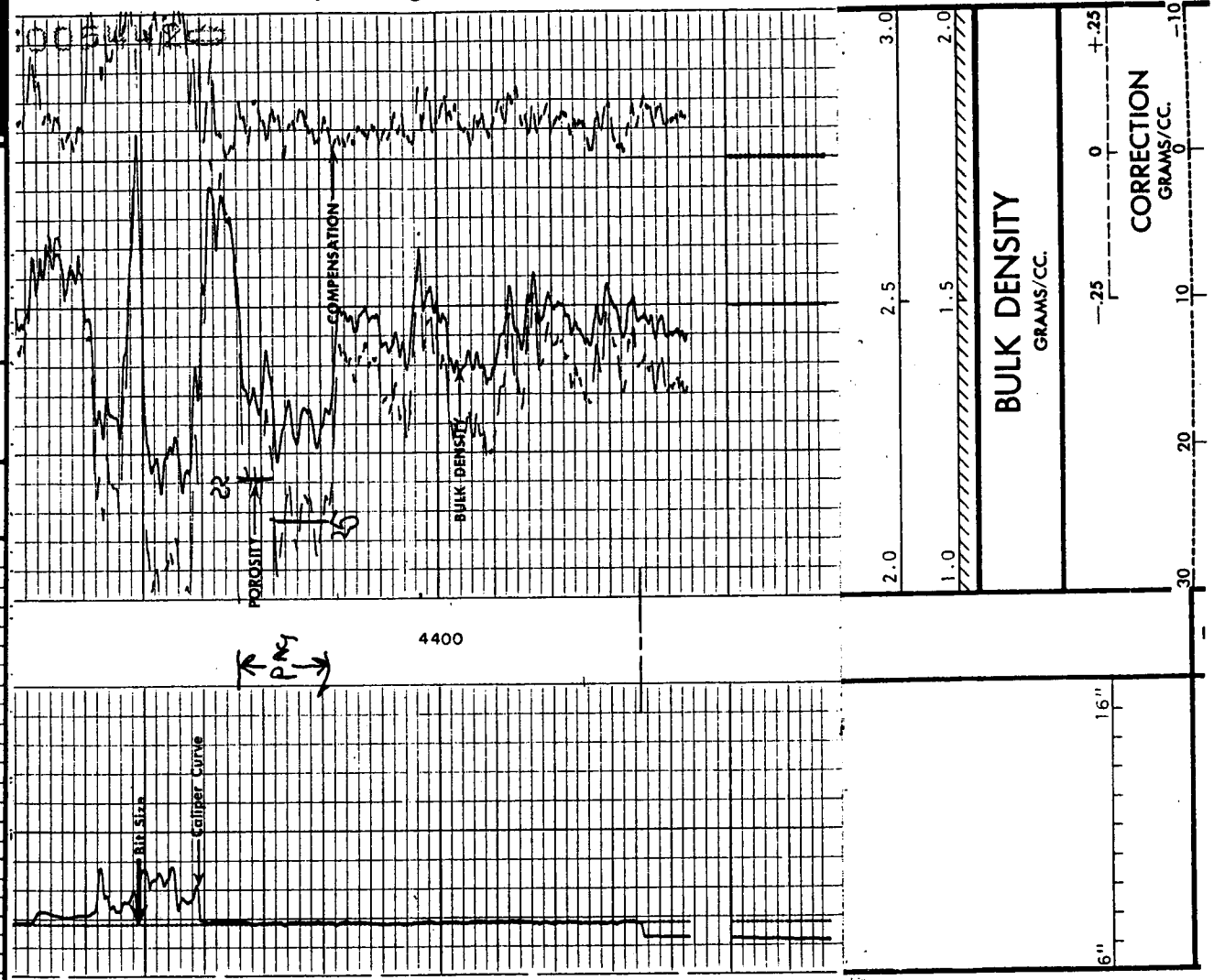
Permanent Datum: GROUND LEVEL ; Elev.: 2243
Log Measured From K.B. , 5 Ft. Above Perm. Datum
Drilling Measured From K.B.

Elev.: K.B. 2248
D.F. 2246
G.L. 2243

Date	3-21-69
Run No.	ONE
Type Log	FDC
Depth—Driller	4435
Depth—Logger	4436
Bottom logged interval	4435
Top logged interval	3500
Type fluid in hole	S.M.
Salinity, PPM Cl.	29,000 (R)
Density	10.0
Level	FULL
Max rec. temp., deg F.	110
Operating rig time	2 HOURS
Recorded by	JACOBS
Witnessed by	CARR, DOUGHERTY

RUN No.	BORE-HOLE RECORD Bit	From	To	CASING RECORD Size	Wgt.	From	To
1	7 7/8	378	4435	8 5/8	---	G.L.	378

WS-1381-D



SCHLUMBERGER

COMPENSATED FORMATION DENSITY LOG

Gamma-Gamma

COUNTY	RUSH
FIELD or LOCATION	N.E. SCHADEL SEC. 29-19S-20W
WELL	WELLS NO. 29-3
COMPANY	PUBCO PETROLEUM CORPORATION

COMPANY PUBCO PETROLEUM CORPORATION

WELL WELLS NO. 29-3

FIELD N.E. SCHADEL

COUNTY RUSH STATE KANSAS

Location: 150'SW OF CENTER NE-NW

Sec. 29 Twp. 19S Rge. 20W

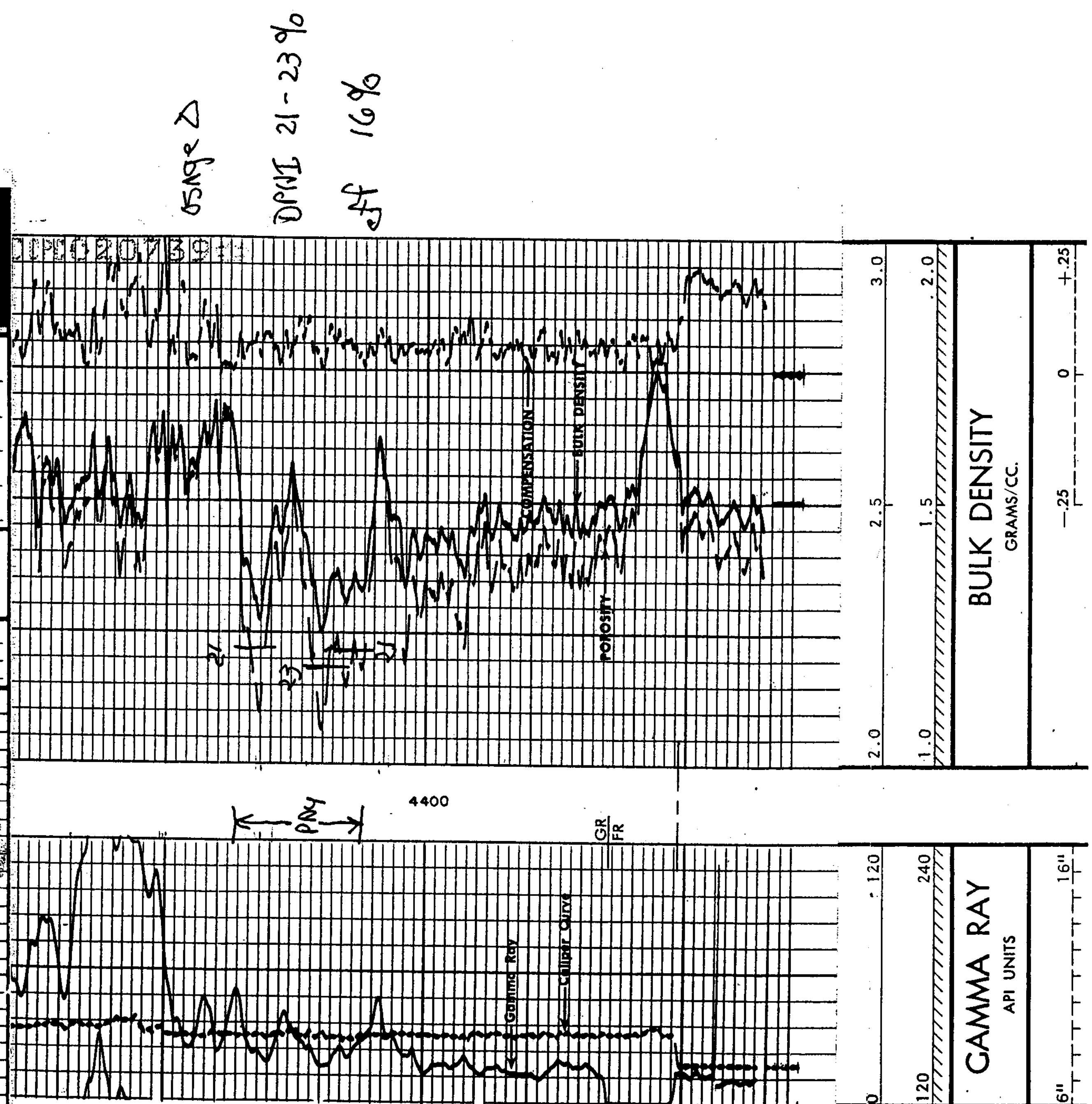
Other Services: DIL LOL

Permanent Datum: GROUND LEVEL ; Elev.: 2244
Log Measured From K.B. , 5 Ft. Above Perm. Datum
Drilling Measured From K.B.

Elev.: K.B. 2249
D.F. 2246
G.L. 2244

Date	8-17-70		relored 63954 WLB
Run No.	ONE		
Type Log	FDC-GR		
Depth—Driller	4445		
Depth—Logger	4450		
Bottom logged interval	4449		
Top logged interval	3000		
Type fluid in hole	SM		
Salinity, PPM Cl.	36,400 (R)		
Density	9.5		
Level	FULL		
Max rec. temp., deg F.	108		
Operating rig time	2 HOURS		
Recorded by	MORGANTI		
Witnessed by	SANDERS		

RUN	BORE-HOLE RECORD			CASING RECORD			
No.	Bit	From	To	Size	Wgt.	From	To
1	8 3/4	360	T.D.	9 5/8	---	G.L.	360



SCHLUMBERGER — DUAL INDUCTION - LATEROLOG

COMPANY PUBCO PETROLEUM CORP.

McCook

WELL WELLS # 29-6

FIELD SCHADEL NE

COUNTY RUSH STATE KANSAS

LOCATION 100'S & 100'W of C SE NW

Sec. 29 Twp. 19S Rge. 20W

Other Services: FDC

Permanent Datum: GL, Elev. 2243

Log Measured From KB, 5 Ft. Above Perm. Datum

Drilling Measured From KB

Elev.: K.B. 2248
D.F. 2246
G.L. 2243

Date	3-21-69			57 027
Run No.	ONE			
Depth—Driller	4435			
Depth—Logger	4436			
Btm. Log Interval	4432			
Top Log Interval	356			
Casing—Driller	8 5/8 @ 378			
Casing—Logger	356			
Bit Size	7 7/8			
Type Fluid in Hole	S.M.			
Dens. / Visc.	10.0 / 48			
pH / Fluid Loss	6.6 / 6.0 ml	ml	ml	ml
Source of Sample	Flowline			
R_m @ Meas. Temp.	.157 @ 68 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	.110 @ 64 °F	.064 @ 110 °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	— @ — °F	@ °F	@ °F	@ °F
Source: R_{mf} / R_{mc}	M / —			
R_m @ BHT	.097 @ 110 °F	@ °F	@ °F	@ °F
Time Since Circ.	2 HRS			
Max. Rec. Temp.	110 °F	°F	°F	°F
Equip. Location	3009 WICHITA			
Recorded By	JACOBS			
Witnessed By	CARR & BOUCHARTY			

The well name, location and borehole reference data were furnished by the customer.

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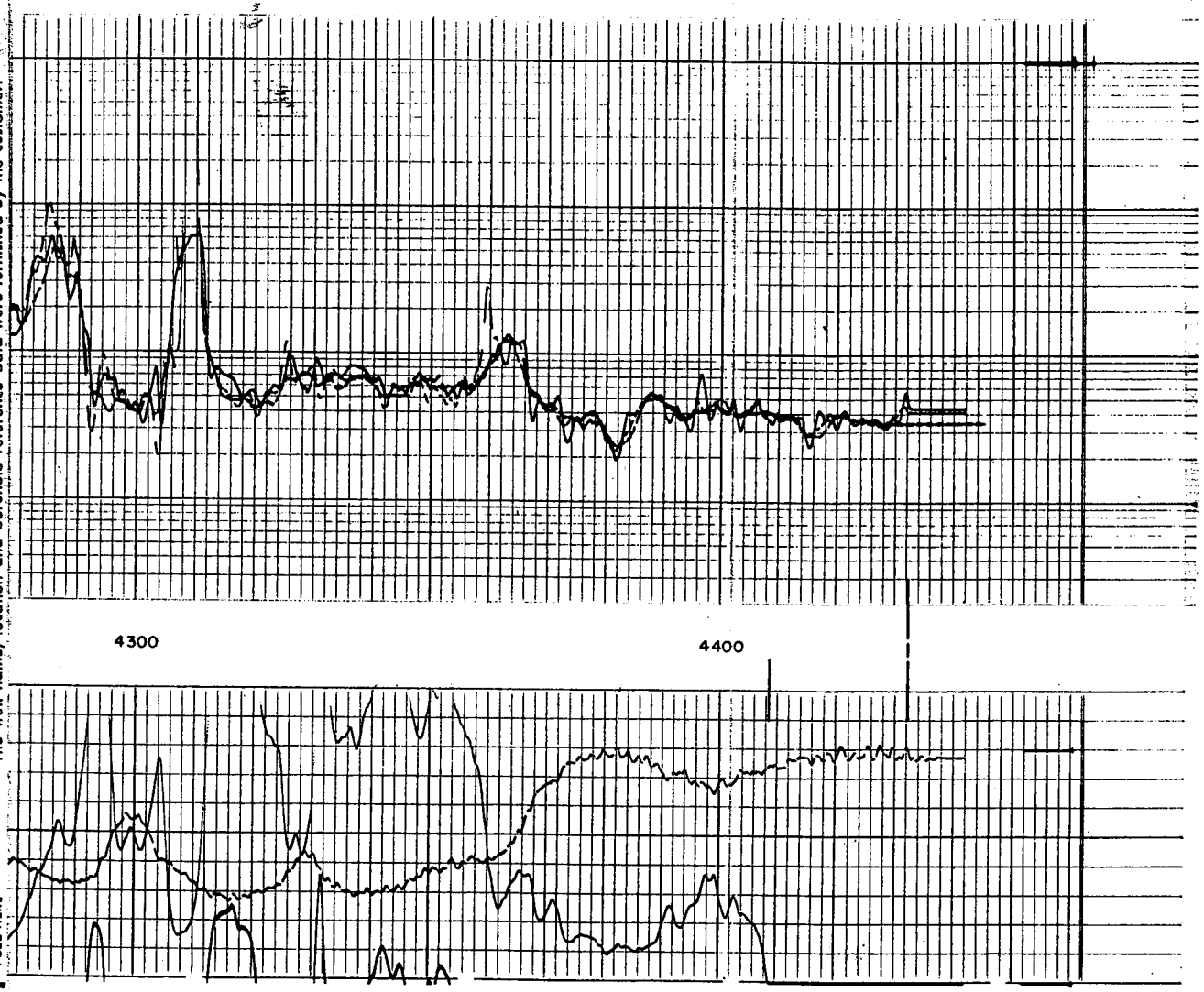
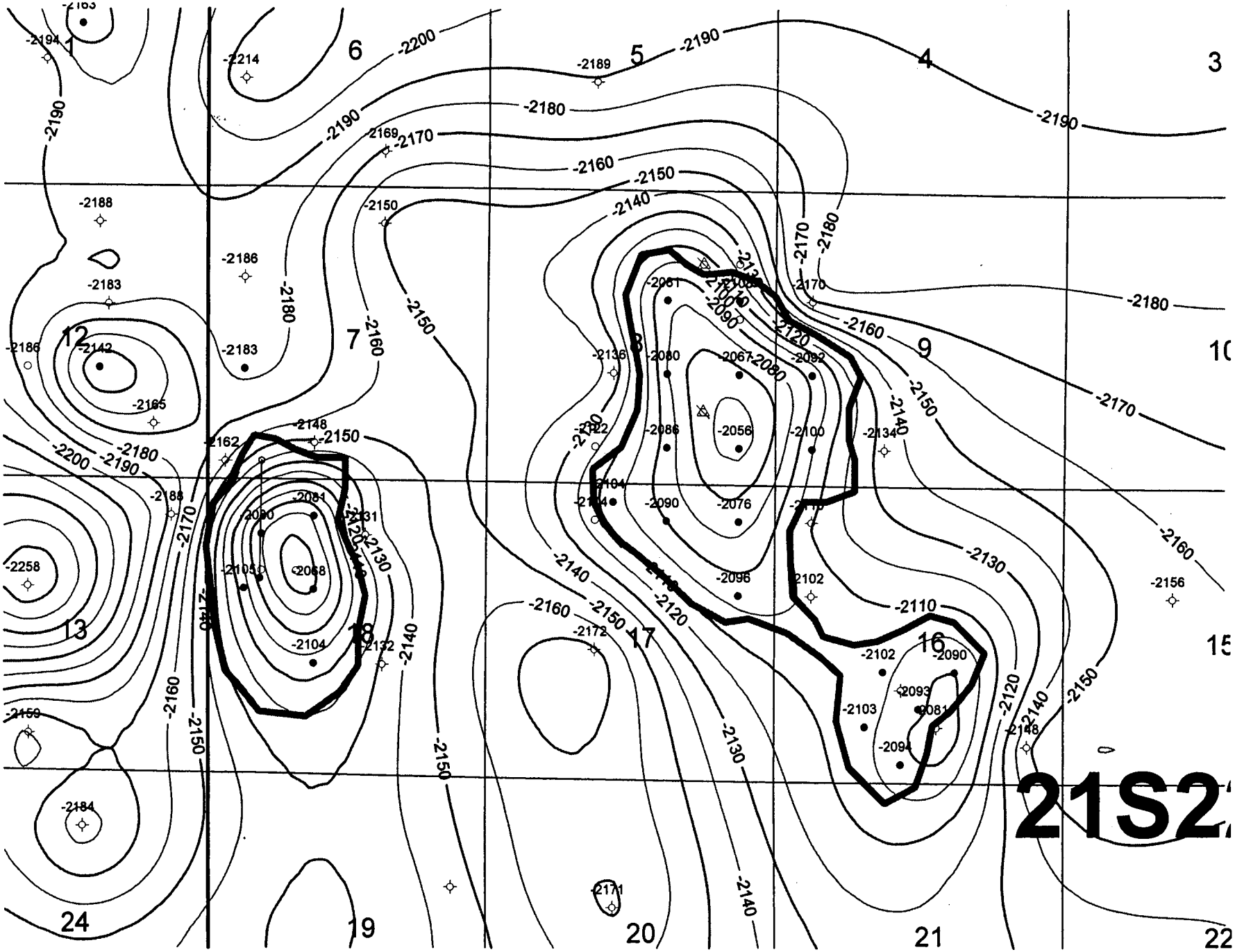
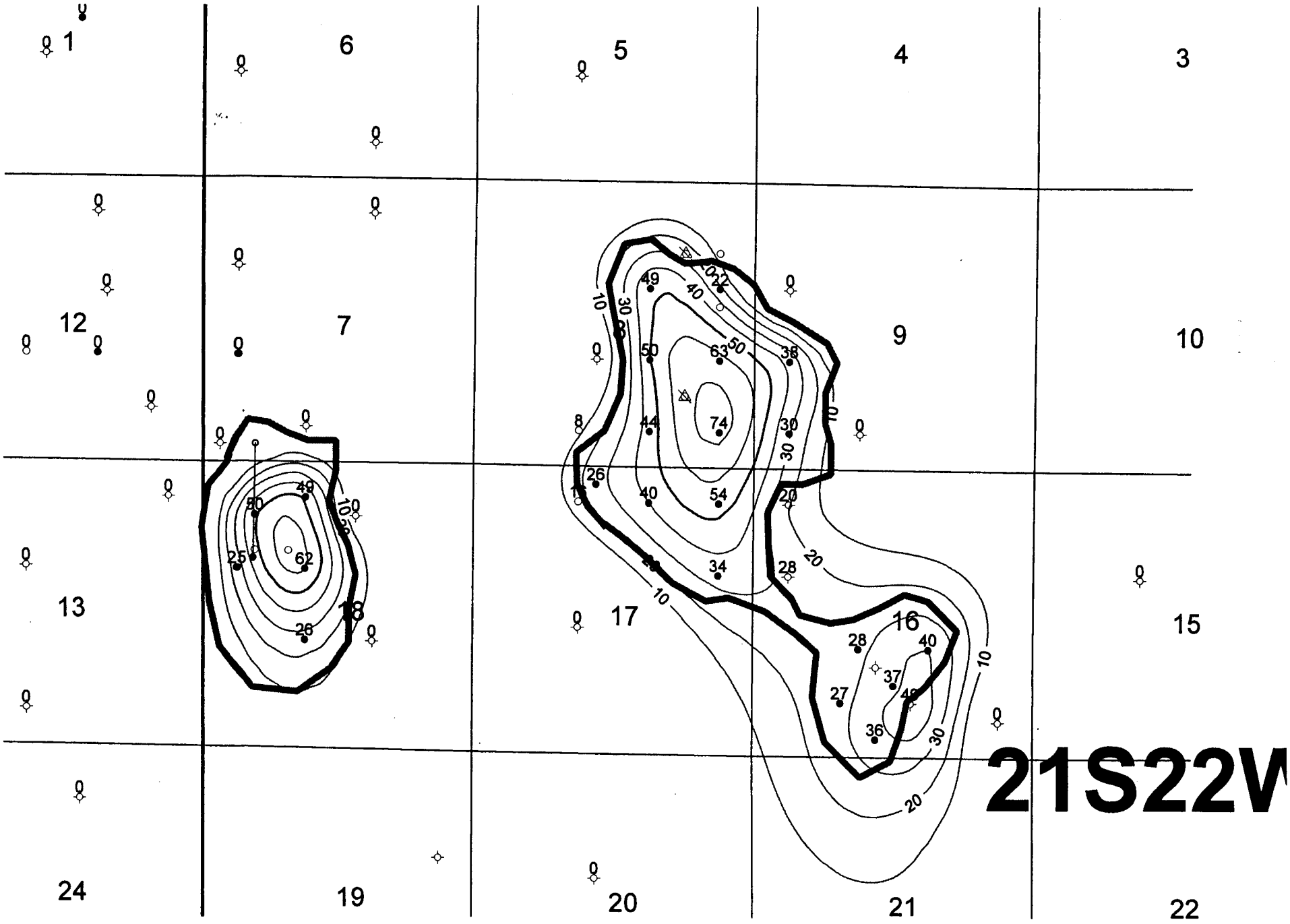
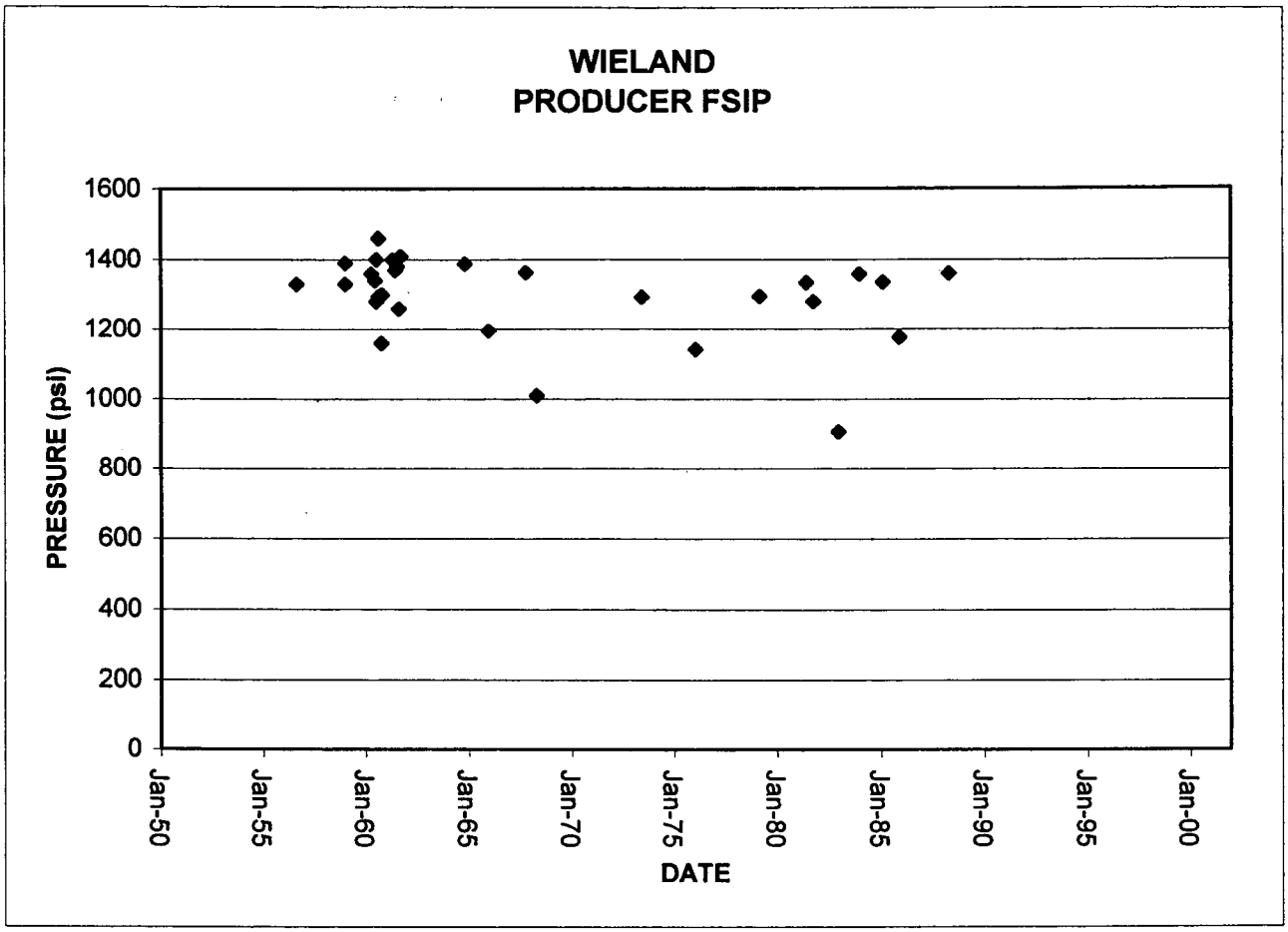
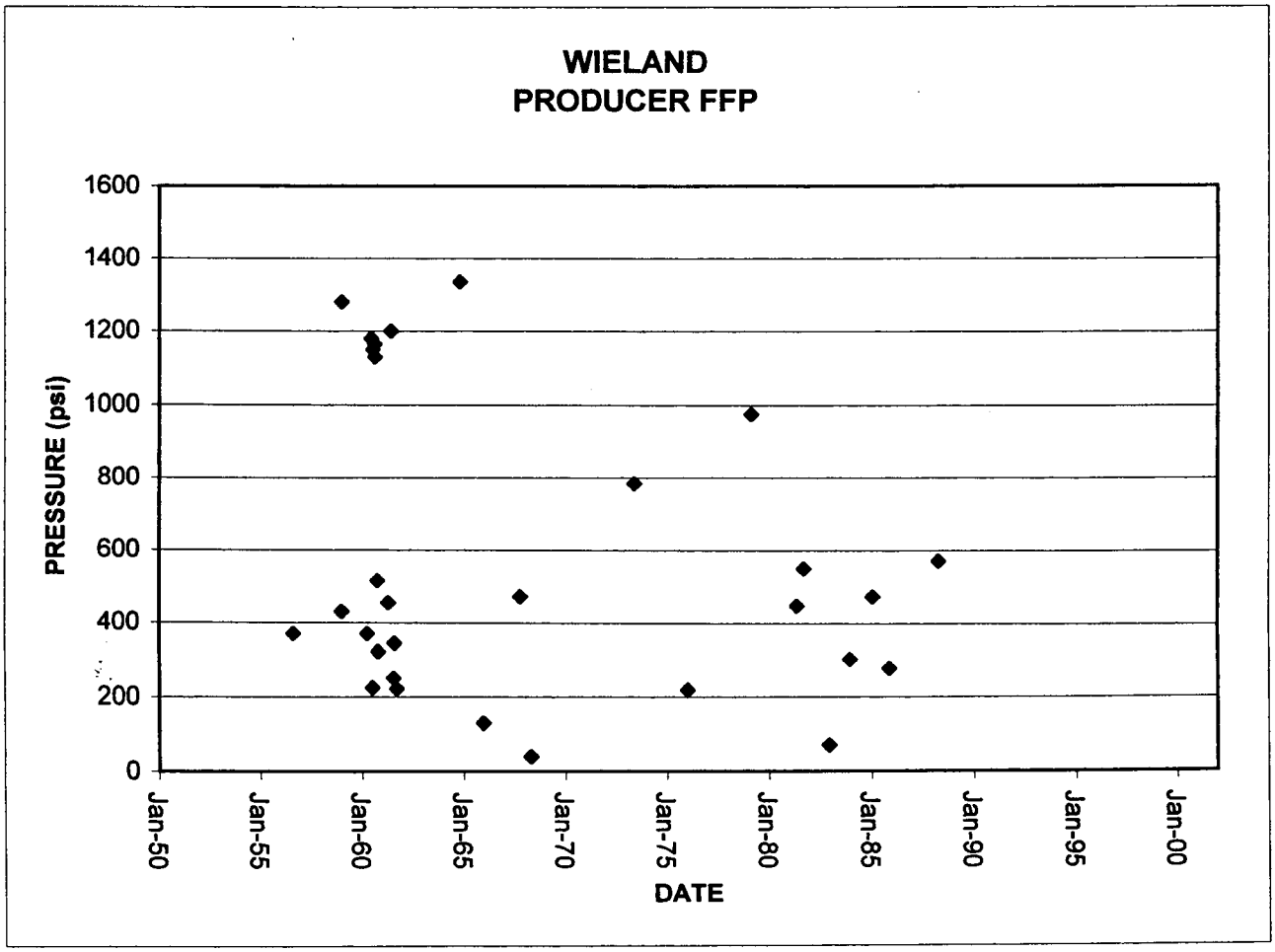


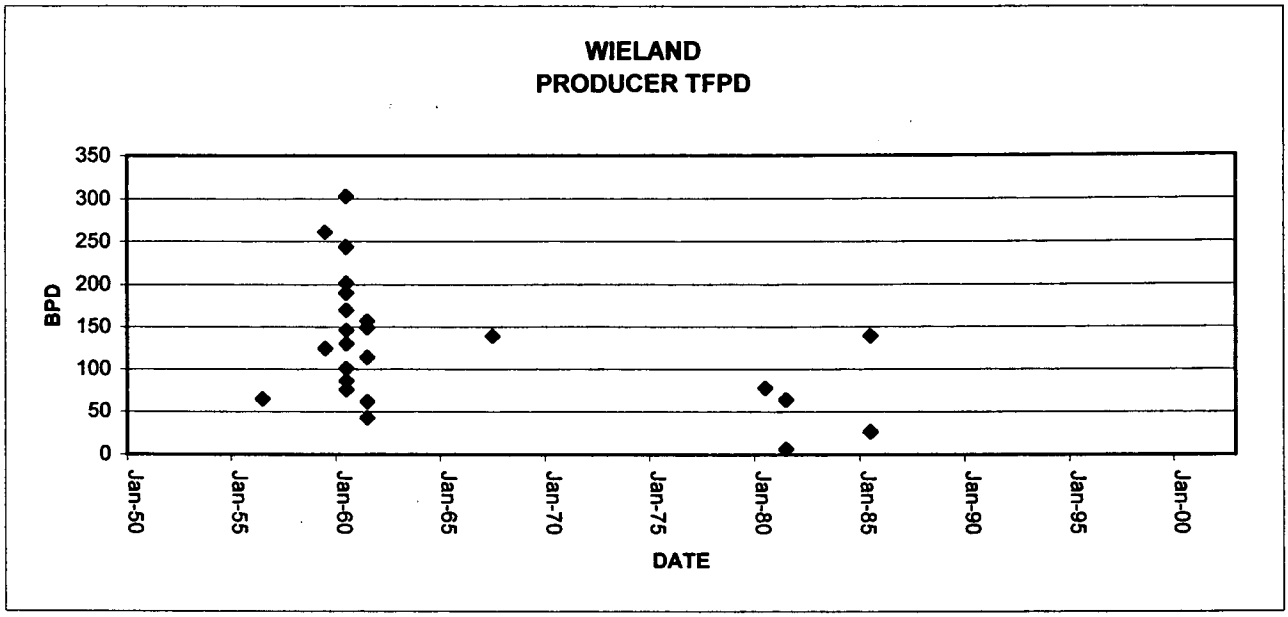

WIELAND & WIELAND WEST
MISS SUBSEA
FIELD OUTLINE
21S2
215/22W

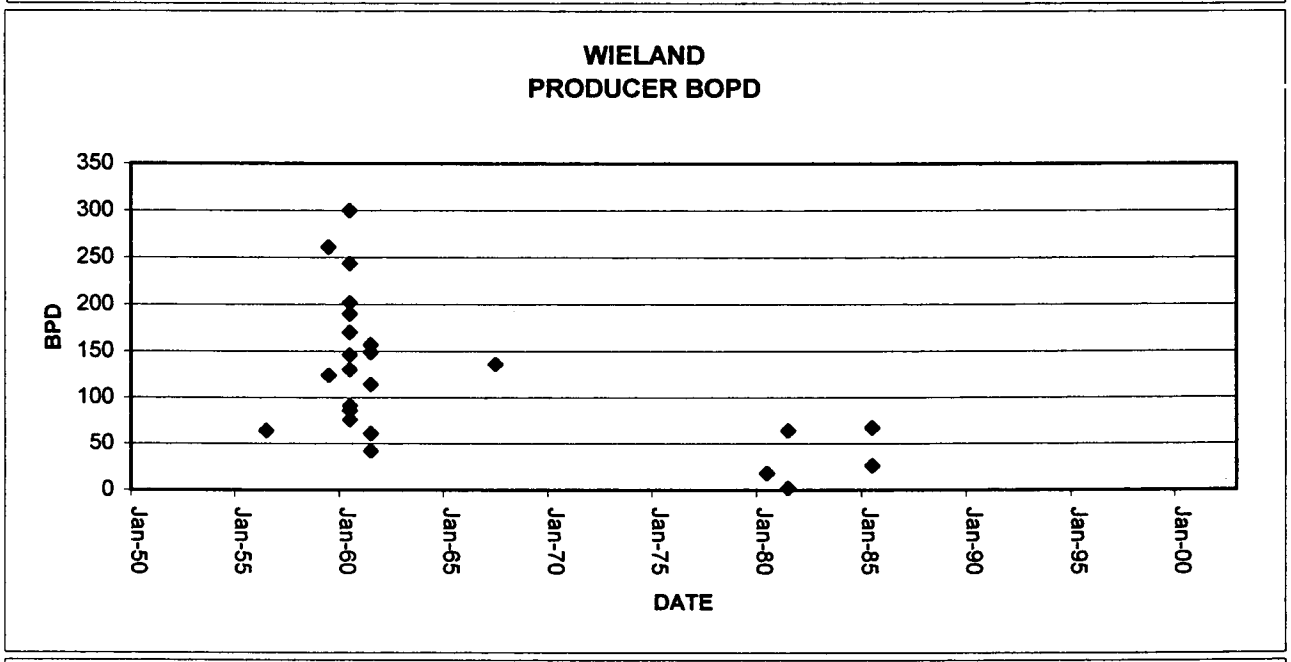


WIELAND & WIELAND WEST **PAY ISOPACH** **FIELD OUTLINE**


WIELAND
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


WIELAND
PRODUCER FFP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


WIELAND
PRODUCER TFPD
BPD
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


WIELAND
PRODUCER BOPD
BPD
350
300
250
200
150
100
50
0
Jan-50
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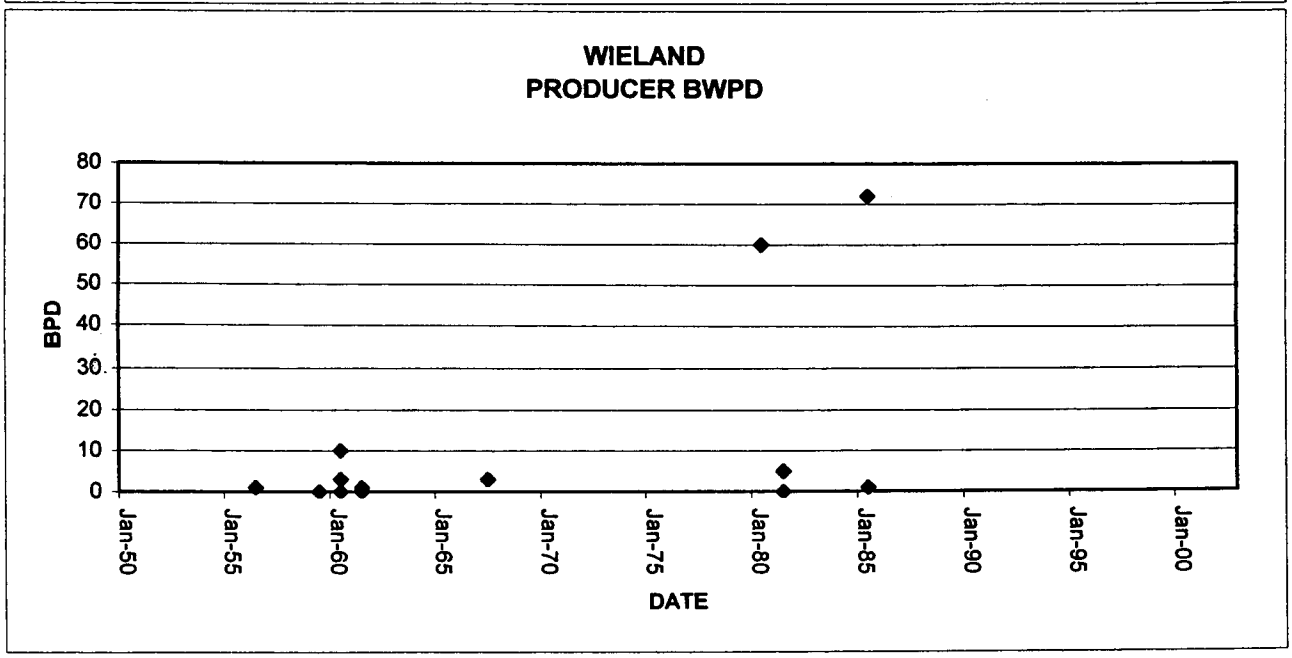
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


WIELAND
PRODUCER BWPD
BPD
80
70
60
50
40
30
20
10
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

Sonic Log

COUNTY HODGEMAN
FIELD or LOCATION WEILAND NORTH 8-21S-22W
WELL SELFRIDGE #2
COMPANY PICKRELL DRILLING COMPANY

COMPANY PICKRELL DRILLING COMPANY
WELL SELFRIDGE #2
FIELD WEILAND NORTH
LOCATION 8-21S-22W C NE SE
COUNTY HODGEMAN
STATE KANSAS

Other Surveys
LGR

Location of Well

28375
PROPERTY OF
K. G. S. LIBRARY
540 Petroleum Bldg.
Wichita, Kansas 67201

Elevation: K.B.: 2250
D.F.: 2247
or G.L.: 2245

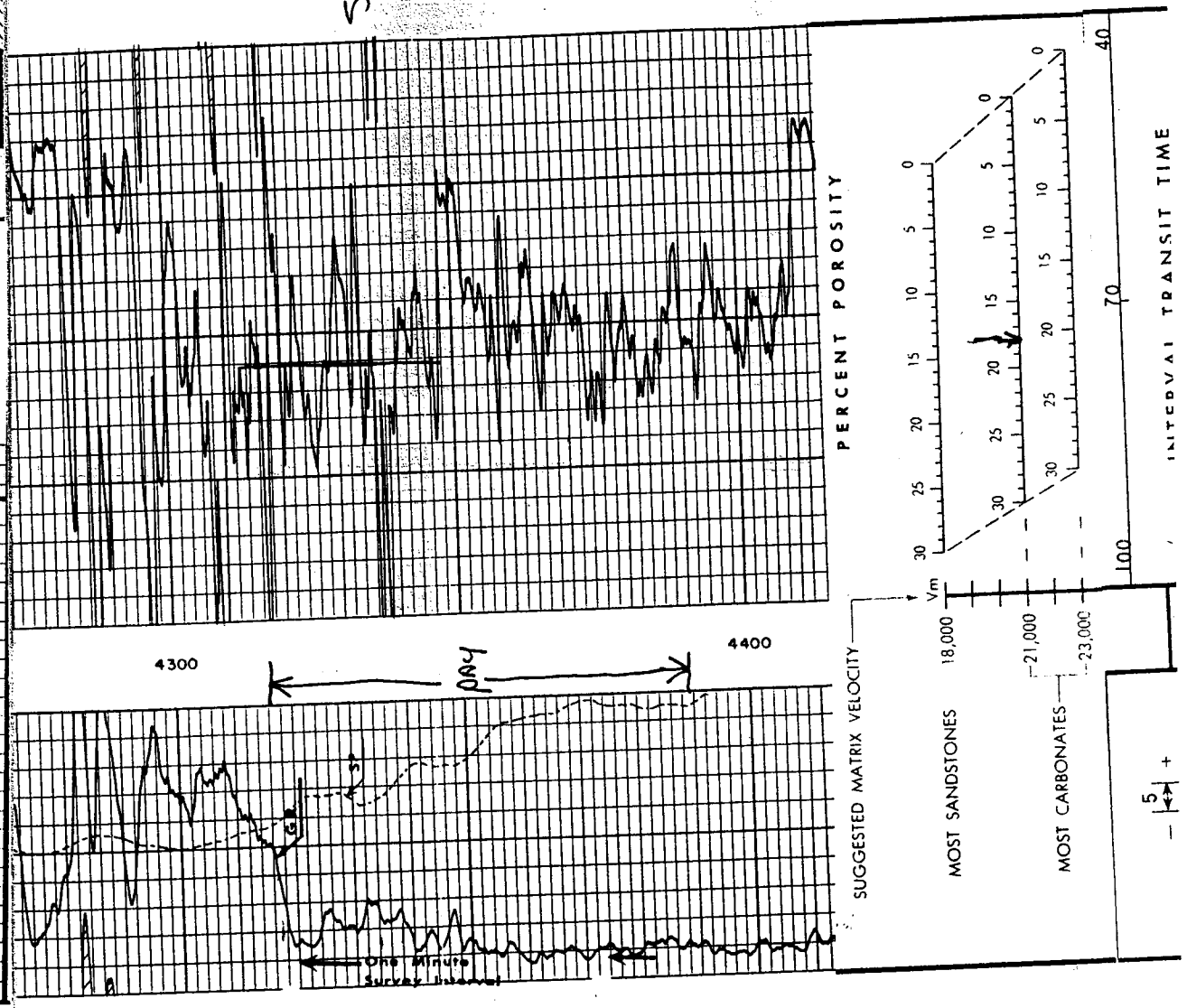
Log Depths Measured From KB 5 Ft. above GL

File No. 36,111 WLB

RUN No.	ONE		
Date	7-24-60		
First Reading	4420 1475		
Last Reading	3550 254		
Feet Measured	870 1221		
Csg. Schlum.	254		
Csg. Driller	254		
Depth Reached	4424		
Bottom Driller	4425		
Mud Nat.	SALT GEL		
Dens. | Visc.	10 | 43	|	|
Mud Resist.	.146 @ 90 °F	@ °F	@ °F
" Res. BHT	.12 @ 110 °F	@ °F	@ °F
" pH	6.2 @ °F	@ °F	@ °F
" Wtr. Loss	8.0 CC 30 min	CC 30 min	CC 30 min
" Rmf	.099 @ 89 °F	.082 @ 110 °F	@ °F
Bit Size	7 7/8		
Span:			
"	3550 To TD	To	To
"	254 To 1475	To	To
Opr. Rig Time	2 HOURS		
Truck No.	2536 - PRATT		
Recorded By	MR. McFADIN		
Witness	MR. MALONE		

RETURN TO:
SCHLUMBERGER WELL SURVEYING CORP.
575 N 4th NAT'L. BANK BLDG.
WICHITA 2, KANSAS

SPNI 18%



SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

Laterolog

WITH GAMMA RAY

COUNTY HODGEMAN
FIELD or LOCATION WEILAND NORTH 8-21S-22W
WELL SELFRIDGE #2
COMPANY PICKRELL DRILLING COMPANY

COMPANY PICKRELL DRILLING COMPANY
WELL SELFRIDGE #2
FIELD WEILAND NORTH
LOCATION 8-21S-22W C NE SE
COUNTY HODGEMAN
STATE KANSAS

Other Surveys ✓
SI

Location of Well

38374

PROPERTY OF
K. G. S. LIBRARY
540 Petroleum Bldg.
Wichita, Kansas 67201

Elevation: K.B.: 2250
D.F.: 2247
or G.L.: 2245

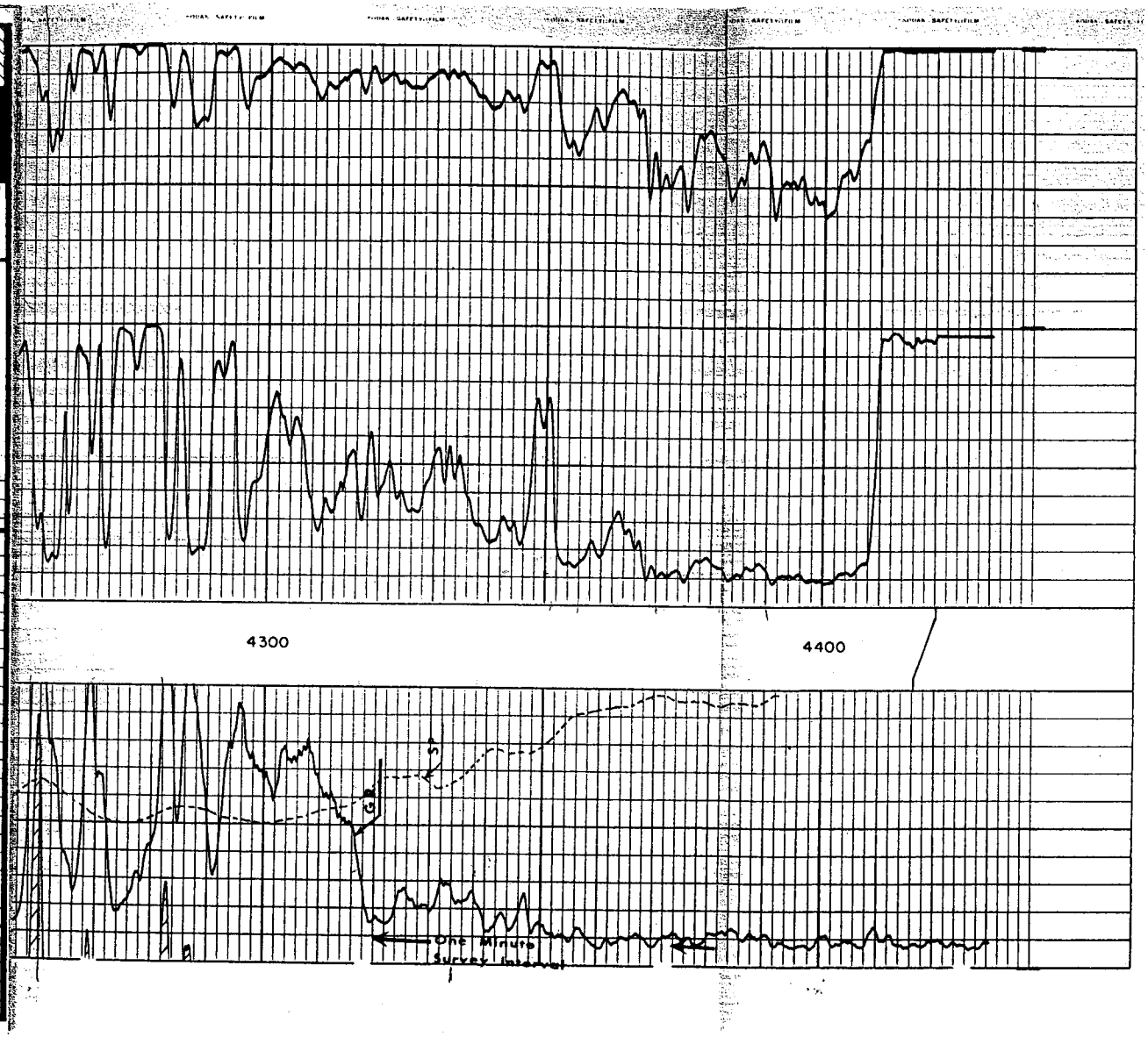
Log Depths Measured From KB 5 Ft. above GL

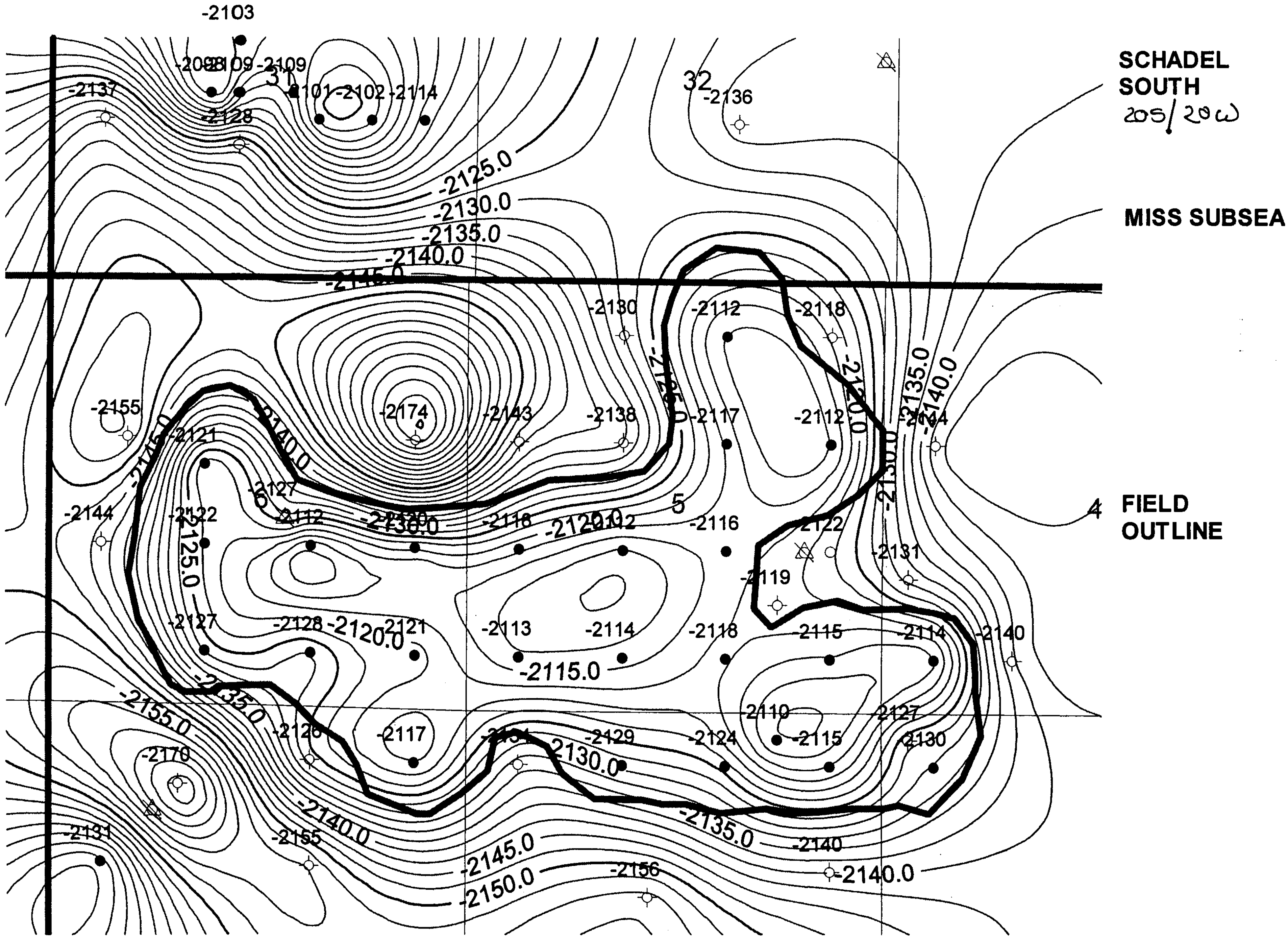
36 III WLB

RUN No.	ONE		
Date	7-24-60		
First Reading	4420		
Last Reading	254		
Feet Measured	4166		
Csg. Schlum.	254		
Csg. Driller	254		
Depth Reached	4423		
Bottom Driller	4425		
Mud Nat.	SALT GEL		
Dens. ; Visc.	10 ; 43	;	;
Mud Resist.	.146 @ 90 °F	@ °F	@ °F
" Res. BHT	.12 @ 110 °F	@ °F	@ °F
" pH	6.2 @ °F	@ °F	@ °F
" Wtr. Loss	8.0 CC 30 min	CC 30 min	CC 30 min
" Rmf	.099 @ 89 °F	@ °F	@ °F
" Rmf BHT	.082 @ 110 °F	@ °F	@ °F
Bit Size	7 7/8"		
Laterolog 3	a= 6" ;L= 31'	a= ;L=	a= ;L=
Laterolog 7	a= ;n=	a= ;n=	a= ;n=
Opr. Rig Time	2 HOURS		
Truck No.	2536 - PRATT		
Recorded By	MR. McFADIN		
Witness	MR. MALONE		

RETURN TO:
SCHLUMBERGER WELL SURVEYING CORP.
576 N. 4th. NAT'L. BANK BLDG.
WICHITA 2, KANSAS

K.G.S. LIBRARY




SCHADEL
SOUTH
20S/20W
MISS SUBSEA
FIELD
OUTLINE
31
32
5
6
4
-2125.0
-2130.0
-2135.0
-2140.0
-2145.0
-2120.0
-2115.0
-2150.0
-2155.0
-2103
-2137
-2128
-2101
-2102
-2114
-2136
-2130
-2112
-2118
-2155
-2121
-2174
-2143
-2138
-2117
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-2140
-2110
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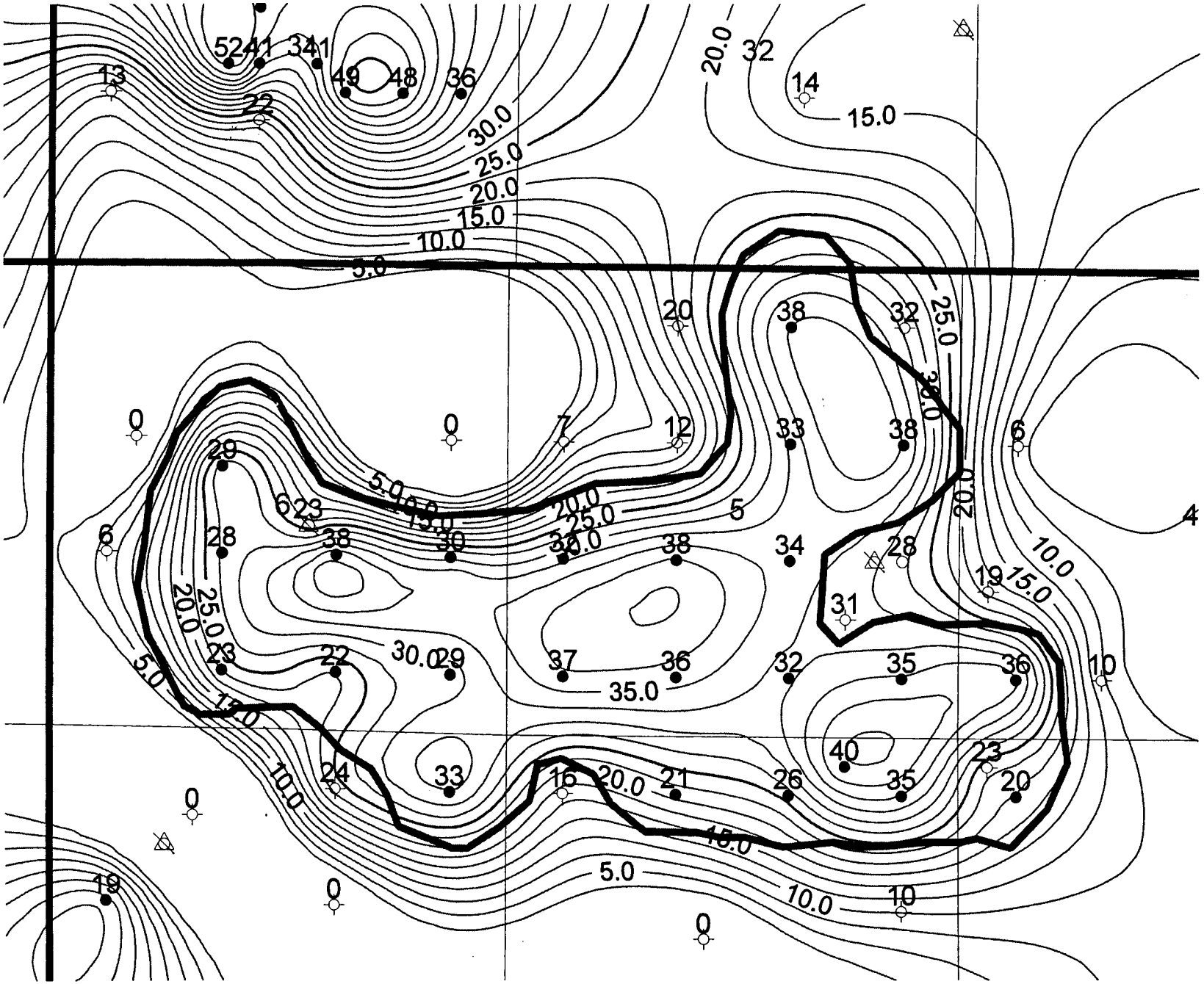
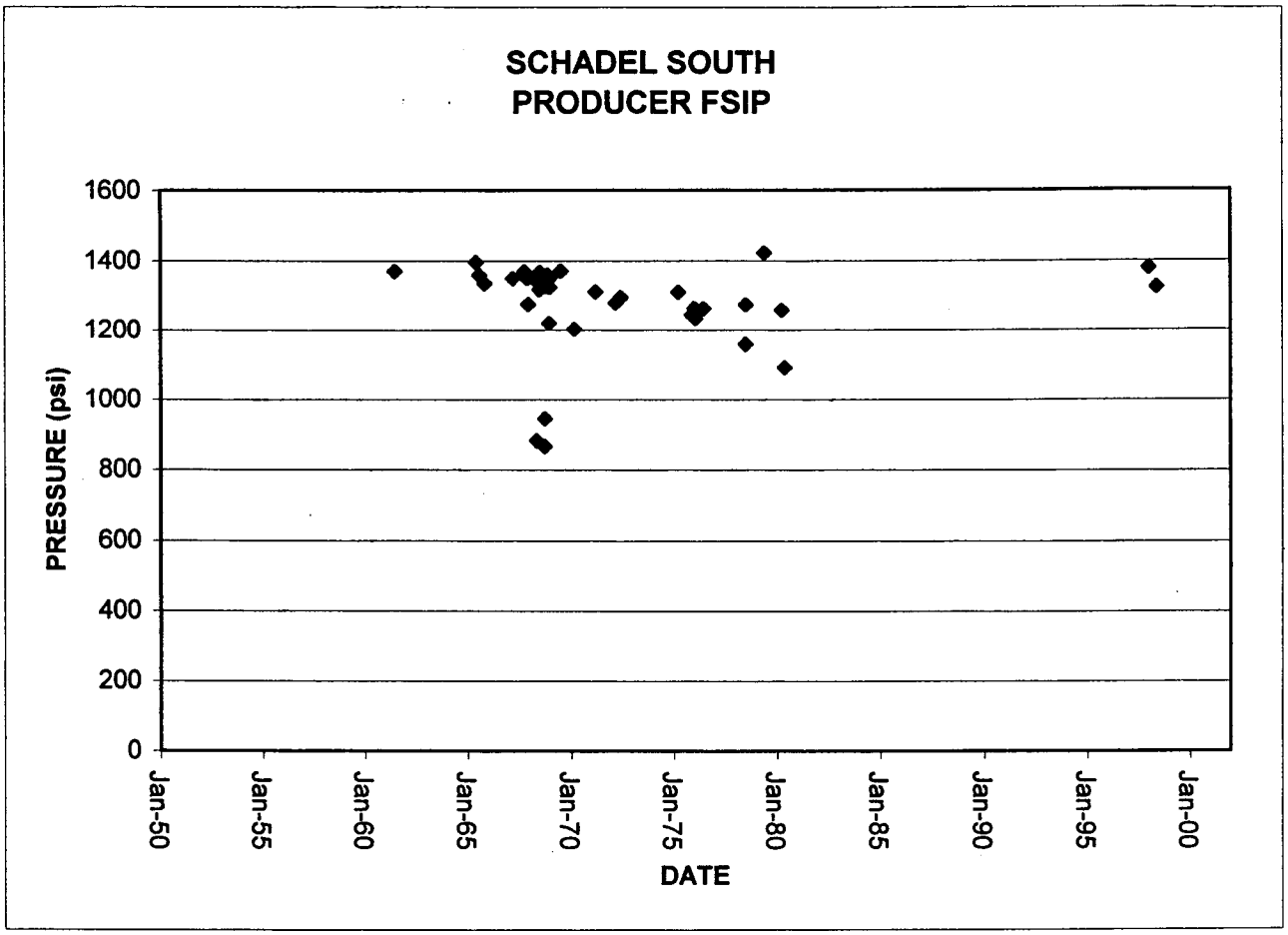
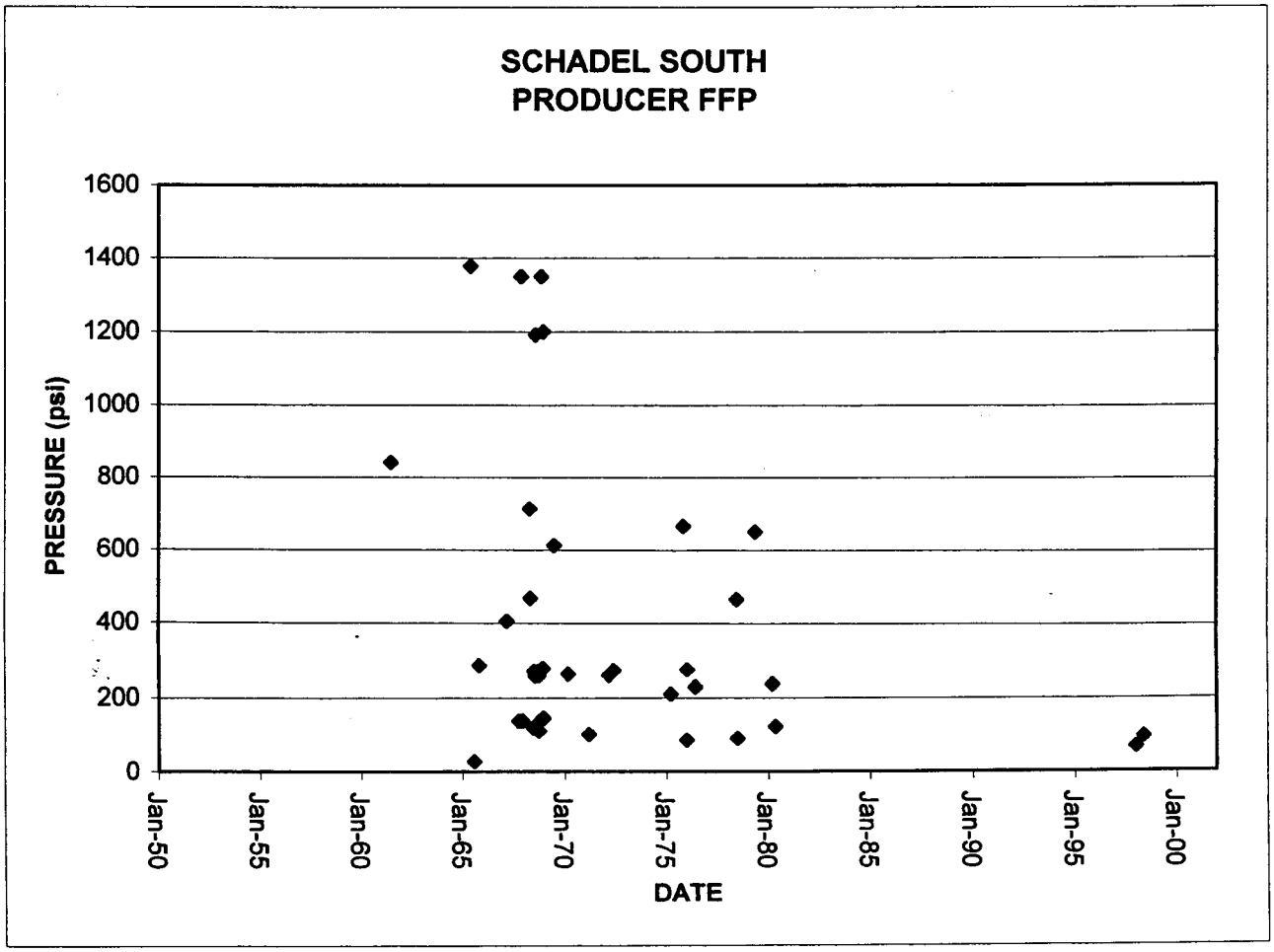
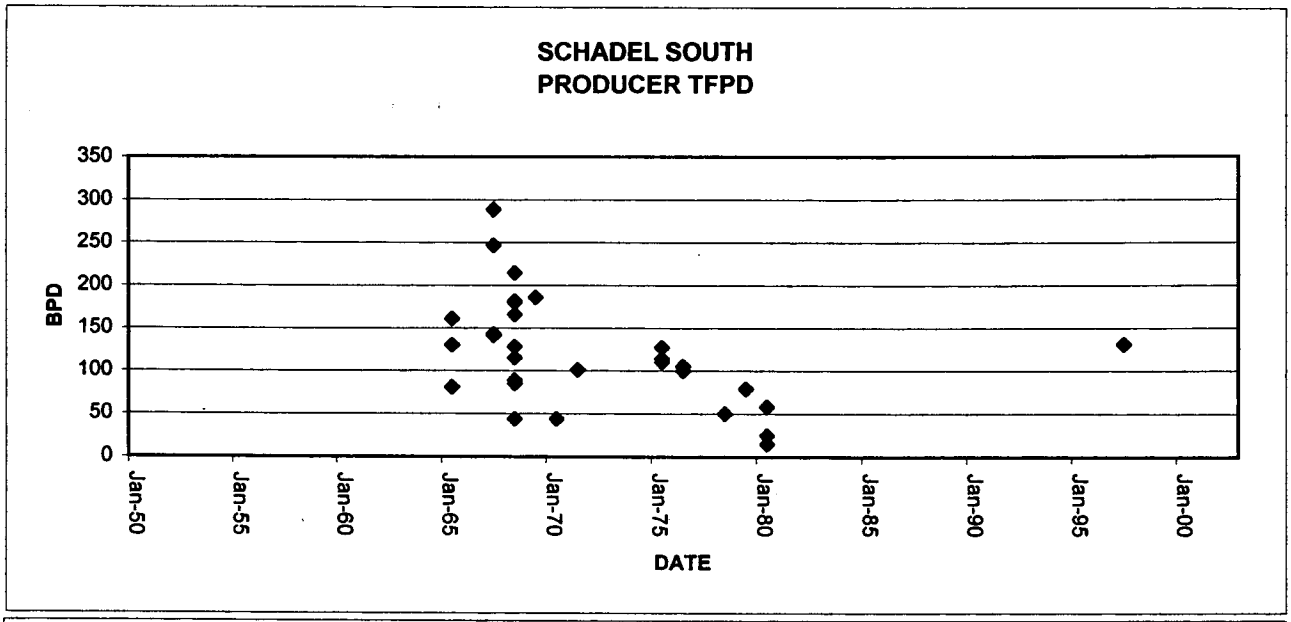
-2140


SCHADEL
SOUTH
20S/20W
PAY ISOPACH
FIELD
OUTLINE


SCHADEL SOUTH
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


SCHADEL SOUTH
PRODUCER FFP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


SCHADEL SOUTH
PRODUCER TFPD
BPD
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
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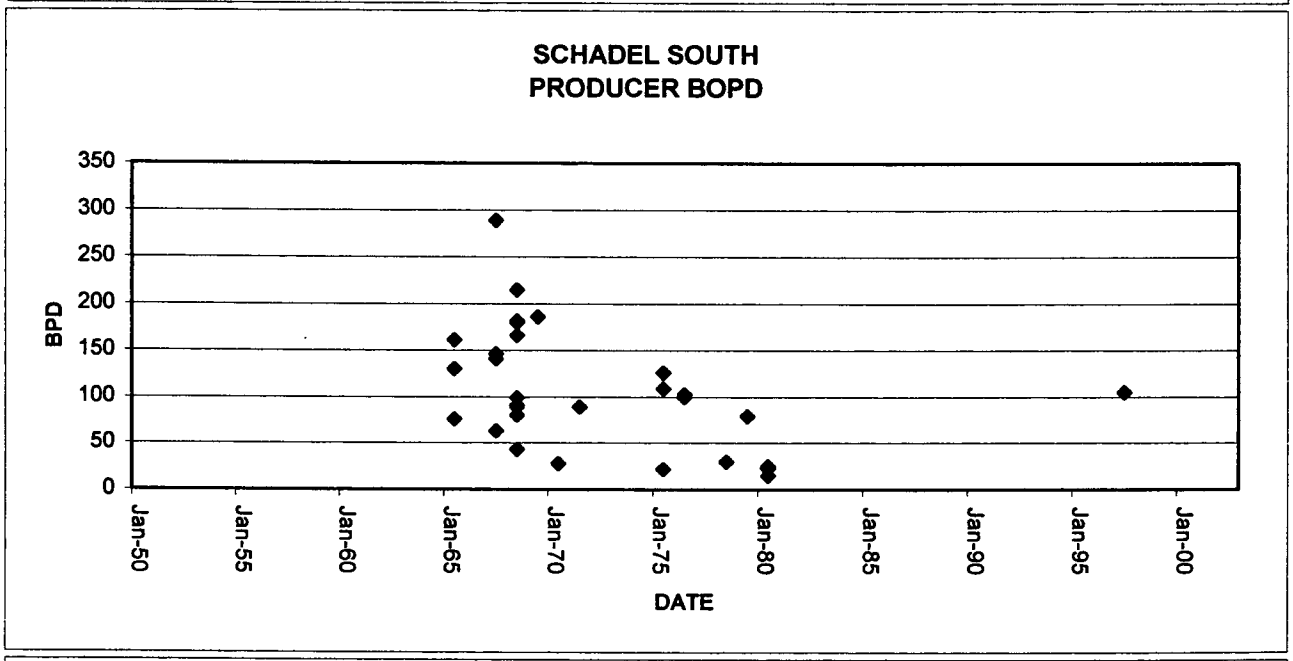
Jan-90
Jan-95
Jan-00
DATE


SCHADEL SOUTH
PRODUCER BOPD
BPD
350
300
250
200
150
100
50
0
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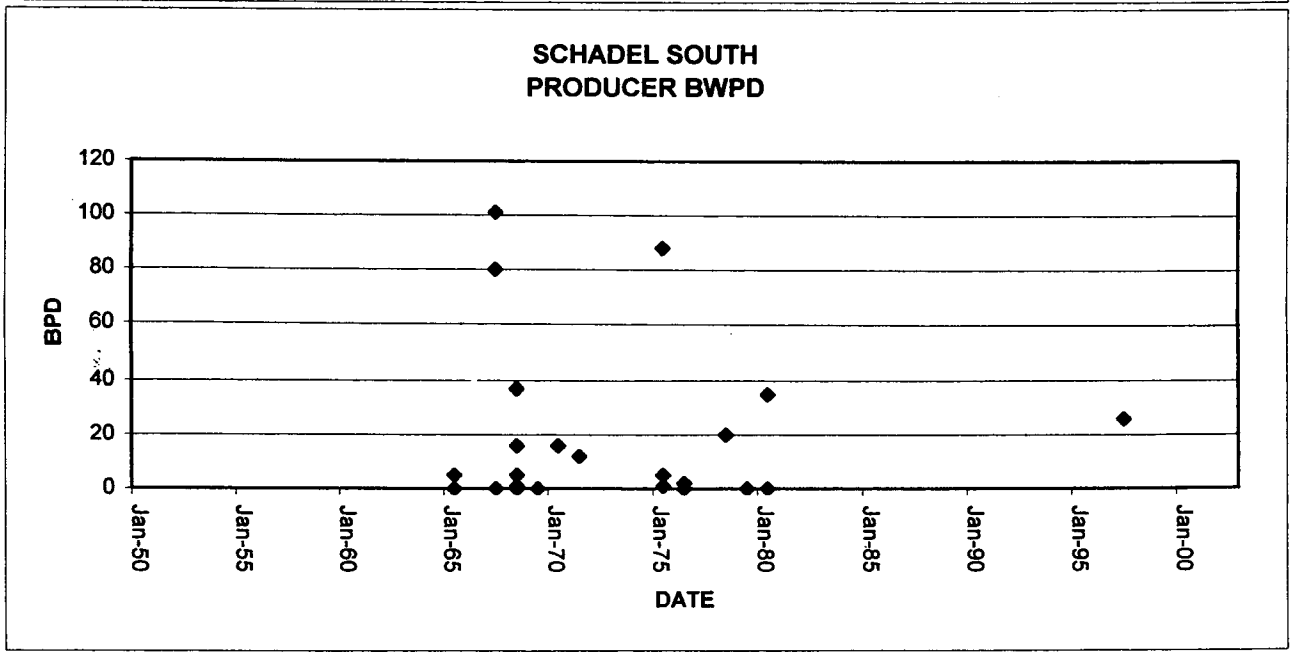
Jan-95
Jan-00
DATE


SCHADEL SOUTH
PRODUCER BWPD
BPD
120
100
80
60
40
20
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

OSAGE A

SPHI = 17%

SONIC LOG

(WITH CALIPER)

SCHLUMBERGER

SCHLUMBERGER WELL SURVEYING CORPORATION
Houston, Texas

FIELD or LOCATION SEC 6-20S-20W
WELL NO. 1 SCHADEL "B"
COMPANY PICKRELL DRLG CO

COMPANY PICKRELL DRILLING COMPANY

PROPERTY OF
K. G. S. LIBRARY
540 Petroleum Bldg.
Wichita, Kansas 67201

WELL NO. 1 SCHADEL "B"
FIELD WILDCAT
COUNTY PAWNEE STATE KANSAS

LOCATION 150'N C SE SE 455
Sec. 6 Twp. 20S Rge. 20W

Other Services:
L-GR

Permanent Datum: G.L. Elev. 2217
Log Measured From K.B. 5 Ft. Above Perm. Datum
Drilling Measured From K.B.

Elev.: K.B. 2222
D.F. 2219
G.L. 2217

Date	3-21-67			53870 WCB
Run No.	ONE			
Depth—Driller	4379			
Depth—Logger	4379			
Btm. Log Interval	4375			
Top Log Interval	3400			
Casing—Driller	8 5/8 @ 277	@	@	@
Casing—Logger	----			
Bit Size	7 7/8"			
Type-Fluid in Hole	SALT GEL			
Dens. / Visc.	9.9 45			
pH / Fluid Loss	6.0 11.6ml	ml	ml	ml
Source of Sample	FLOW LINE			
R_m @ Meas. Temp.	.168 @ 70 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	.099 @ 70 °F	.066 @ 110°F	@ °F	@ °F
R_{mc} @ Meas. Temp.	---- @ -- °F	@ °F	@ °F	@ °F
Source: R_{mf} R_{mc}	FP --			
R_m @ BHT	.11 @ 10 °F	@ °F	@ °F	@ °F
Time Since Circ.	12 HOURS			
Max. Rec. Temp.	110 °F	°F	°F	°F
Equip. / Location	3845 GT BEND			
Recorded By	THOMPSON			
Witnessed By	KUWWE			

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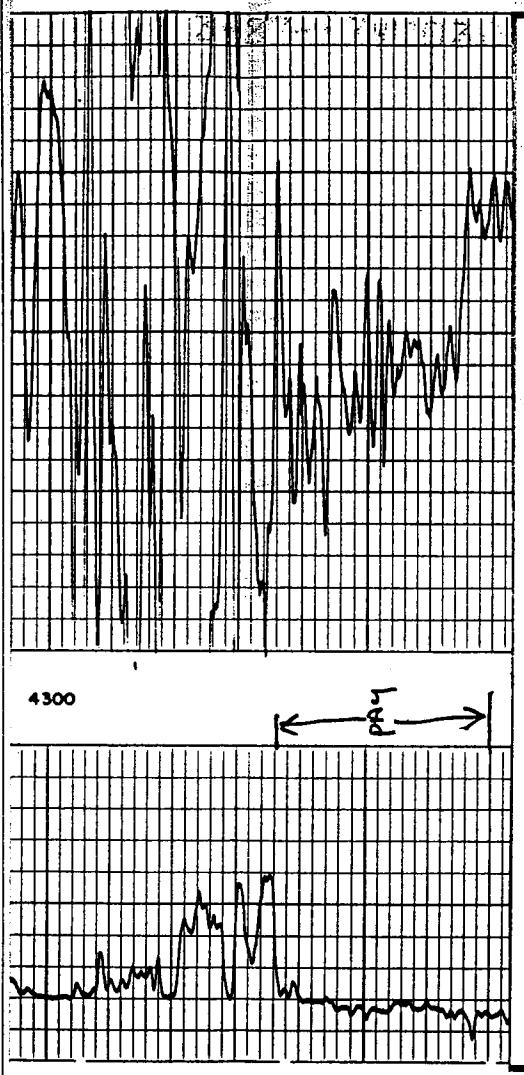
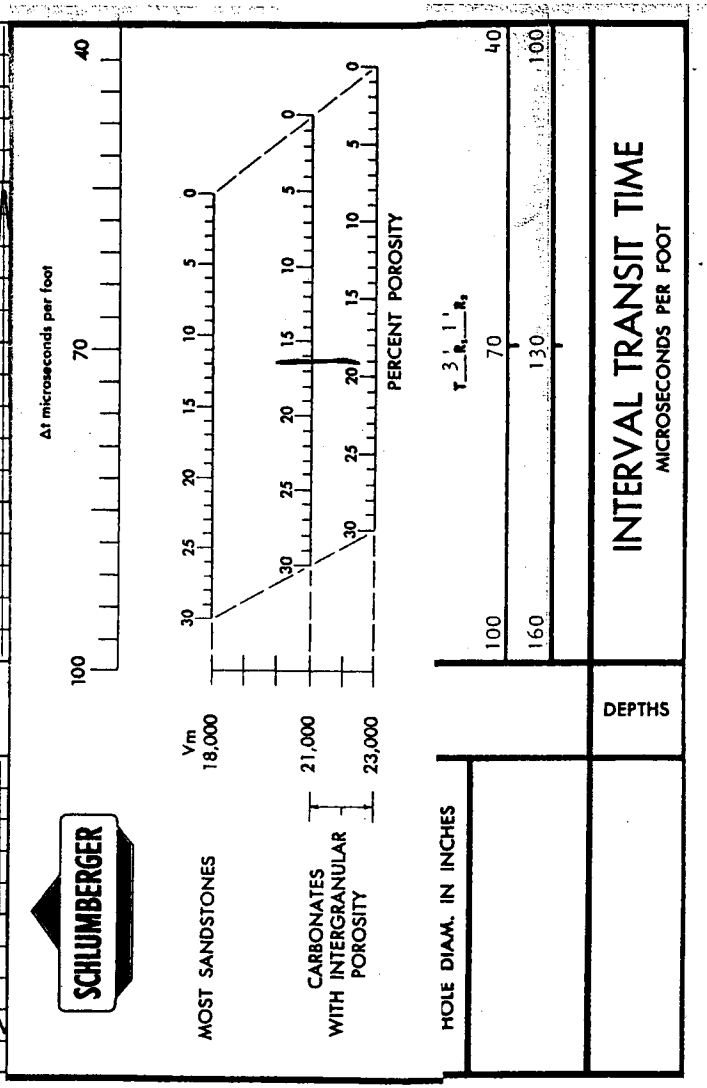




SCHLUMBERGER

LATEROLOG
WITH GAMMA RAY

COUNTY	PAWNEE
FIELD or LOCATION	SEC 6-20S-20W
WELL	NO. 1 SCHADEL "B"
COMPANY	PICKRELL DRLG. CO.

COMPANY PICKRELL DRILLING COMPANY

WELL NO. 1 SCHADEL "B"

FIELD WILDCAT

COUNTY PAWNEE STATE KANSAS

LOCATION 150'N, C SE SE L55

Sec. 6 Twp. 20S Rge. 20W

Other Services: SL-CAL.

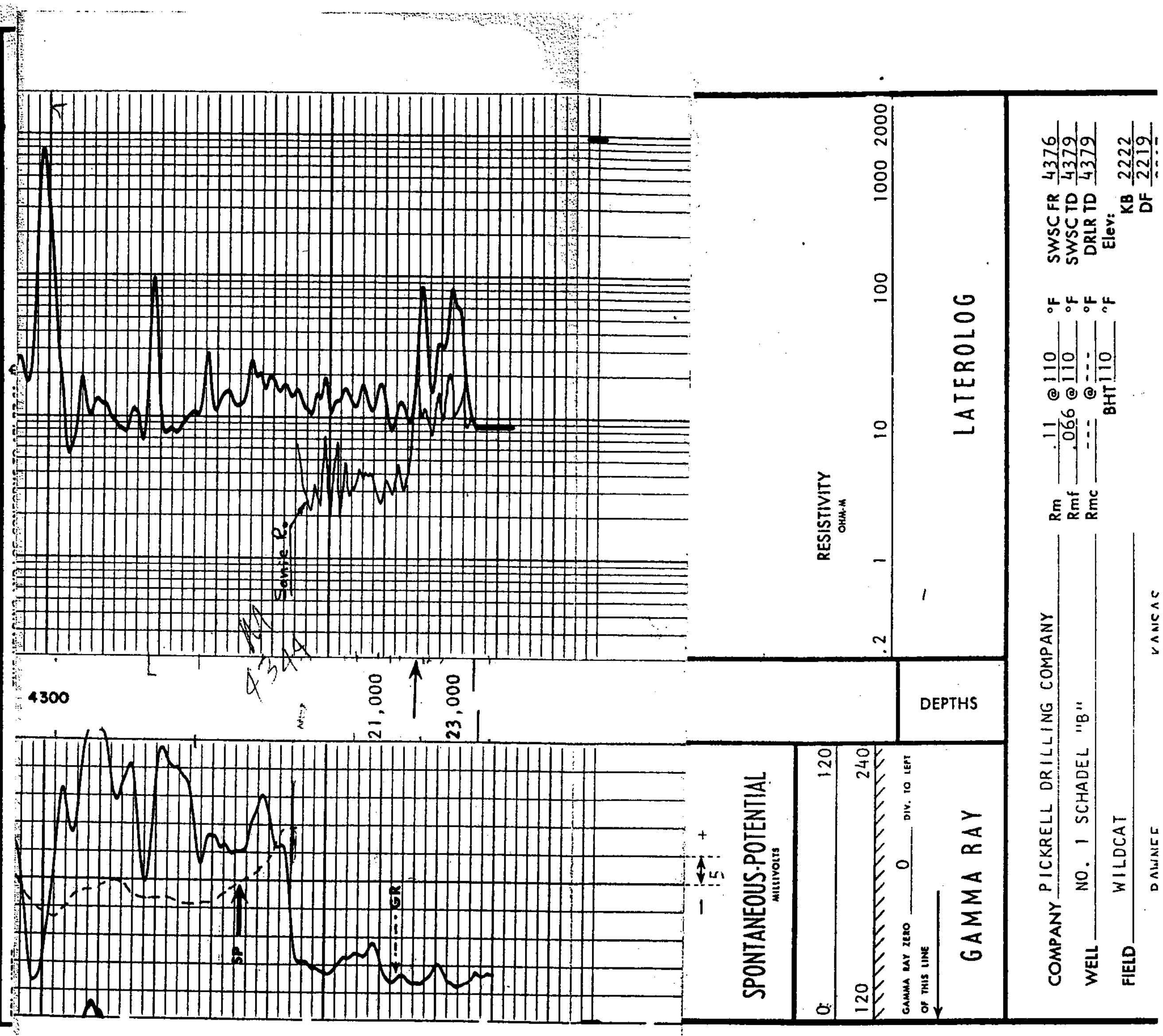
Permanent Datum: G.L., Elev. 2217
Log Measured From K.B., 5 Ft. Above Perm. Datum
Drilling Measured From K.B.

Elev.: K.B. 2222
D.F. 2219
G.L. 2217

53870
WCB

Date	3-21-67			
Run No.	ONE			
Depth—Driller	4379			
Depth—Logger	4379			
Btm. Log Interval	4376			
Top Log Interval	277			
Casing—Driller	8 5/8 @ 277	@	@	@
Casing—Logger	277			
Bit Size	7 7/8"			
Type Fluid in Hole	SALT GEL			
Dens. | Visc.	9.9 | 45	|	|	|
pH | Fluid Loss	6.0 | 11.6 ml	ml	ml	ml
Source of Sample	FLOW LINE			
R_m @ Meas. Temp.	.168 @ 70 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas. Temp.	.099 @ 70 °F	.066 @ 110 °F	@ °F	@ °F
R_{mc} @ Meas. Temp.	---- @ -- °F	@ °F	@ °F	@ °F
Source: R_{mf} R_{mc}	FP | --			
R_m @ BHT	.11 @ 110 °F	@ °F	@ °F	@ °F
Time Since Circ.	10 HOURS			
Max. Rec. Temp.	110 °F	°F	°F	°F
Equip. | Location	3845 | GT. BEND			
Recorded By	THOMPSON			
Witnessed By	RUWWE			

SWSC-1285



RADIOACTIVITY CALIBRATION DATA

COMPANY PICKRELL DRILLING COMPANY
WELL NO. 1 SCHADEL "B"
FIELD WILDCAT
COUNTY PAWNEE STATE KANSAS

Rm .11 @ 110 °F
Rmf .066 @ 110 °F
Rmc ___ @ --- °F
BHT 110 °F

SWSC FR 4376
SWSC TD 4379
DRLR TD 4379
Elev:
KB 2222
DF 2219
GL 2217

Log Analysis

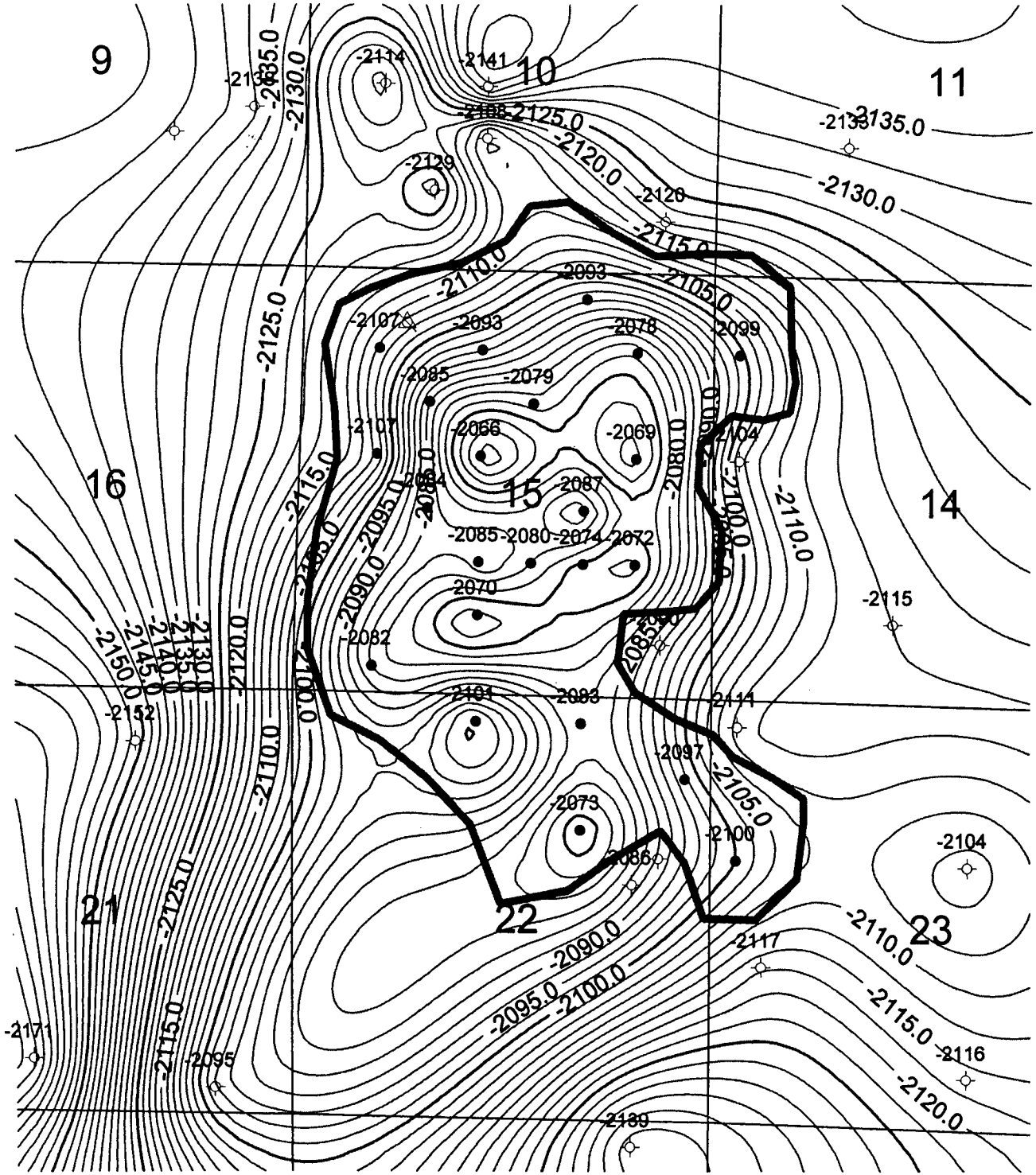
SCHLUMBERGER

COMPANY PICKRELL DRILLING COMPANY
WELL NO. 1 SCHADEL "B"
FIELD WILDCAT
COUNTY PAWNEE
R_w 0.100
V_m OR F_o

PLOT NO.	DEPTH	LOG DATA: ΔT OR F_o	LOG DATA: RESISTIVITY RLL	LOG DATA: RESISTIVITY (R_{xo})	FORMATION OR RESERVOIR DATA: POROSITY (φ)	FORMATION OR RESERVOIR DATA: WATER SATURATION (S_w)	REMARKS
	4344-46				13.5	53	M=2 VM=21,000
	4346-47		11.5		22.5	37	"
	4348		14.5		19	39	"
	4348-49		14.5		21.5	34	"
	4349-50		18		12	53	"
	4350-51		12.5		23	35	"
	4351-52		14		13	40	"
	4352-		15		24.5	30	"
	4353		16		15.5	44	"
	4354-56		13		19-20	39	"
	4356-59		12.5		16-17	44	"
	4359-60		17		21	32	"
	4360-62		8.5		19	49	"
	4362-64		13		16	46	"
	4364		10		18.5	46	"
	4364-66		35		15	30	M=2 VM=23,000
	4366-67		80		8	37	"
	4367-69		17		11-12	59	"
	4370		32		8.5	58	"
	4370-72		31		12	40	"
	4372-74		65		9-11	34	"
	4331-33				11	55	SD. 18,000
	4265				14.5	42	LIME 21,000

DATE MARCH 21, 1967
SCHLUMBERGER LOCATION GREAT BEND, KANSAS
ENGINEER WALT H. THOMPSON

SWSC-1220-A

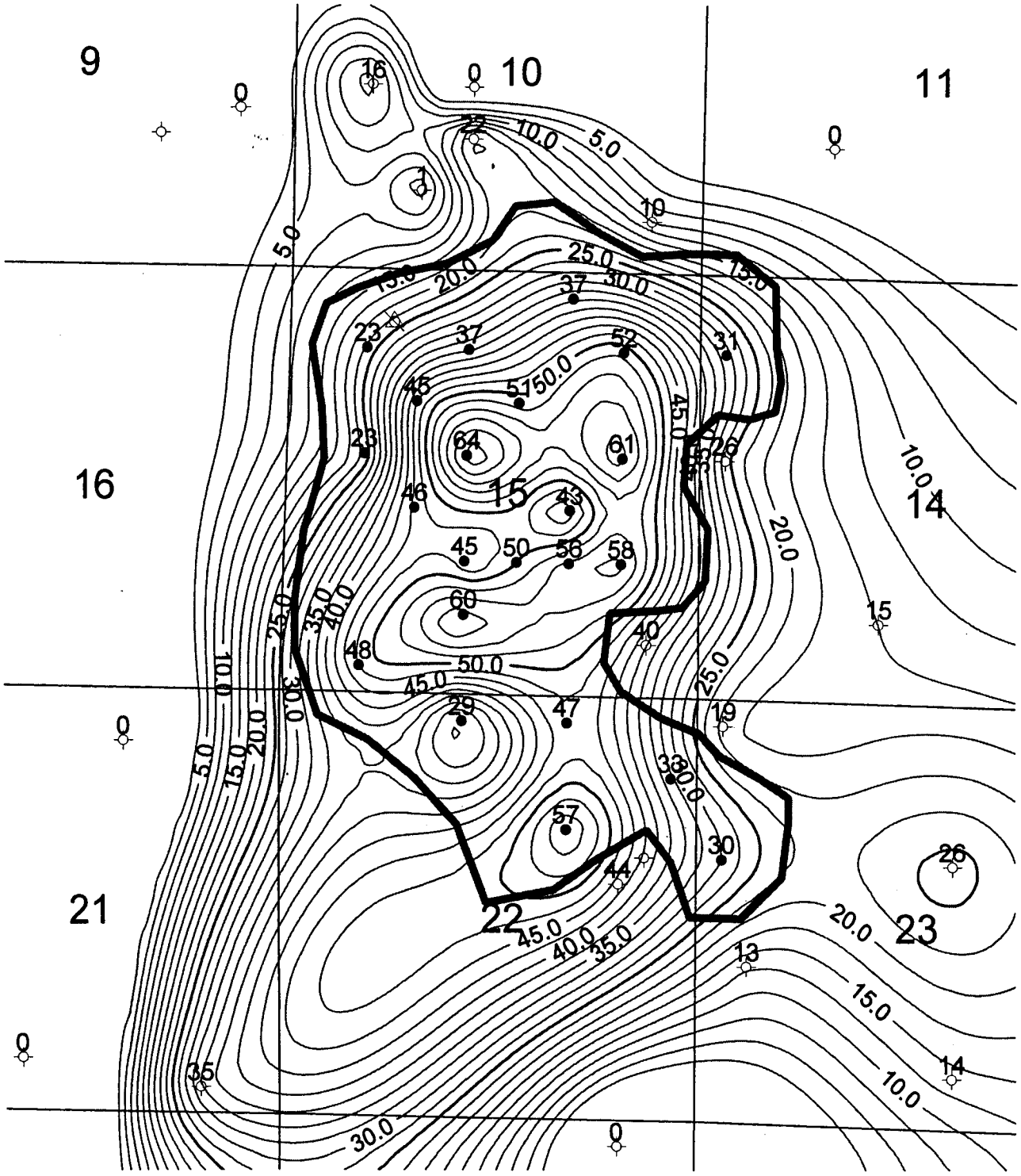


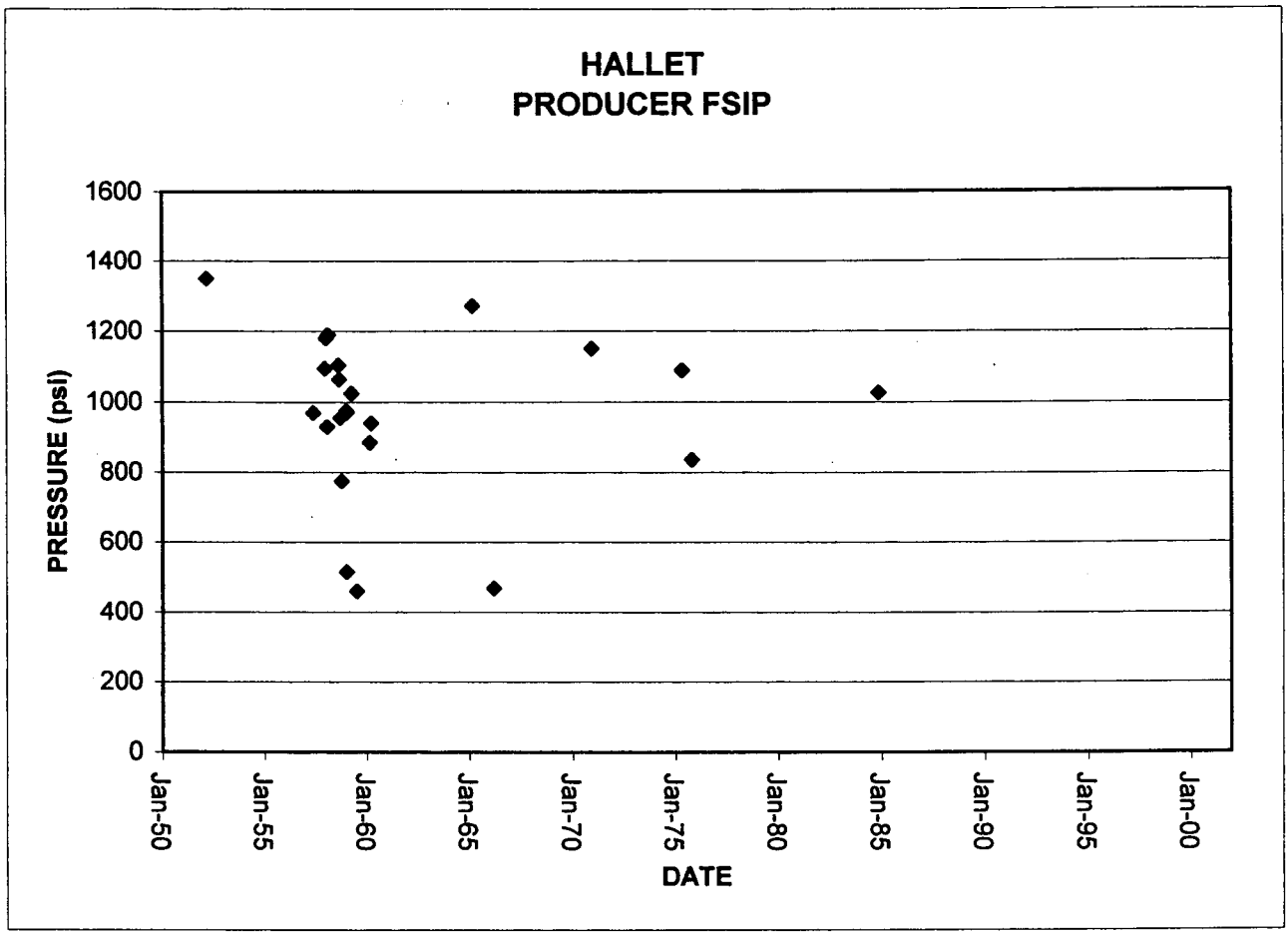
HALLET FIELD

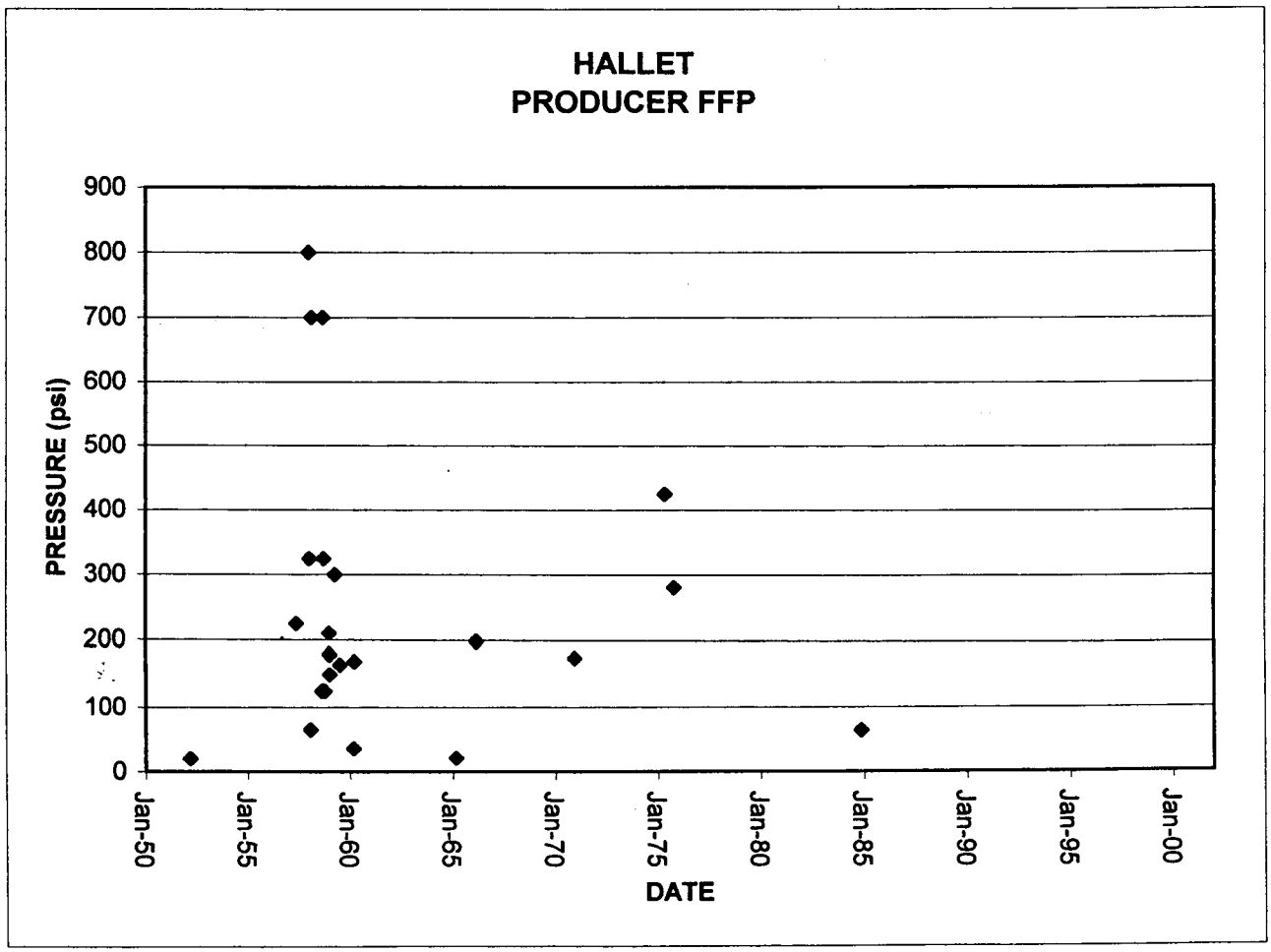
225/25W

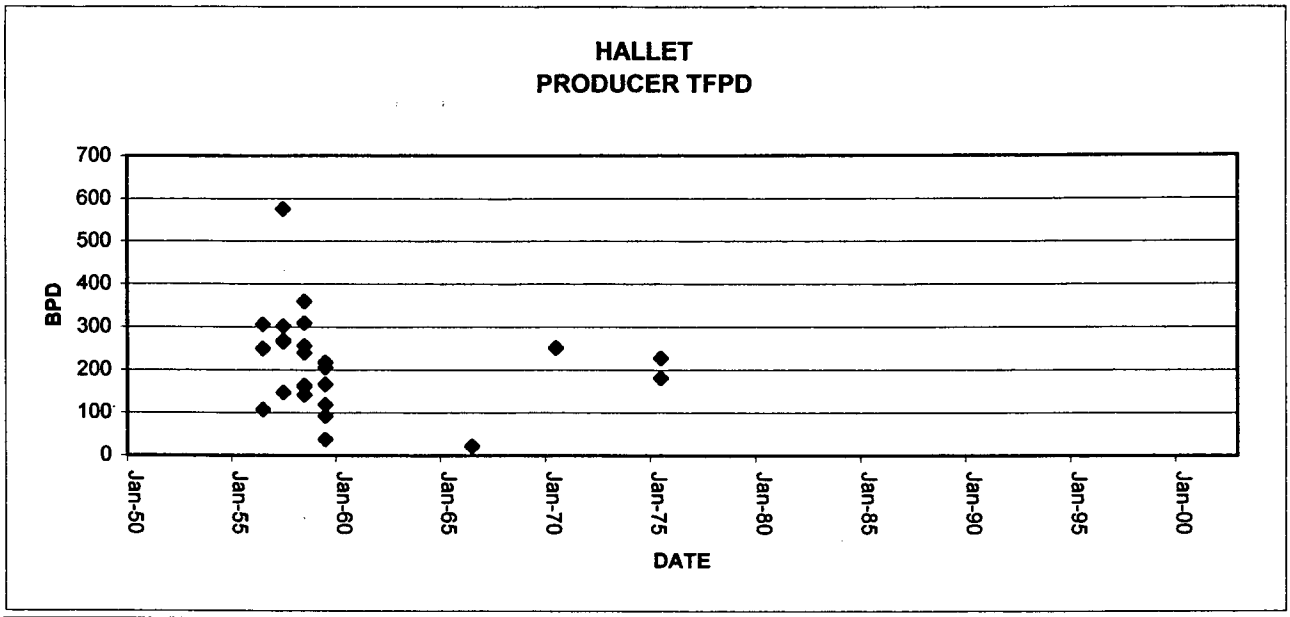
MISS SUBSEA

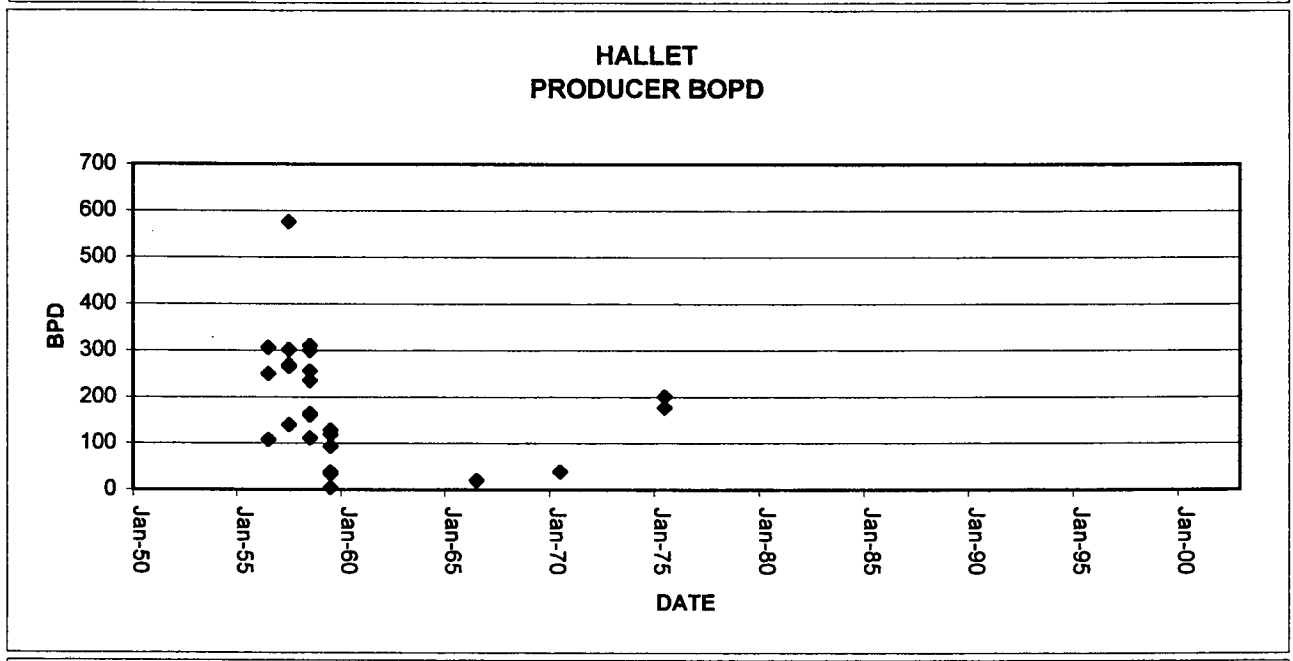
FIELD OUTLINE

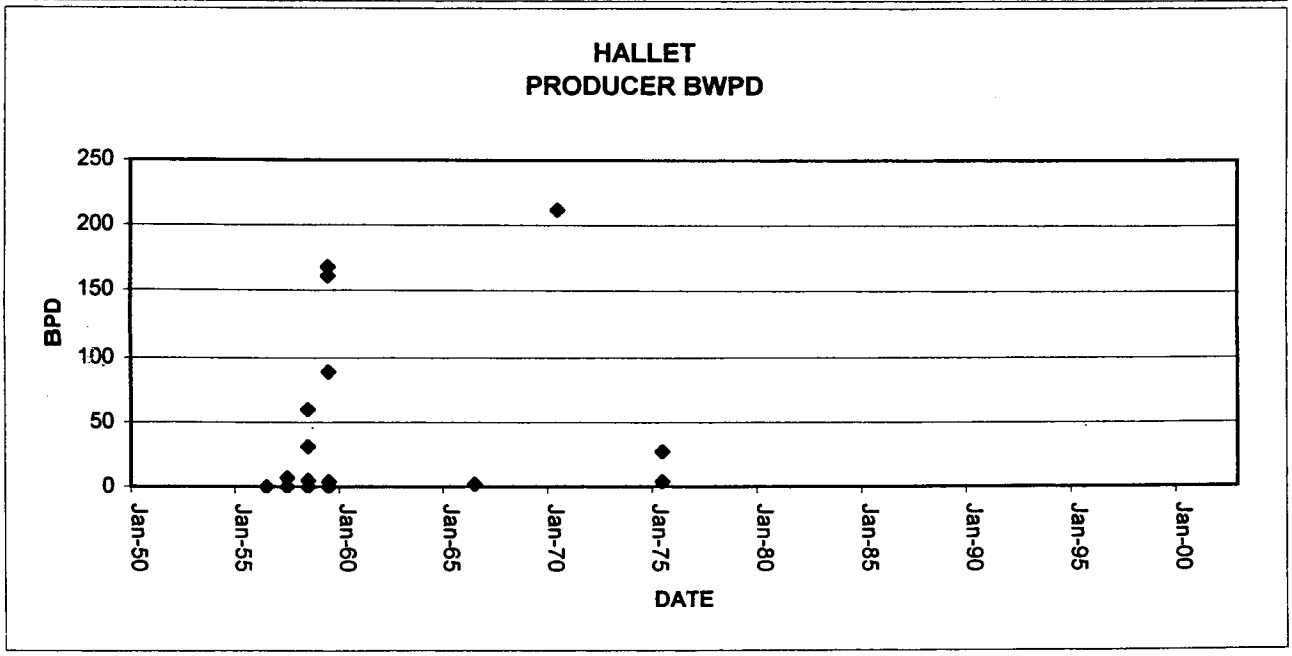

HALLET FIELD
PAY ISOPACH
FIELD OUTLINE
9
10
11
16
15
14
21
22
23
5.0
10.0
15.0
20.0
25.0
30.0
35.0
40.0
45.0
50.0


HALLET
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HALLET
PRODUCER FFP
PRESSURE (psi)
900
800
700
600
500
400
300
200
100
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HALLET
PRODUCER TFPD
700
600
500
400
300
200
100
0
BPD
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HALLET
PRODUCER BOPD
700
600
500
400
300
200
100
0
BPD
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


HALLET
PRODUCER BWPD
250
200
150
100
50
0
BPD
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

FORM 565.0 (C43831) PRINTED IN U.S.A.

SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

Sonic Log

COMPANY KEWANEE OIL COMPANY

WELL KLINE #2

FIELD HALLET

LOCATION SEC. 15-22S-25W

COUNTY HODGEMAN

STATE KANSAS

Other Surveys LL - GR

Location of Well
985.99' FROM SL
AND 330' FROM
WL
NE/4

33154
NW SW NE

CEMENT MARKER : 2489

Elevation: K.B.
D.F. 2490
or G.L.

Property of
Kansas Geological Society
540 Petroleum Bldg.
Wichita, Kansas

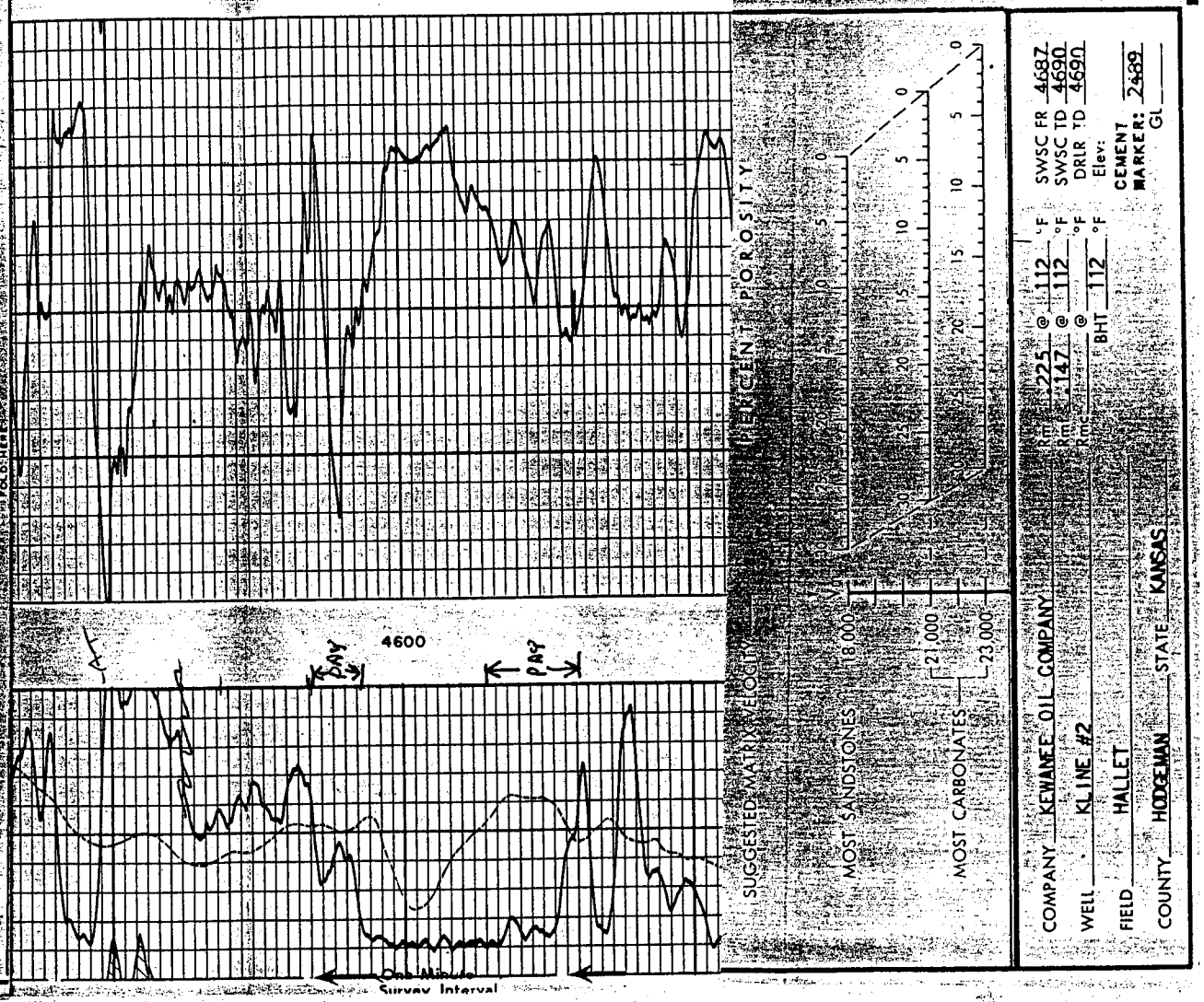
C

COUNTY HODGEMAN
FIELD or HALLET
LOCATION SEC. 15-22S-25W
WELL KLINE #2
COMPANY KEWANEE OIL CO.

Log Depths Measured From CEMENT MARKER 3 Ft. BELOW RT

RUN No.	ONE		3242.8 WLB
Date	9-12/13-58		
First Reading	4687		
Last Reading	800		
Feet Measured	887		
Csg. Schlum.			
Csg. Driller	555		
Depth Reached	4690		
Bottom Driller	4690		
Mud Nat.	MAGCOGEL		
Dens. | Visc.	9.8 | 48		
Mud Resist.	.340 @ 73 °F	M @ °F	@ °F
" Res. BHT	.225 @ 112 °F	M @ °F	@ °F
" pH	6.5 @ °F	@ °F	@ °F
" Wtr. Loss	9 CC 30 min	CC 30 min	CC 30 min
" Rmf	.147 @ 112 °F	M @ °F	@ °F
Bit Size	7 7/8"		
Spacing:			
3'	3800 To T. D.	To	To
	To	To	To
Opr. Rig Time	2 HRS.		
Truck No.	2538		
Recorded By	GUM		
Witness	DAVIS		

SPHI = 17%



COMPANY KEWANEE OIL COMPANY
WELL KLINE #2
FIELD HALLET
COUNTY HODGEMAN STATE KANSAS

SWSC FR 4687
SWSC TD 4690
DRLR TD 4690
Elev:
CEMENT MARKER: 2489
GL

Rm @ 112 °F
Rmf @ 112 °F
Rmc @ 112 °F
BHT 112 °F

FORM 576 PRINTED IN U.S.A.

15-22-25

SCHLUMBERGER WELL SURVEYING CORPORATION

HOUSTON, TEXAS

SCHLUMBERGER

Laterolog

WITH GAMMA RAY

COUNTY	HODGEMAN
FIELD or LOCATION	HALLET SEC. 15-22S-25W
WELL	KLINE #2
COMPANY	KEWANEE OIL CO.

G

COMPANY KEWANEE OIL COMPANY

WELL KLINE #2

FIELD HALLET

LOCATION SEC. 15-22S-25W

COUNTY HODGEMAN

STATE KANSAS

Other Surveys SR

Location of Well 985.99' FROM SL & 330' FROM WL NE/4

NW SW NE

33155

CEMENT MARKER : 2489

Elevation: K.B.:

D.F.: 2490

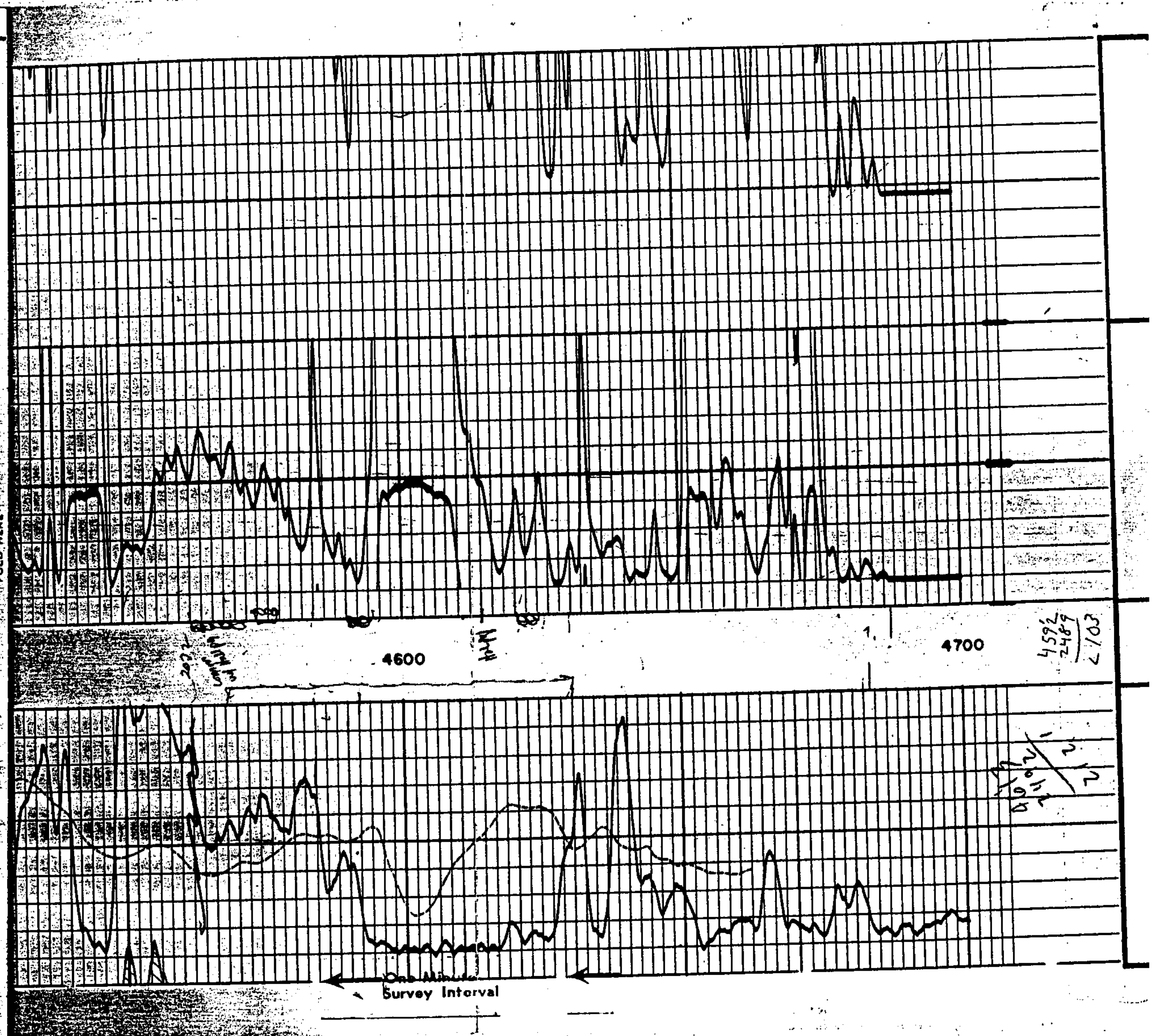
or G.L.:

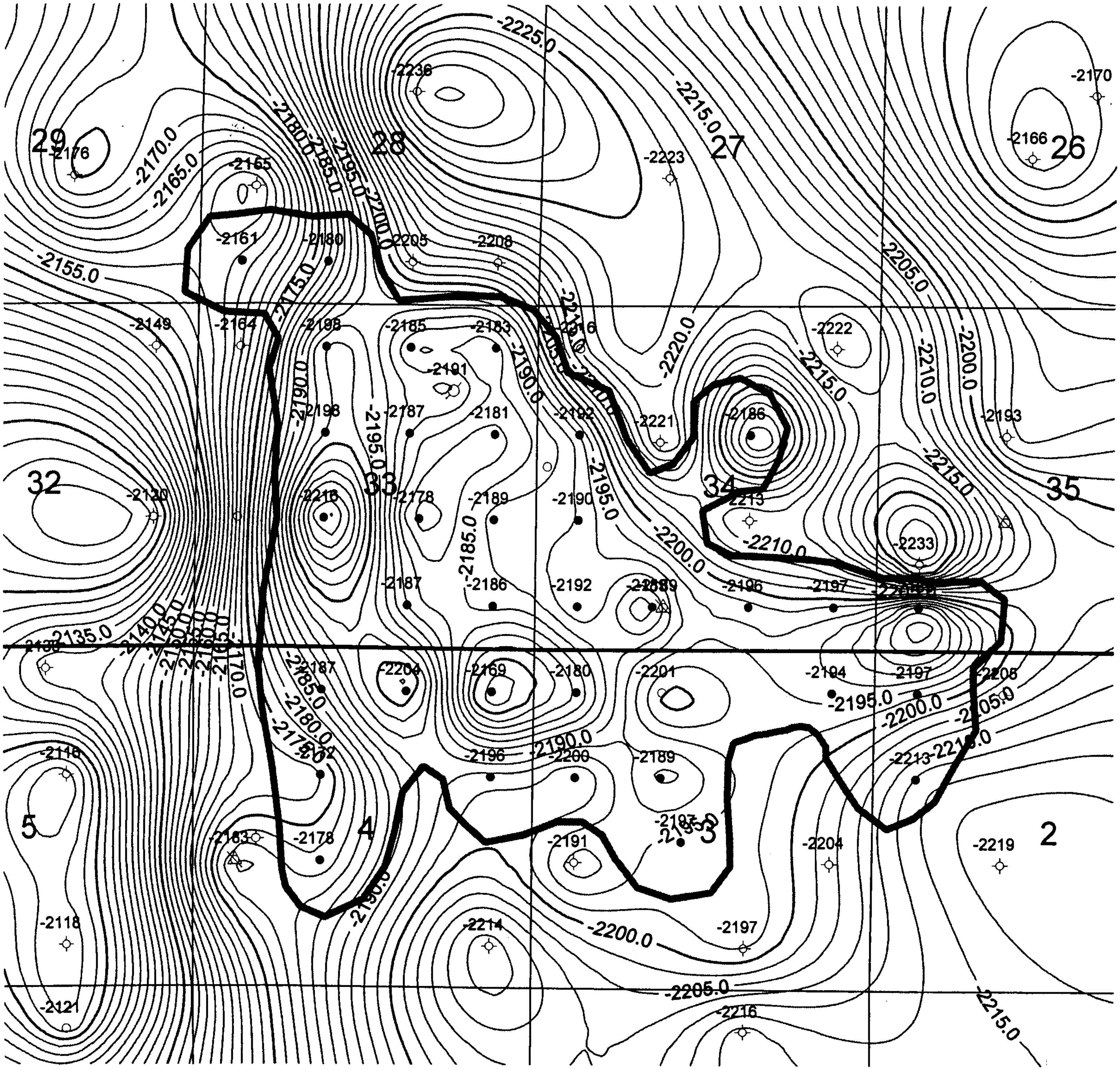
Log Depths Measured From CEMENT MARKER 3 Ft. ~~above~~ BELOW RT

32428 WLB

RUN No.	ONE		
Date	9-12/13-58		
First Reading	4687		
Last Reading	555		
Feet Measured	4132		
Csg. Schlum.	555		
Csg. Driller	555		
Depth Reached	4690		
Bottom Driller	4690		
Mud Nat.	MAGCOGEL		
Dens. | Visc.	9.8 | 48		
Mud Resist.	.340 @ 73 °F M	@ °F	@ °F
" Res. BHT	.225 @ 112 °F M	@ °F	@ °F
" pH	6.5 @ °F	@ °F	@ °F
" Wtr. Loss	9 CC 30 min	CC 30 min	CC 30 min
" Rmf	.147 @ 112 °F M	@ °F	@ °F
" Rmc	@ °F	@ °F	@ °F
Bit Size	7 7/8"		
Laterolog 3	a= 6" ;L= 3'	a= ;L=	a= ;L=
Laterolog 7	a= ;n=	a= ;n=	a= ;n=
Opr. Rig Time	2 HRS.		
Truck No.	2538		
Recorded By	GUM		
Witness	DAVIS		

FOLD HERE



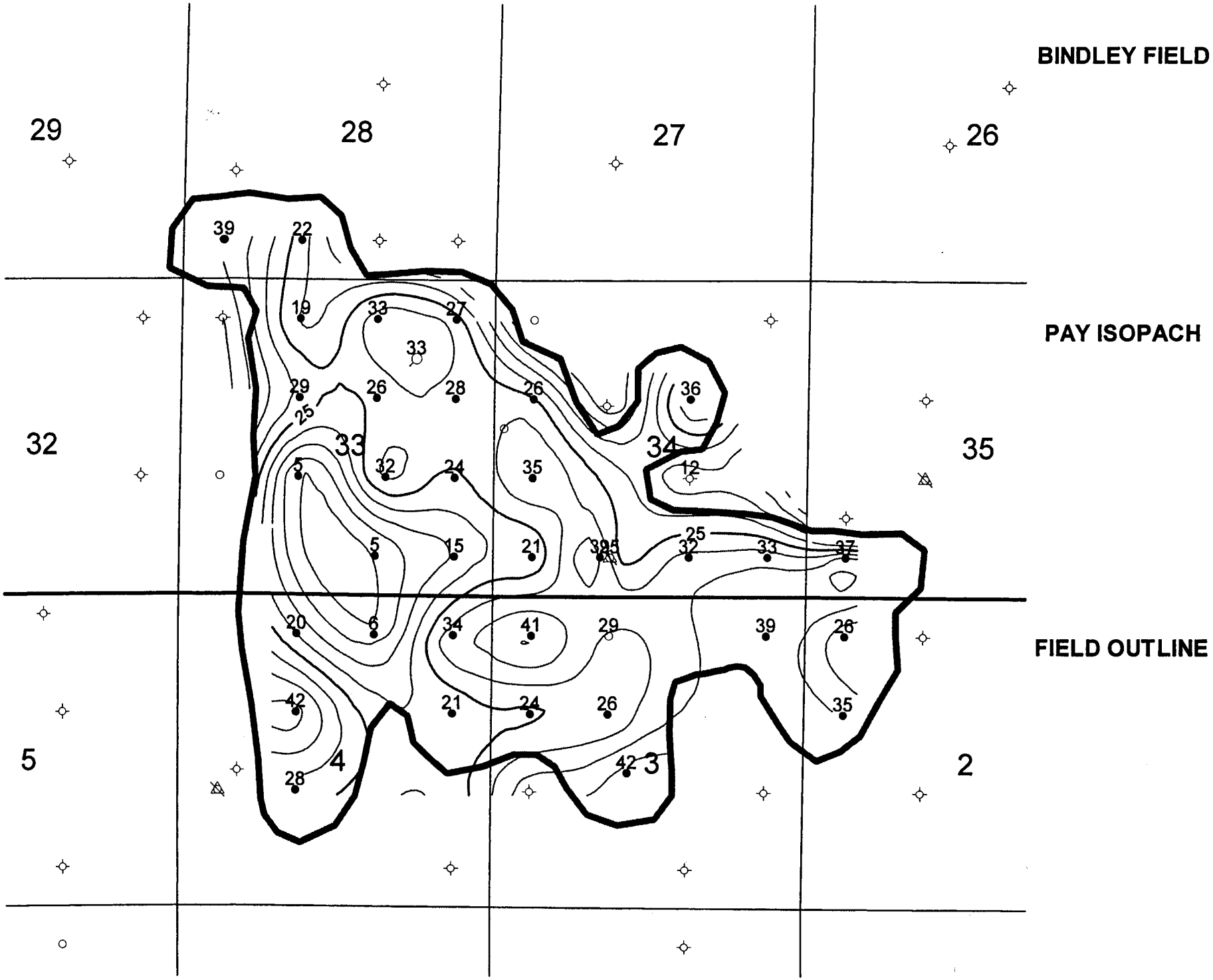

29
28
27
26
32
33
34
35
5
4
3
2
-2225.0
-2215.0
-2205.0
-2200.0
-2210.0
-2220.0
-2170.0
-2165.0
-2155.0
-2135.0
-2195.0
-2190.0
-2185.0
-2180.0
-2175.0
-2236
-2170
-2176
-2165
-2223
-2166
-2161
-2180
-2205
-2208
-2149
-2164
-2198
-2185
-2183
-2216
-2222
-2191
-2187
-2181
-2192
-2221
-2186
-2193
-2120
-2218
-2178
-2189
-2190
-2213
-2233
-2187
-2186
-2192
-2196
-2197
-2187
-2204
-2169
-2180
-2201
-2194
-2197
-2208
-2118
-2196
-2200
-2189
-2213
-2183
-2178
-2191
-2204
-2219
-2118
-2214
-2197
-2121
-2216

BINDLEY FIELD

21-22S/24W

MISS SUBSEA

FIELD OUTLINE


BINDLEY FIELD
PAY ISOPACH
FIELD OUTLINE
29
28
27
26
32
33
34
35
5
4
3
2
39
22
19
33
27
33
29
26
28
26
36
25
5
32
24
35
12
5
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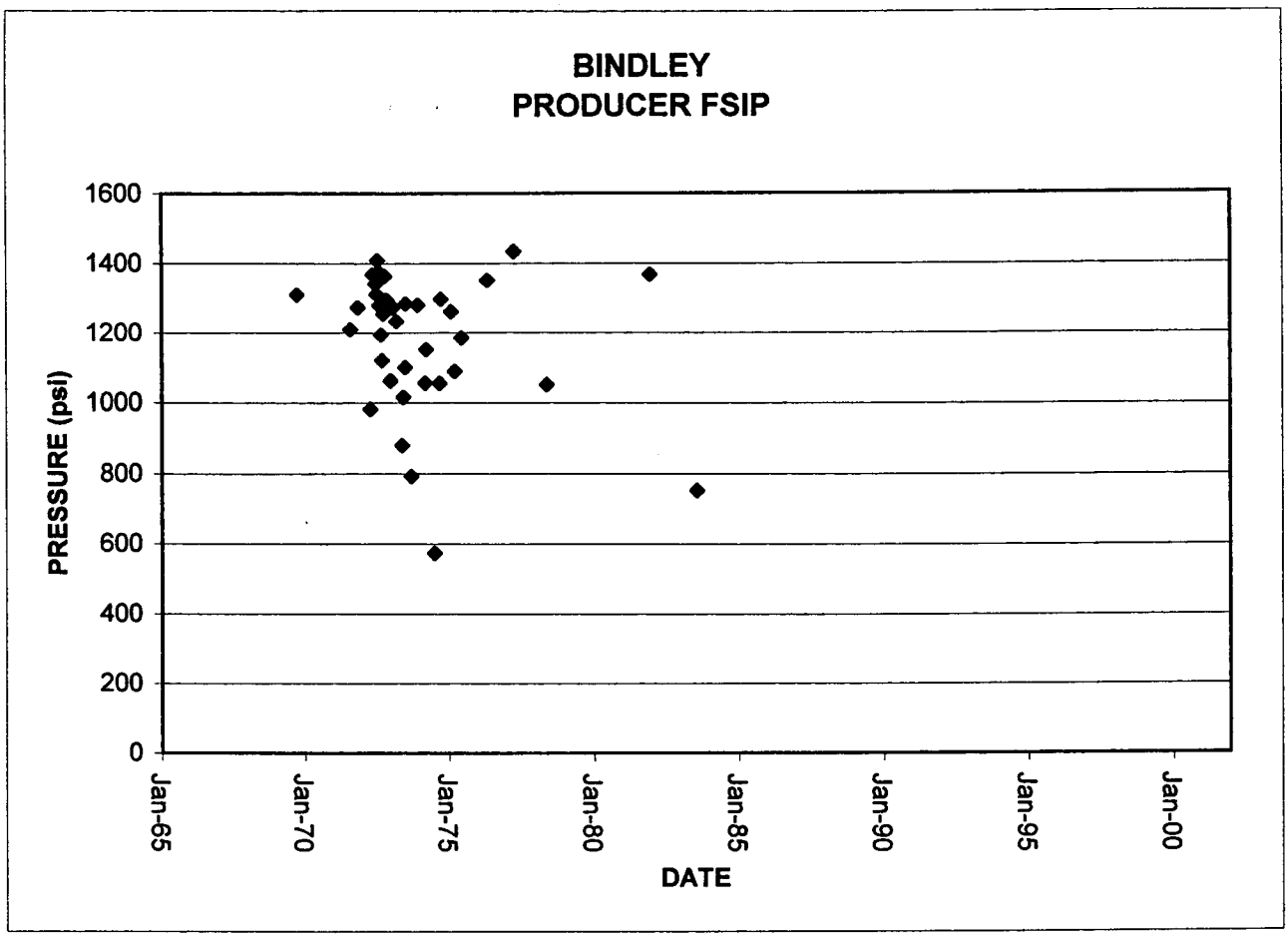
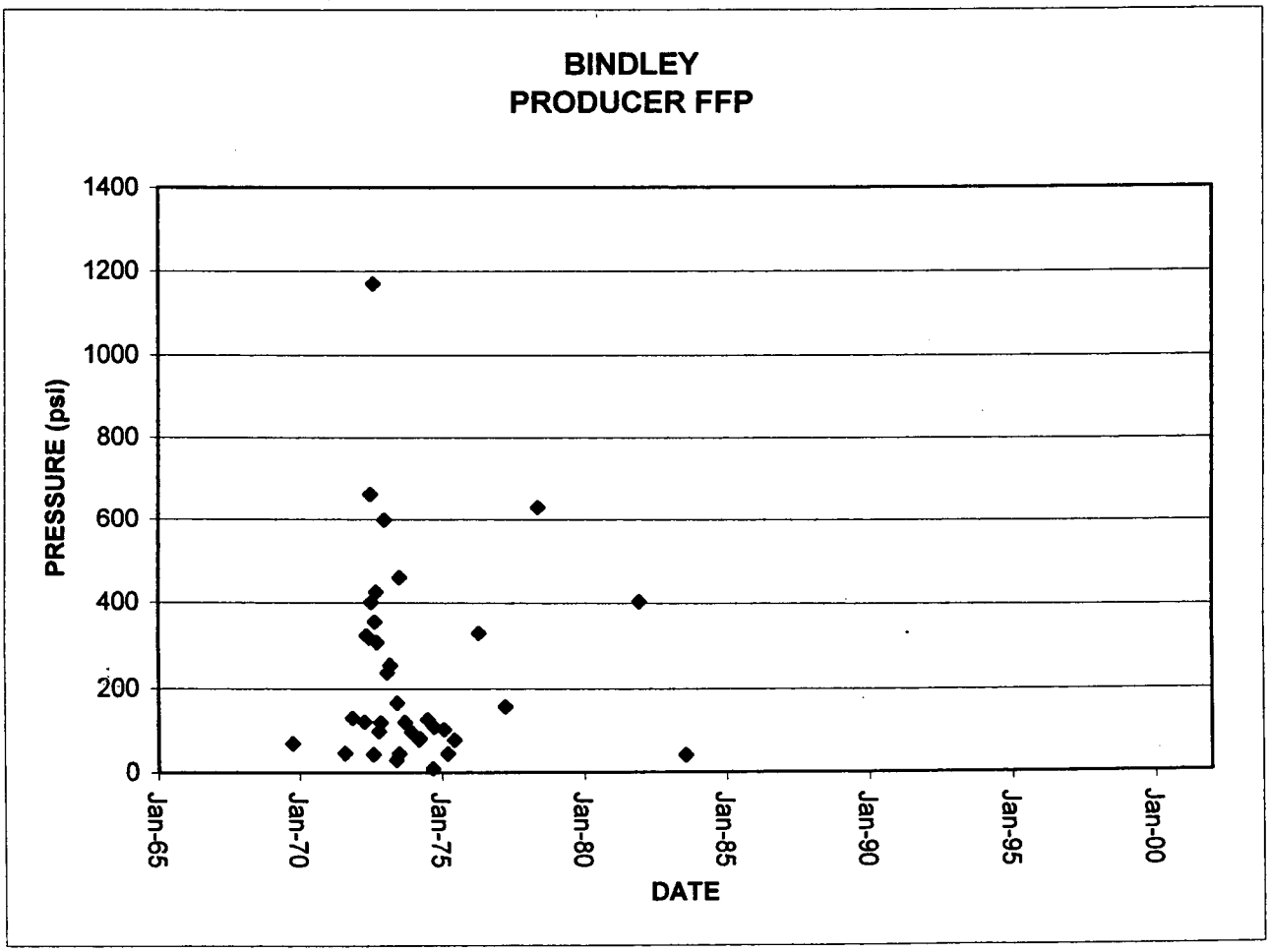
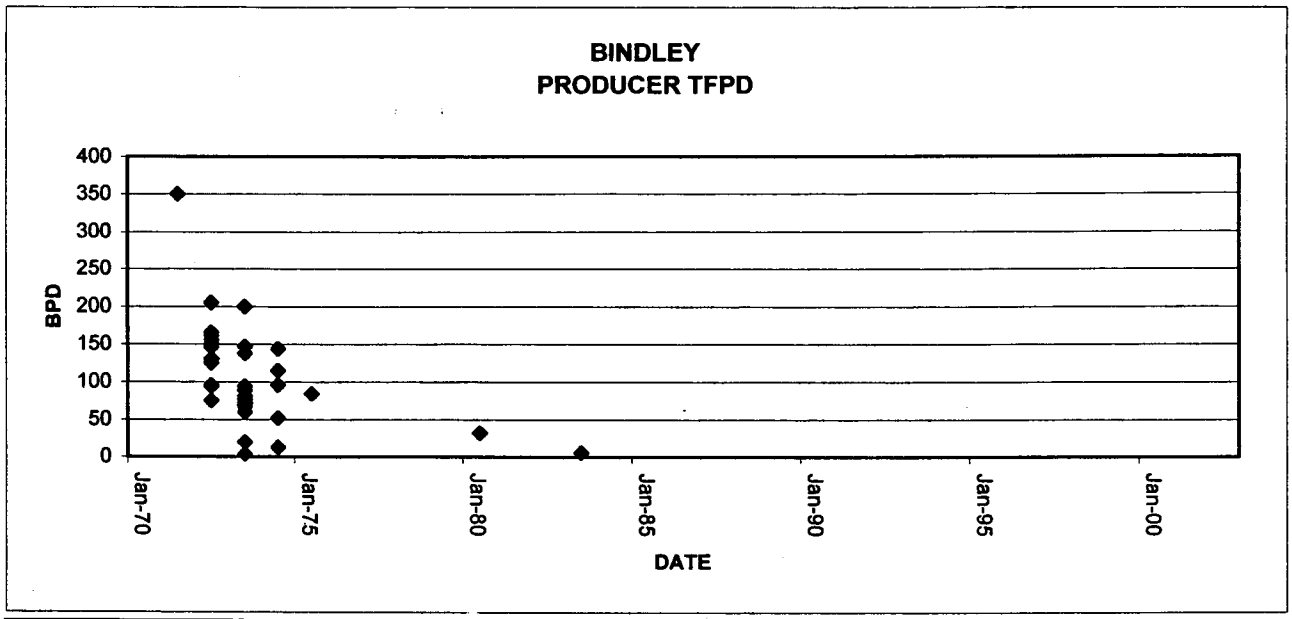
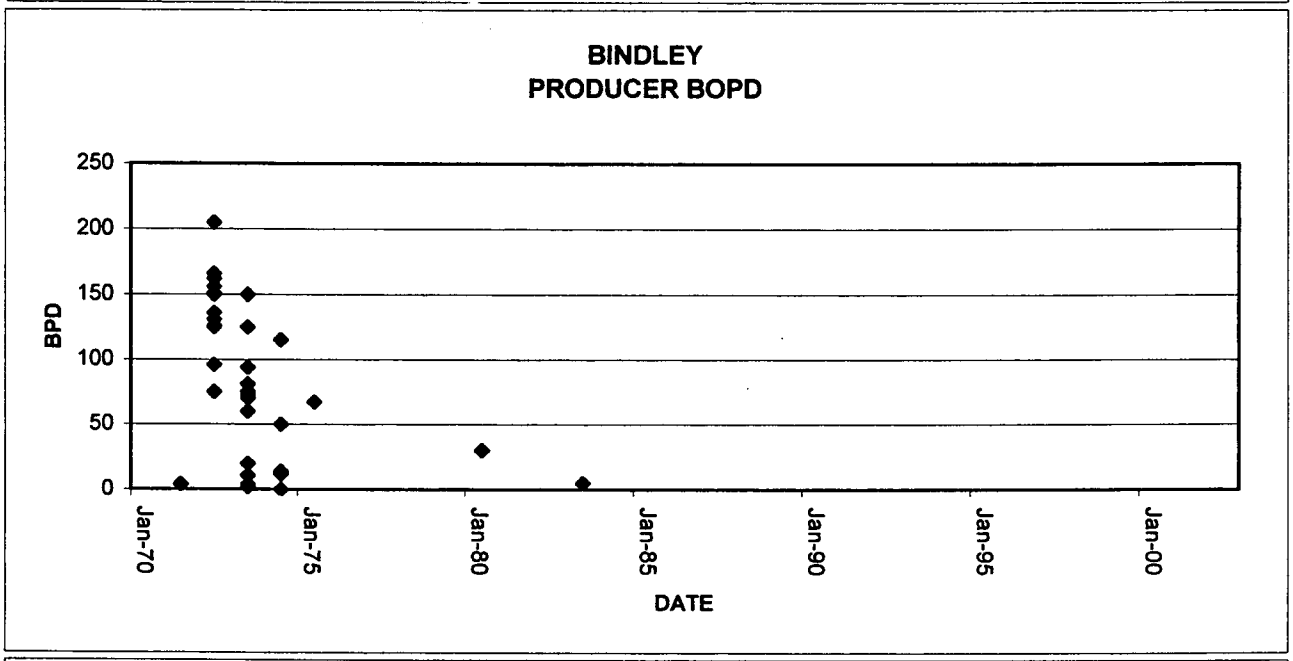
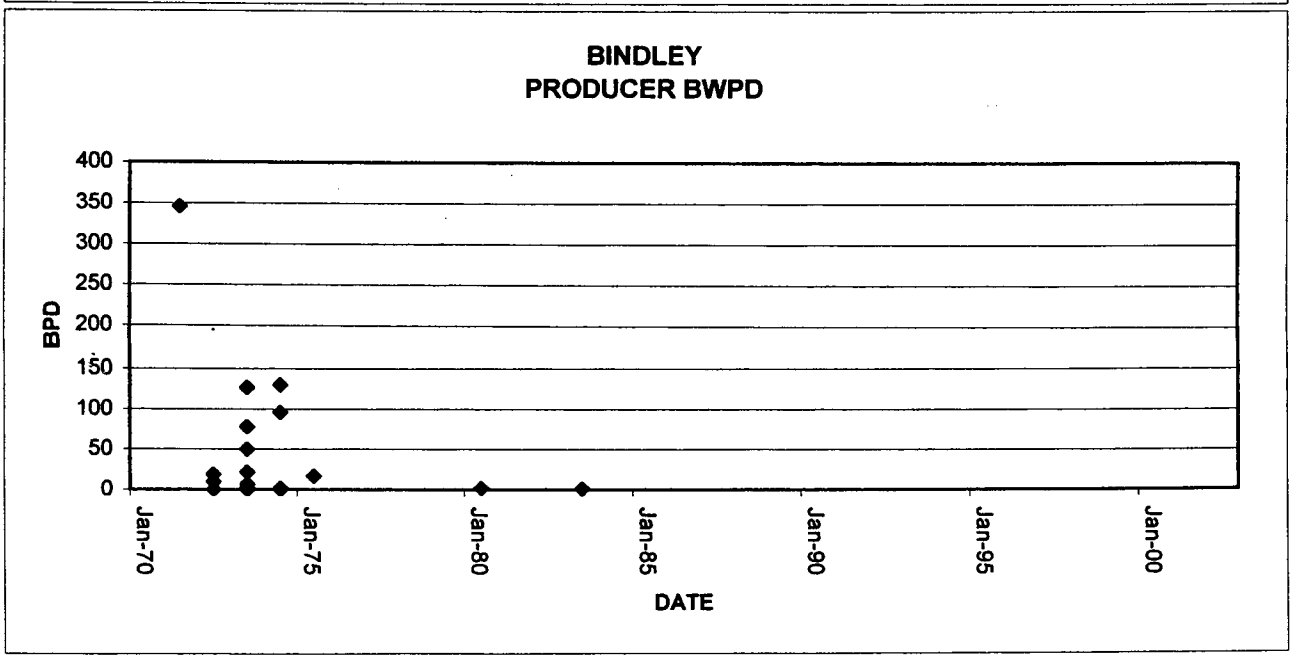
21
24
26
35
28
42


BINDLEY
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


BINDLEY
PRODUCER FFP
PRESSURE (psi)
1400
1200
1000
800
600
400
200
0
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


BINDLEY
PRODUCER TFPD
400
350
300
250
200
150
100
50
0
BPD
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


BINDLEY
PRODUCER BOPD
250
200
150
100
50
0
BPD
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


BINDLEY
PRODUCER BWPD
400
350
300
250
200
150
100
50
0
BPD
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

Log File

Welex

COMPENSATED ACOUSTIC VELOCITY LOG

COMPANY OASIS PETROLEUM, INCORPORATED

WELL BINDLEY # 1

FIELD

COUNTY HODGEMAN STATE KANSAS

Location C-SE-NE

Other Services: RADIATION GUARD

Sec. 33 Twp 21S Rge 24W

@ K

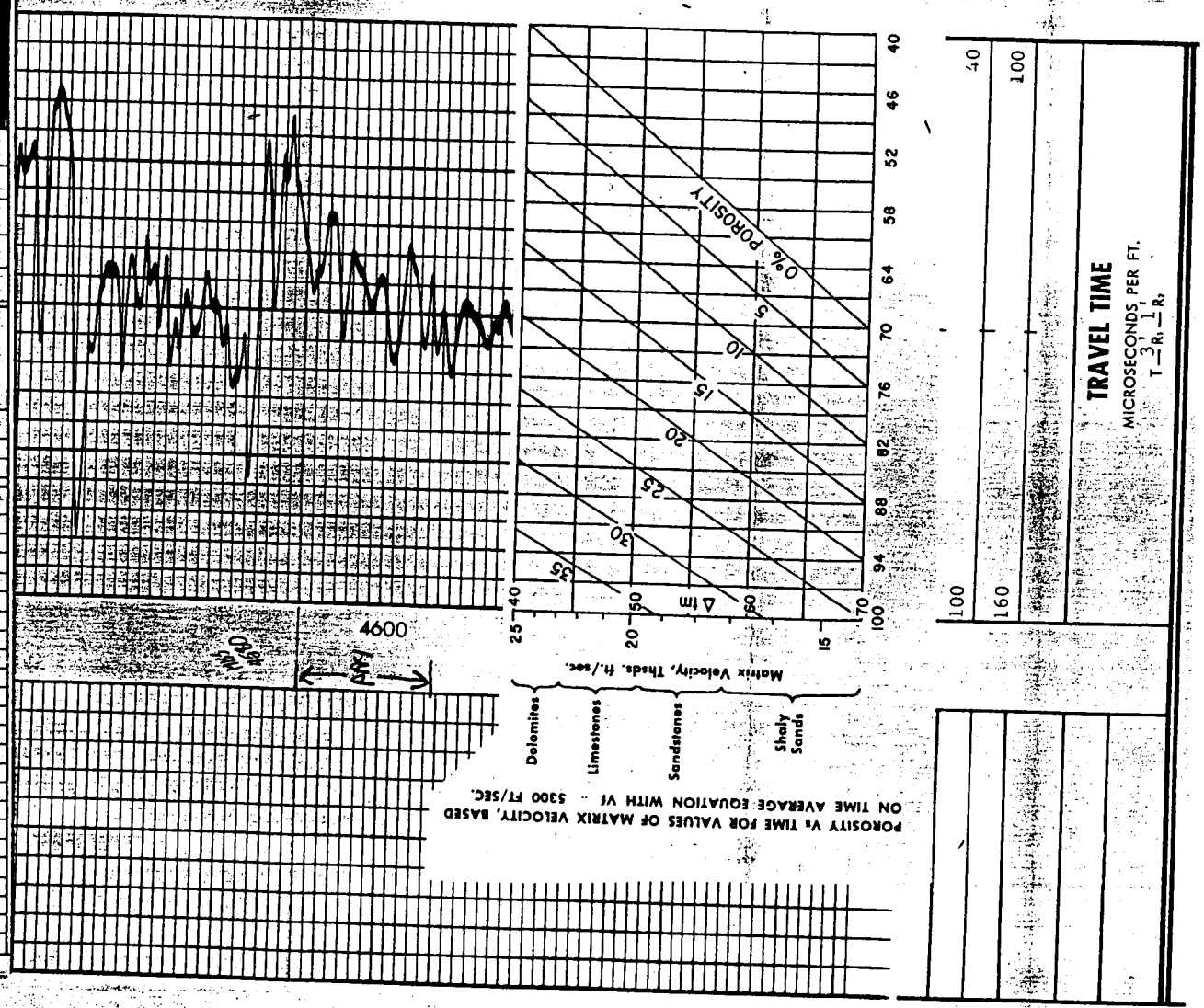
Permanent Datum GROUND LEVEL Elev. 2394' K.B. 2399'

Log Measured From KELLY BUSHING Ft. Above Perm. Datum D.F. 2396'

Drilling Measured From KELLY BUSHING G.L. 2394'

Date	6-1-72			
Run No.	ONE			
Depth—Driller	4685'			
Depth—Welex	4684'			
Btm. Log Inter.	4679'			
Top Log Inter.	3700'			
Casing—Driller	8-5/8" @ 554'	@	@	@
Casing—Welex	SAME			
Bit Size	7-7/8"			
Type Fluid in Hole	WATER BASE SALT MUD			
Dens. | Visc.	9.5 | 54	|	|	|
pH | Fluid Loss	7 | 10.2ml	| ml	| ml	| ml
Source of Sample	FLO LINE			
R_m @ Meas.Temp.	.16 @ 74 °F	@ °F	@ °F	@ °F
R_{mf} @ Meas.Temp.	.11 @ 74 °F	@ °F	@ °F	@ °F
R_{mc} @ Meas.Temp.	.24 @ 74 °F	@ °F	@ °F	@ °F
Source R_{mf} R_{mc}	MEAS. |	|	|	|
R_m @ BHT	.12 @ 116°F	@ °F	@ °F	@ °F
Time Since Circ.	4 HOURS			
Max. Rec. Temp.	116F @ TD	°F @	°F @	°F @
Equip. | Location	8766 | GT. BEND	|	|	|
Recorded By	PEBLEY			
Witnessed By	MR. GRANT			

Assume Dolo LS SPHI 18%



lib

Welex

RADIATION-GUARD LOG

COMPANY OASIS PETROLEUM, INCORPORATED
WELL BINDLEY # 1
FIELD HODGEMAN State KANS.
County

C

COMPANY OASIS PETROLEUM, INCORPORATED

15-083.20,227

WELL BINDLEY # 1

FIELD

COUNTY HODGEMAN STATE KANSAS

Location C-SE-NE

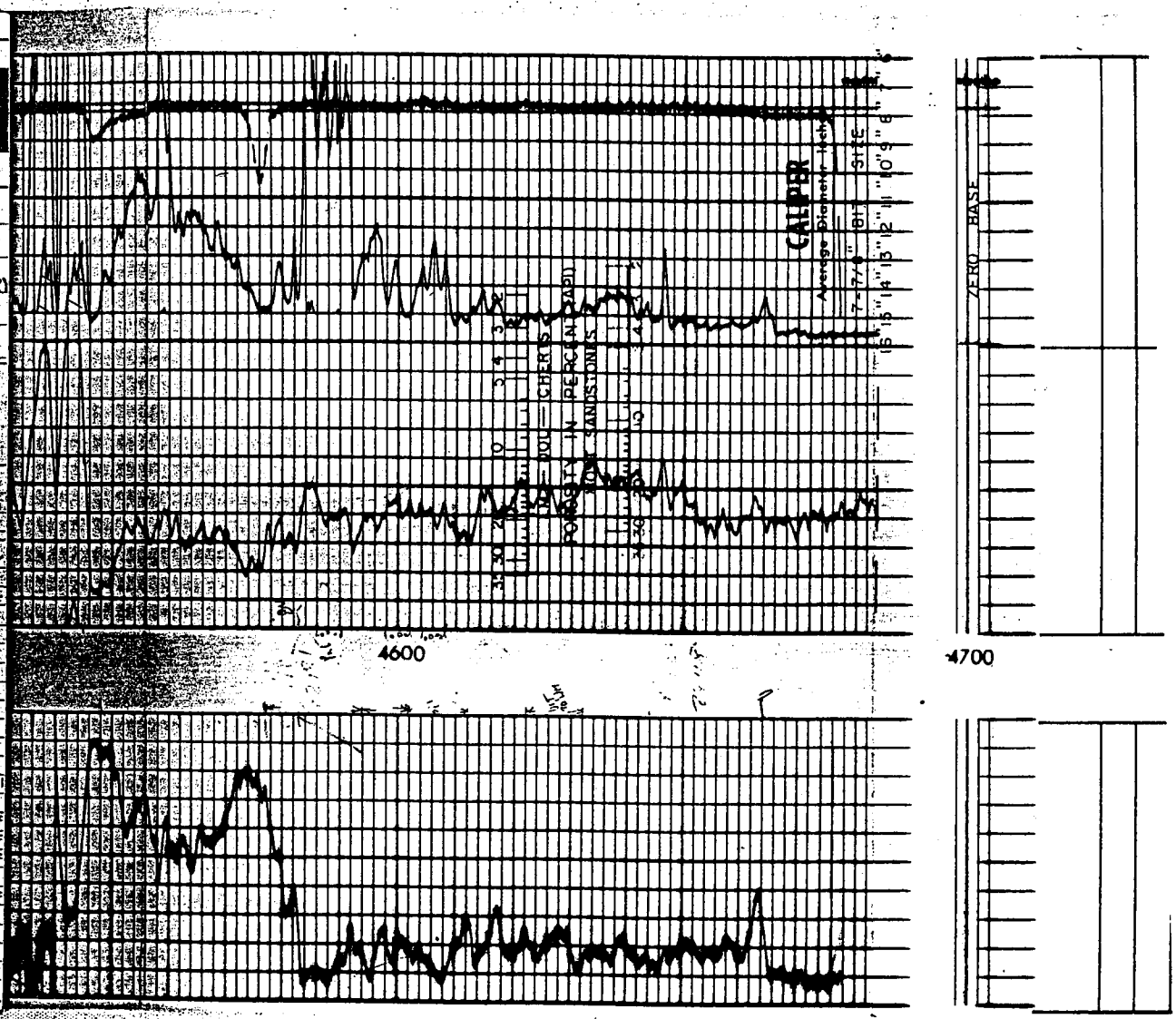
Other Services:
D K
COMP. A.V.

Sec. 33 Twp 21S Rge 24W

Permanent Datum GROUND LEVEL Elev. 2394'
Log Measured From KELLY BUSHING Ft. Above Perm. Datum
Drilling Measured From KELLY BUSHING

Elev.: K.B. 2399'
D.F. 2396'
G.L. 2394'

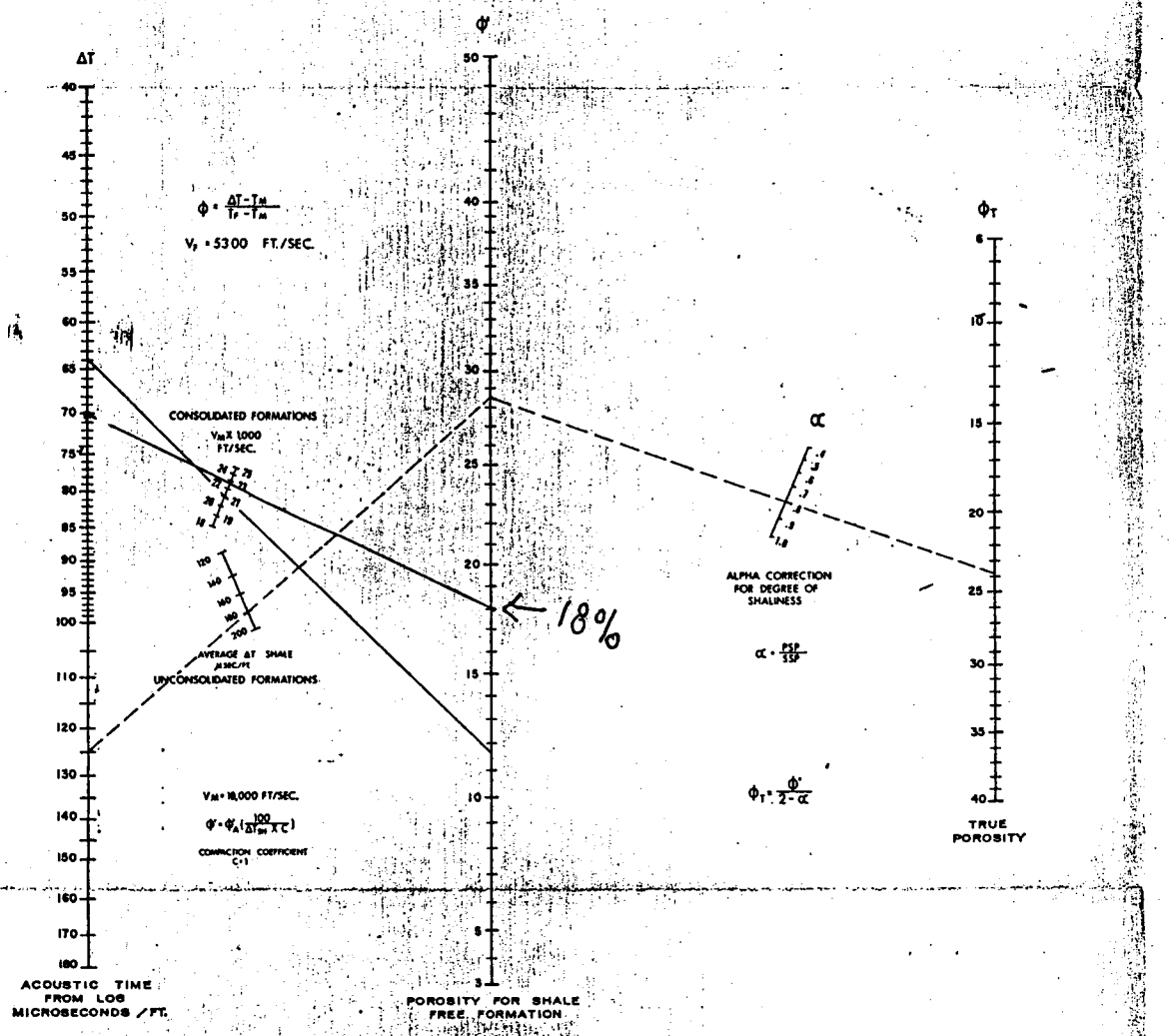
Date	6-1-72	6-1-72	6-1-72	60292 WB3
Run No. ONE	GAMMA	NEUTRON	GUARD	
Depth—Driller	4685'	4685'	4685'	
Depth—Welex	4684'	4684'	4684'	
Btm. Log Inter.	4676'	4684'	4676'	
Top Log Inter.	0'	0'	3550'	
Casing—Driller	@	@	8-5/8"@554'	@
Casing—Welex			8-5/8"554'	
Bit Size			7-7/8"	
Type Fluid in Hole			WATER BASE SALT MUD	
Dens. | Visc.	|	|	9.5 | 54	|
pH | Fluid Loss	| ml	| ml	7 |10.2ml	| ml
Source of Sample			FLO LINE	
R_m @ Meas.Temp.	@ °F	@ °F	.16@74 °F	@ °F
R_{mf} @ Meas.Temp.	@ °F	@ °F	.11@74 °F	@ °F
R_{mc} @ Meas.Temp.	@ °F	@ °F	.24@74 °F	@ °F
Source R_{mf} R_{mc}	|	|	MEAS.	|
R_m @ BHT	@ °F	@ °F	.12 @116°F	@ °F
Time Since Circ.			2 HOURS	
Max. Rec. Temp.	°F @	°F @	116@ TD	°F @
Equip. | Location	8766 | GT. BEND		|	|
Recorded By	PEBLEY & STUEVE			
Witnessed By	MR. GRANT			

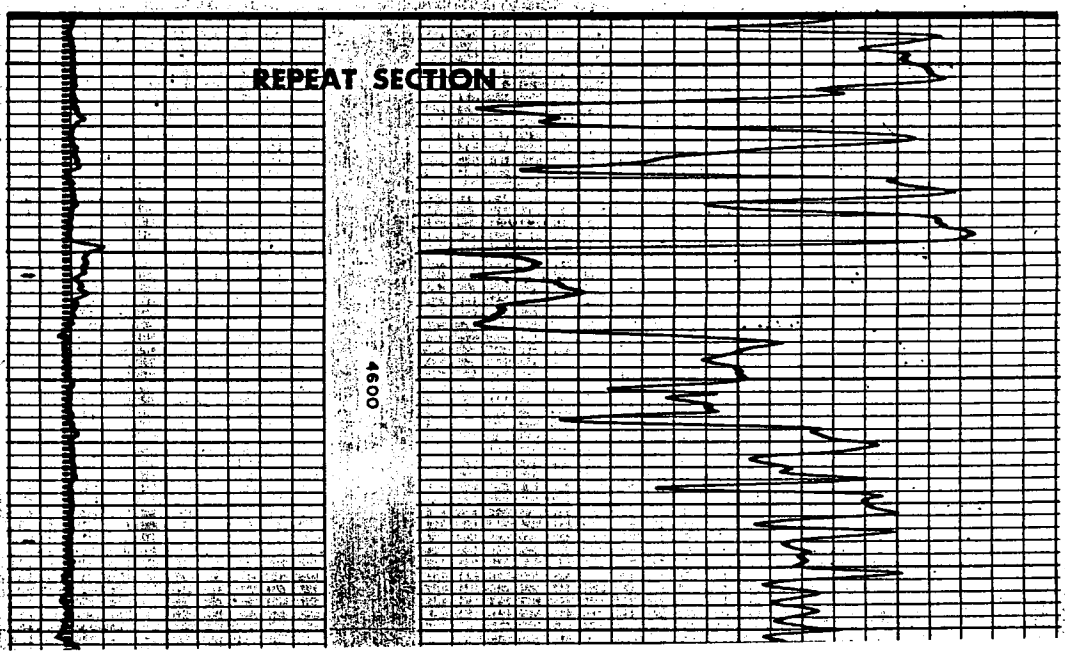


& Caliper	DEPTH	ACOUSTILOG T1 3 R1 2 R2

Company	OASIS PETROLEUM, INC.	Drillers T.D.	4710	
Well	OASIS - BINDLEY NO. 4	Log F.R.	4705	
Field	BINDLEY	Log T.D.	4709	
County	HODGEMAN	Elevations:		
State	KANSAS	K.B. 2422	D.F. 2420	G.L. 2417

POROSITY DETERMINATION FROM ACOUSTILOG





FORM 925191

Dresser Atlas

BHC Acoustilog®

JPHI = 16-17%

FILE NO. C
15-083-20,331

COMPANY OASIS PETROLEUM, INC.
WELL OASIS - BINDLEY NO. 4
FIELD BINDLEY
COUNTY HODGEMAN STATE KANSAS

LOCATION: CNWNE
730' FNL - 1980' FEL
SEC 33 TWP 21S RGE 24W

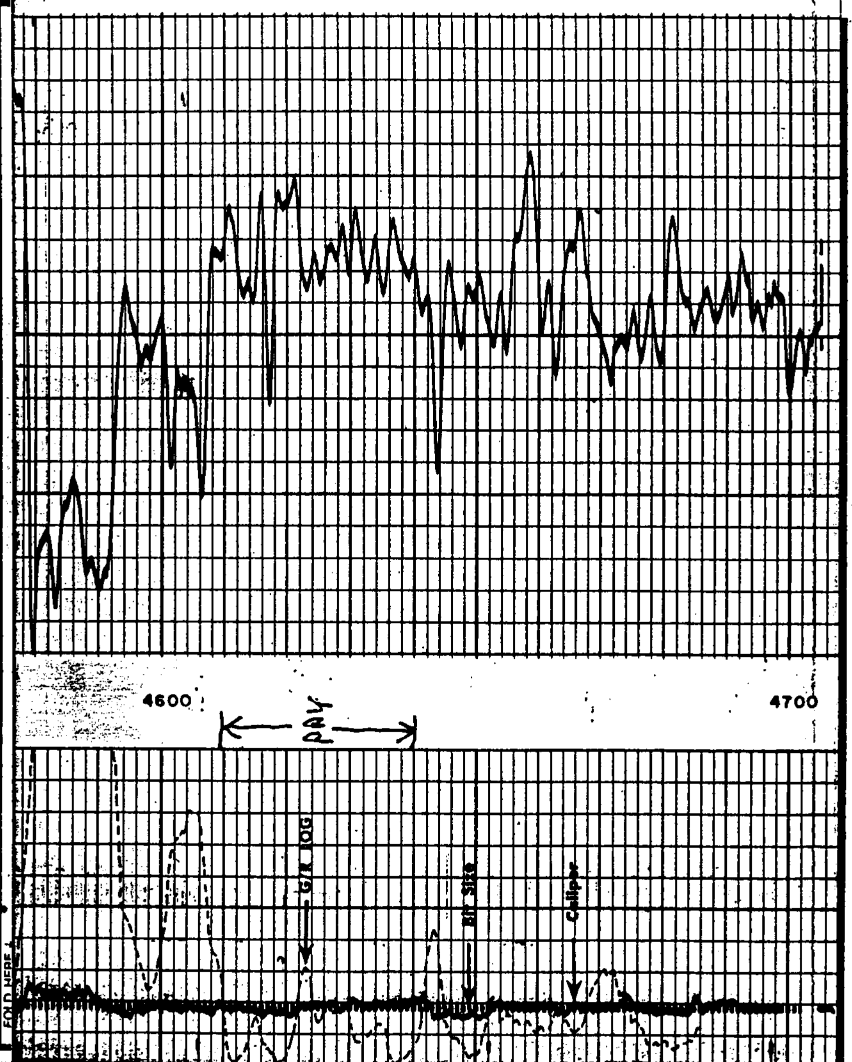
Other Services: LL-G/R-N

Permanent Datum GROUND LEVEL Elev. 2417
Log Measured from KELLY BUSHING 5 Ft. Above Permanent Datum
Drilling Measured from KELLY BUSHING

Elevations: KB 2422, DF 2420, GL 2417

62398 WCB

Date	11-4-73			
Run No.	ONE			
Depth—Driller	4710			
Depth—Logger	4709			
Bottom Logged Interval	4705			
Top Logged Interval	3700			
Casing—Driller	8-5/8@561	@	@	@
Casing—Logger	-			
Bit Size	7-7/8			
Type Fluid in Hole	STARCH MUD			
Density and Viscosity	9.6 | 58			
pH and Fluid Loss	6.7 | 8.0cc	cc	cc	cc
Source of Sample	FLOW LINE			
Rm @ Meas. Temp.	.25 @ 72°F	.15 @120°F	@ °F	@ °F
Rmf @ Meas. Temp.	@ °F	.10 @120°F	@ °F	@ °F
Rmc @ Meas. Temp.	@ °F	.47 @120°F	@ °F	@ °F
Source of Rmf and Rmc	MEAS.	CHARTS		
Rm @ BHT	.15 @120°F	@ °F	@ °F	@ °F
Time Since Circ.	7 HRS.			
Max. Rec. Temp. Deg. F.	120°F	°F	°F	°F
Equip. No. and Location	LL-1004 GB			
Recorded By	BARLOW			
Witnessed By	MR. HOLKE-MR. TUCKER			



FORM 925191 A

SPECIFIC ACOUSTIC TIME
Micro Seconds Per Foot
40 55 70 85 100

ACOUSTILOG T_1 3 R_1 2 R_2

Drillers T.D. 4710

DEPTH

G/R & Caliper
HOLE SIZE - INCHES 7 9 11 13 15
API UNITS 10 110

Company OASIS PETROLEUM, INC.

Form 925243

Dresser Atlas

Laterolog

Gamma Ray Neutron

C

FILE NO. 15-083-20331

COMPANY OASIS PETROLEUM, INC.

WELL OASIS - BINDLEY NO. 4

FIELD BINDLEY

COUNTY HODGEMAN STATE KANSAS

LOCATION: CNWNE

730' FNL - 1980' FEL

SEC 33 TWP 21S RGE 24W

Other Services: BHC-A/L-CALIPER

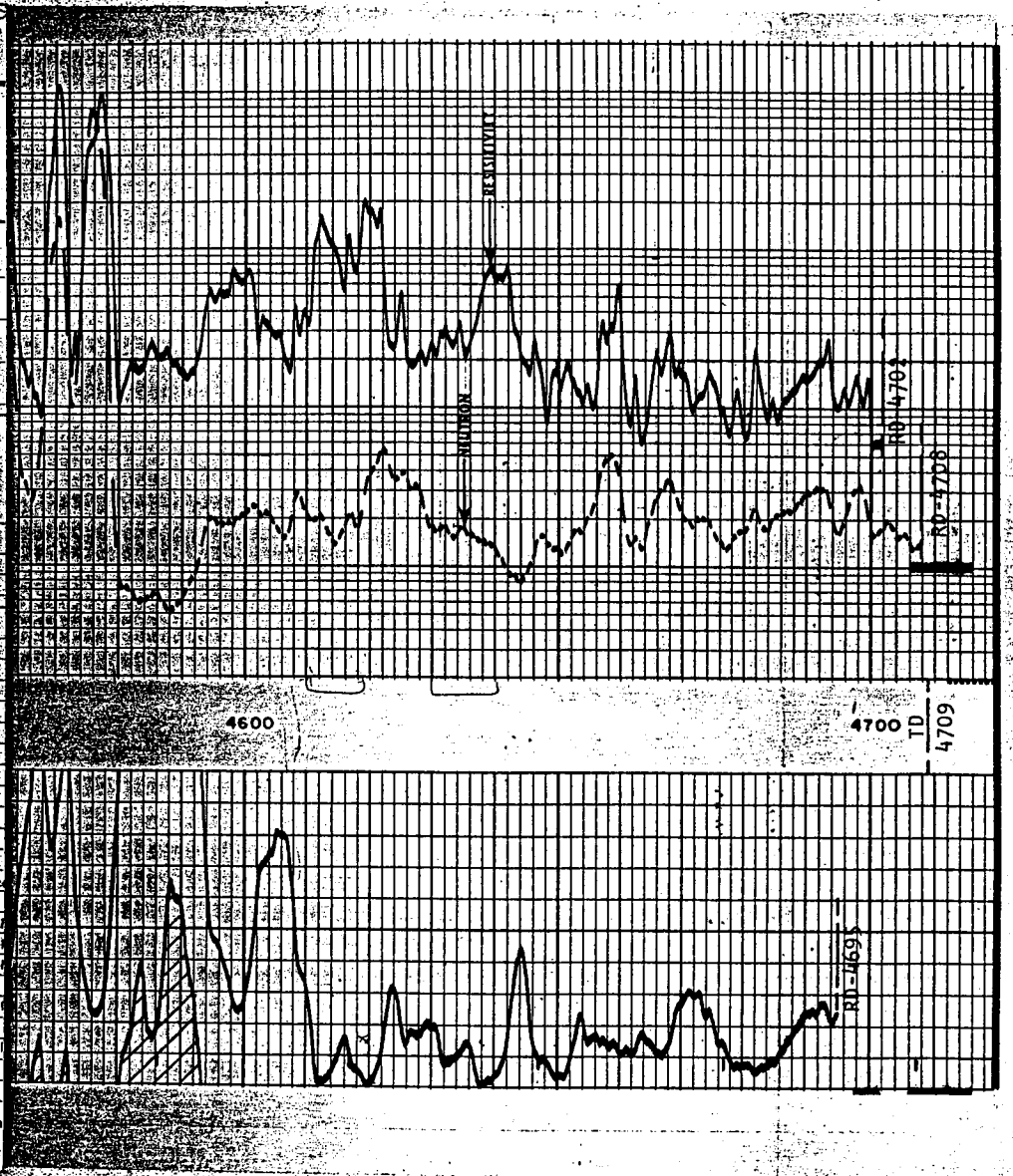
Permanent Datum GROUND LEVEL Elev. 2417

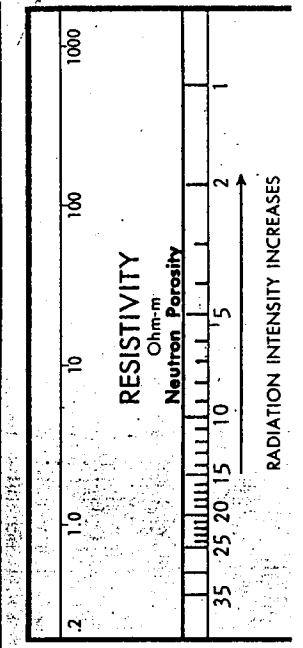
Log Measured from KELLY BUSHING 5 Ft. Above Permanent Datum

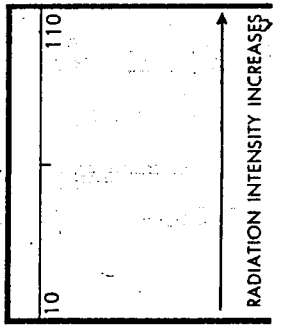
Drilling Measured from KELLY BUSHING

Elevations: KB 2422 DF 2420 GL 2417

Date	11-4-73		62398 WEB	
Run No.	ONE			
Depth—Driller	4710			
Depth—Logger	4709			
Bottom Logged Interval	4708			
Top Logged Interval	0			
Casing—Driller	8-5/8 @561			
Casing—Logger	-			
Bit Size	7-7/8			
Type Fluid in Hole	STARCH MUD			
	@	@	@	@
Density and Viscosity	9.6 58			
pH and Fluid Loss	6.7 8.0cc	cc	cc	cc
Source of Sample	FLOW LINE			
Rm @ Meas. Temp.	.25 @ 72 °F	.15 @120 °F	@ °F	@ °F
Rmf @ Meas. Temp.	@ °F	.10 @120 °F	@ °F	@ °F
Rmc @ Meas. Temp.	@ °F	.47 @120 °F	@ °F	@ °F
Source of Rmf and Rmc	MEAS.	CHARTS		
Rm @ BHT	.15 @ 120 °F	@ °F	@ °F	@ °F
Time Since Circ.	2 HRS.			
Max. Rec. Temp. Deg. F.	120 °F	°F	°F	°F
Equip. No. and Location	LL-1004 GB			
Recorded By	BARLOW			
Witnessed By	MR. HOLKE-MR. TUCKER			







Form 925243

DresserAtlas

Laterolog

Gamma Ray Neutron

C

FILE NO. 15-083-20331

COMPANY OASIS PETROLEUM, INC.

WELL OASIS - BINDLEY NO. 4

FIELD BINDLEY

COUNTY HODGEMAN STATE KANSAS

LOCATION: CNWNE

730' FNL - 1980' FEL

SEC 33 TWP 21S RGE 24W

Other Services: BHC-A/L CALIPER

Permanent Datum GROUND LEVEL Elev. 2417

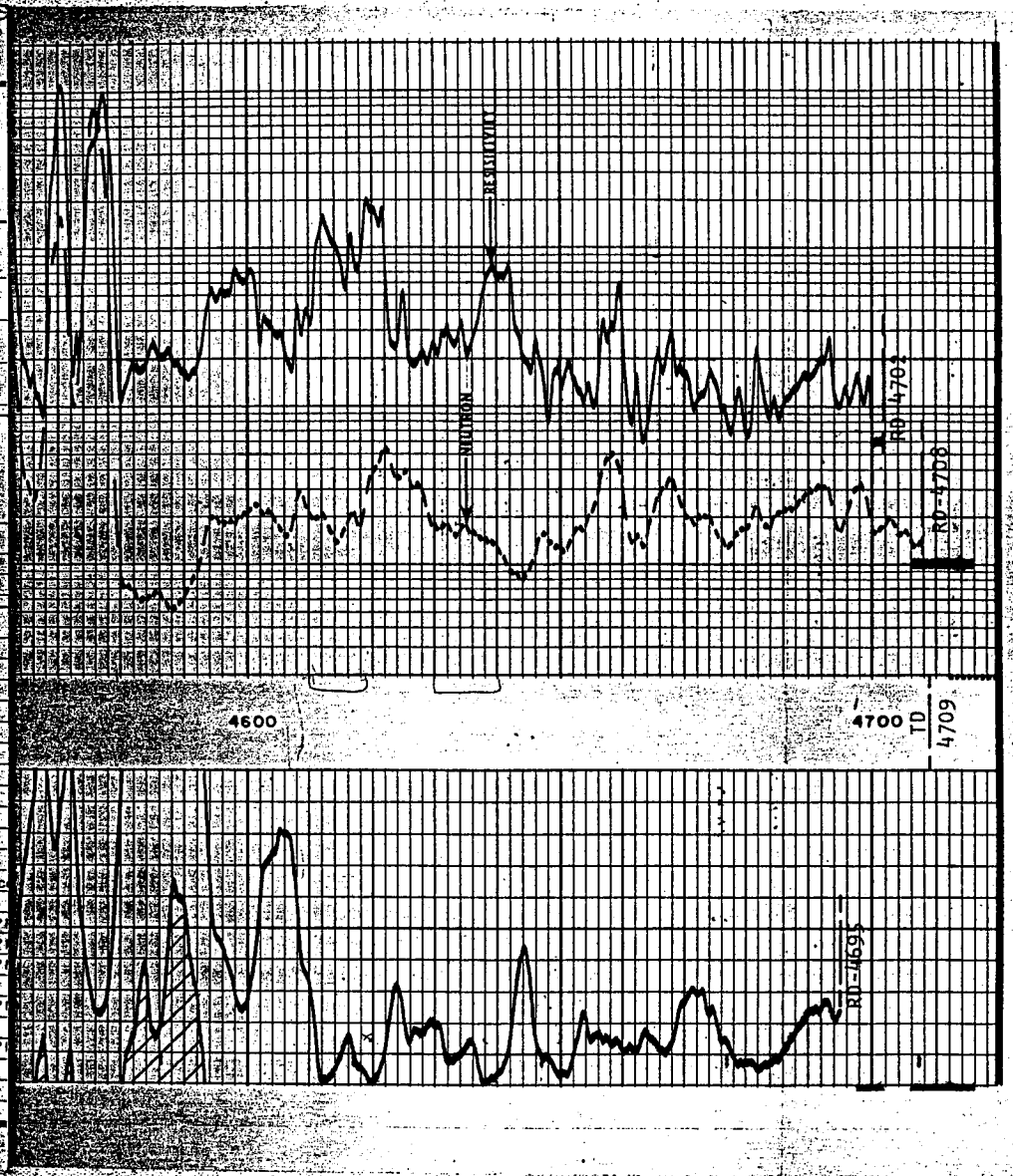
Log Measured from KELLY BUSHING 5 Ft. Above Permanent Datum

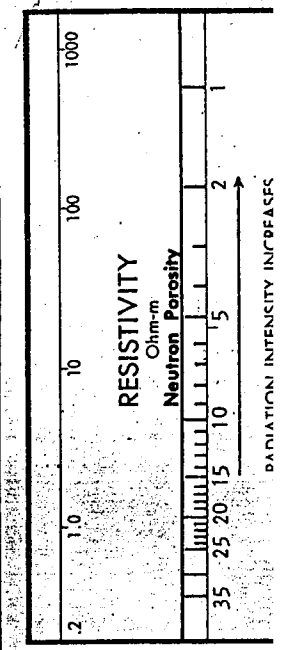
Drilling Measured from KELLY BUSHING

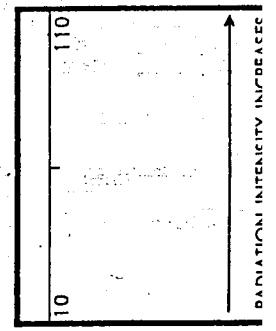
Elevations: KB 2422 DF 2420 GL 2417

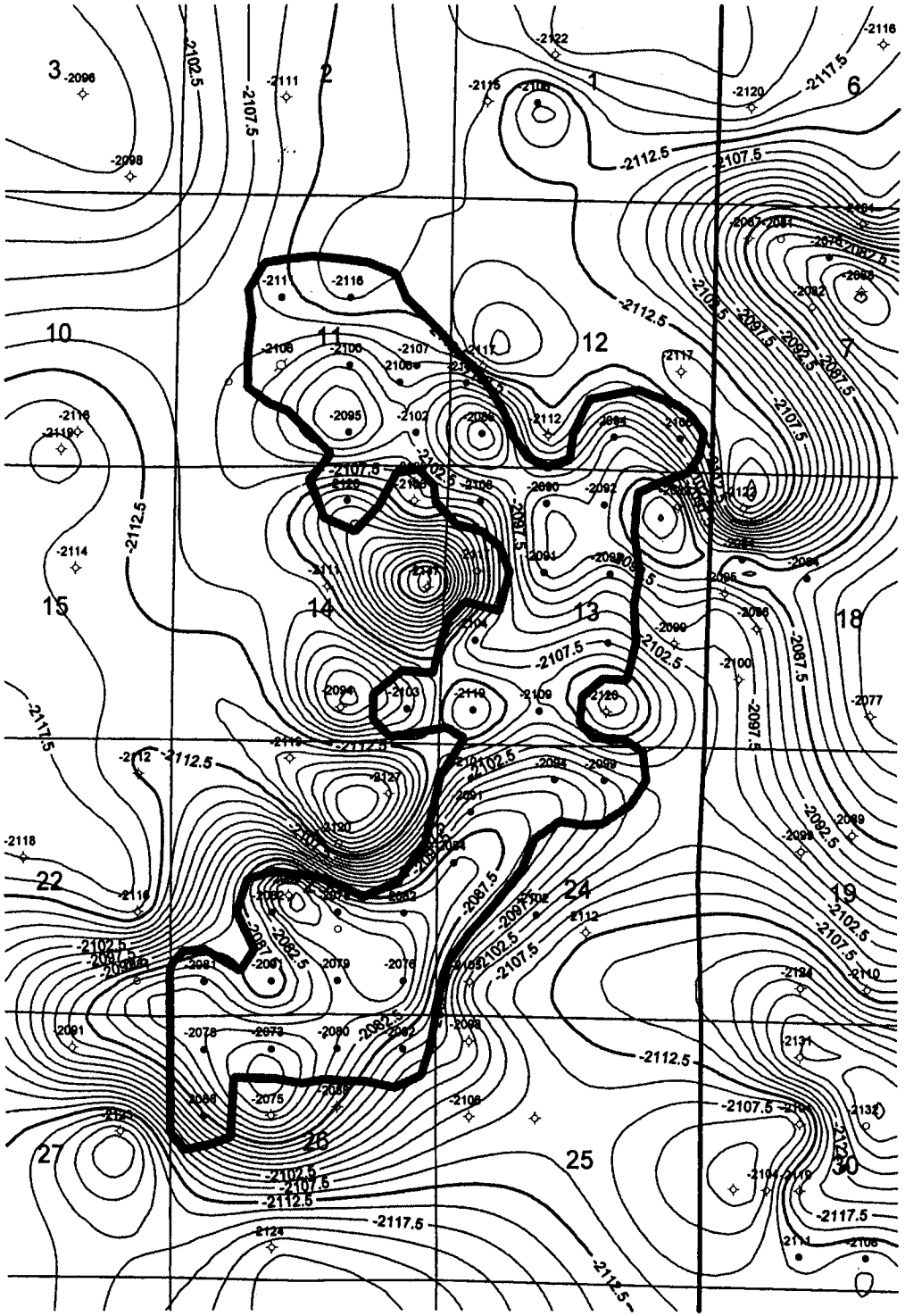
Date	11-4-73			
Run No.	ONE			
Depth—Driller	4710			
Depth—Logger	4709			
Bottom Logged Interval	4708			
Top Logged Interval	0			
Casing—Driller	8-5/8 @ 561			
Casing—Logger	-			
Bit Size	7-7/8			
Type Fluid in Hole	STARCH MUD			
	@	@	@	@
Density and Viscosity	9.6 58			
pH and Fluid Loss	6.7 8.0cc	cc	cc	cc
Source of Sample	FLOW LINE			
Rm @ Meas. Temp.	.25 @ 72 °F	.15 @120 °F	@ °F	@ °F
Rmf @ Meas. Temp.	@ °F	.10 @120 °F	@ °F	@ °F
Rmc @ Meas. Temp.	@ °F	.47 @120 °F	@ °F	@ °F
Source of Rmf and Rmc	MEAS.	CHART$		
Rm @ BHT	.15 @ 120 °F	@ °F	@ °F	@ °F
Time Since Circ.	2 HRS.			
Max. Rec. Temp. Deg. F.	120 °F	°F	°F	°F
Equip. No. and Location	LL-1004 GB			
Recorded By	BARLOW			
Witnessed By	MR. HOLKE-MR. TUCKER			

62398
WG







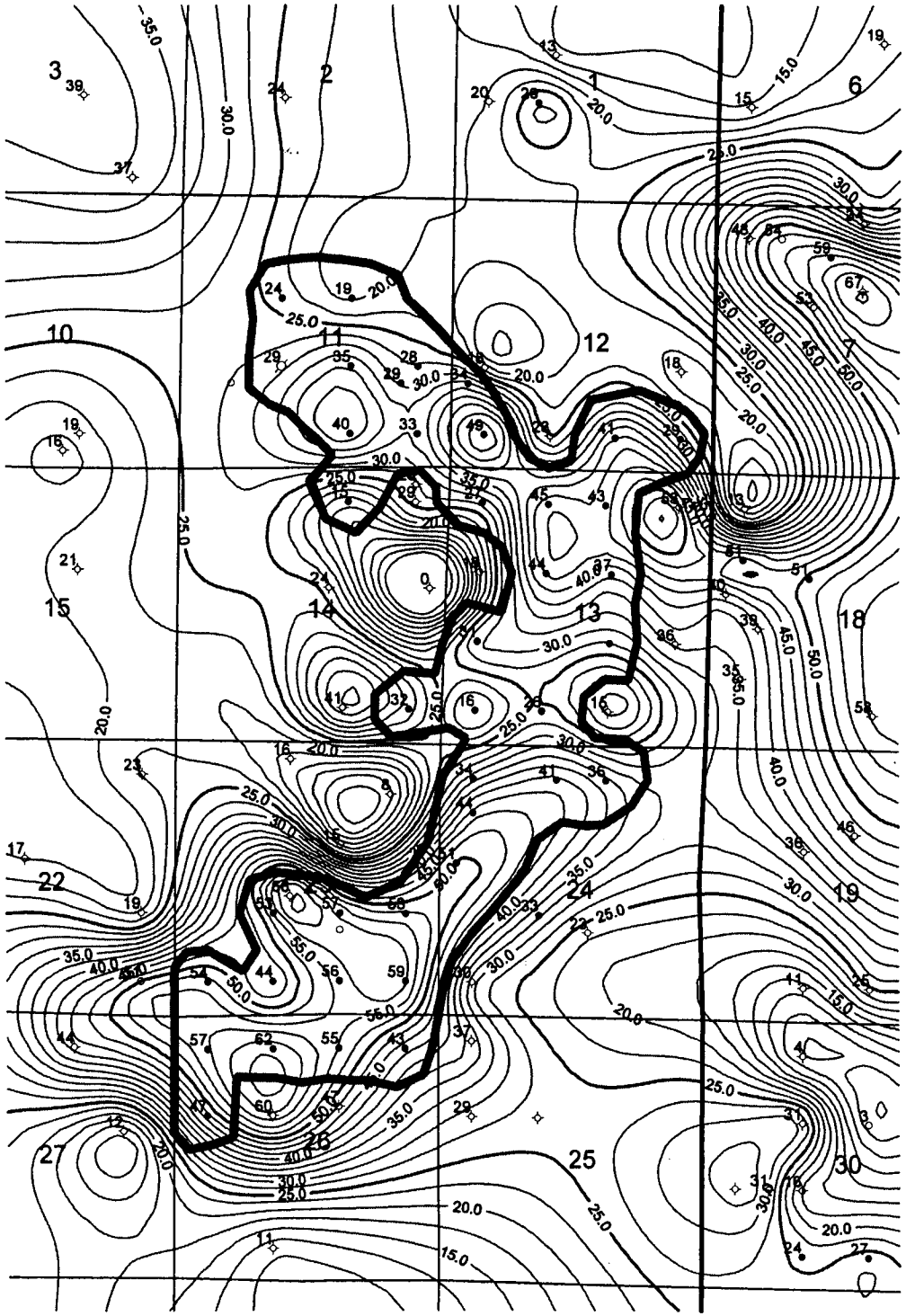


STAIRETT FIELD

25/25W

MISS SUBSEA

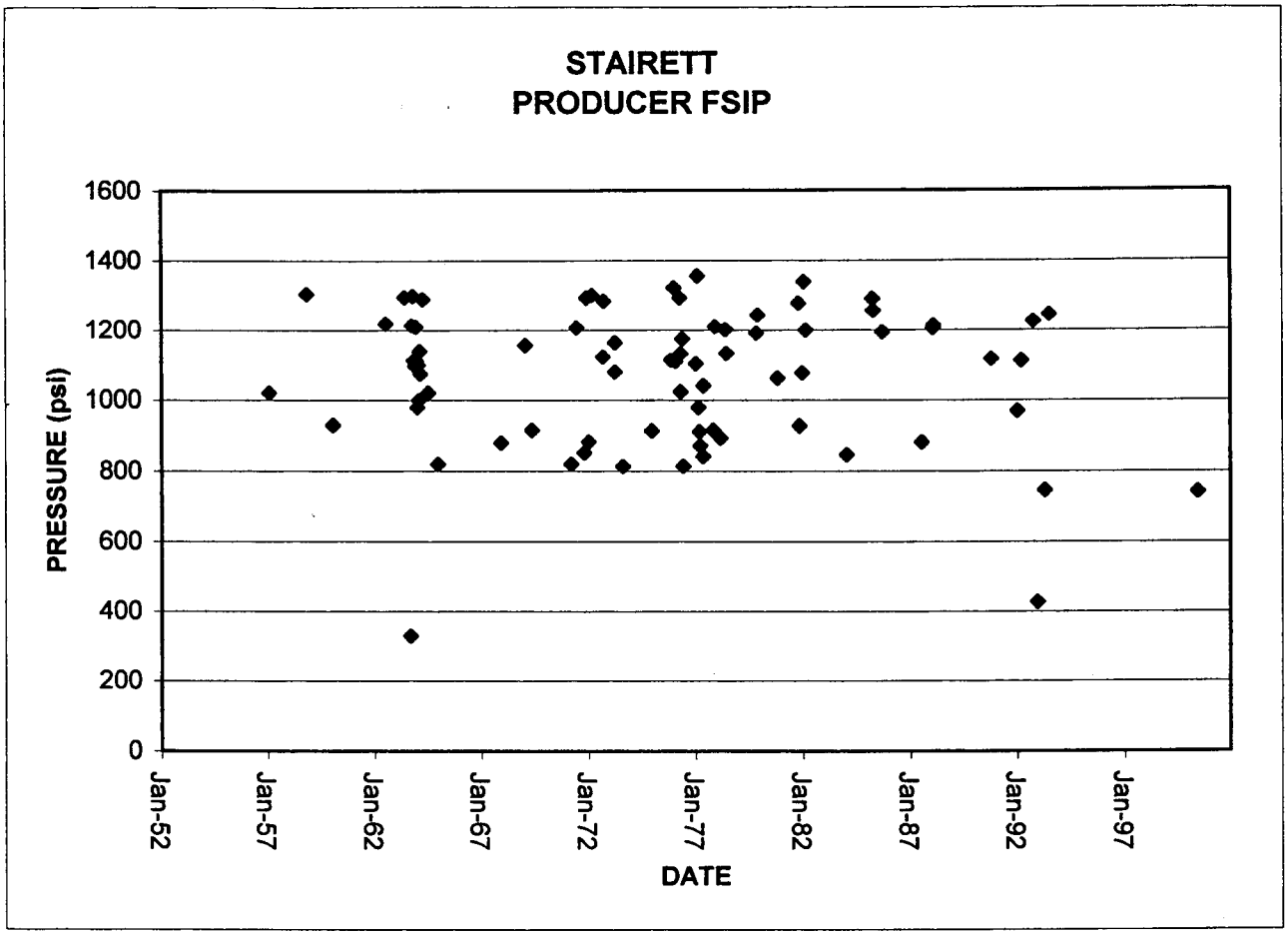
FIELD OUTLINE

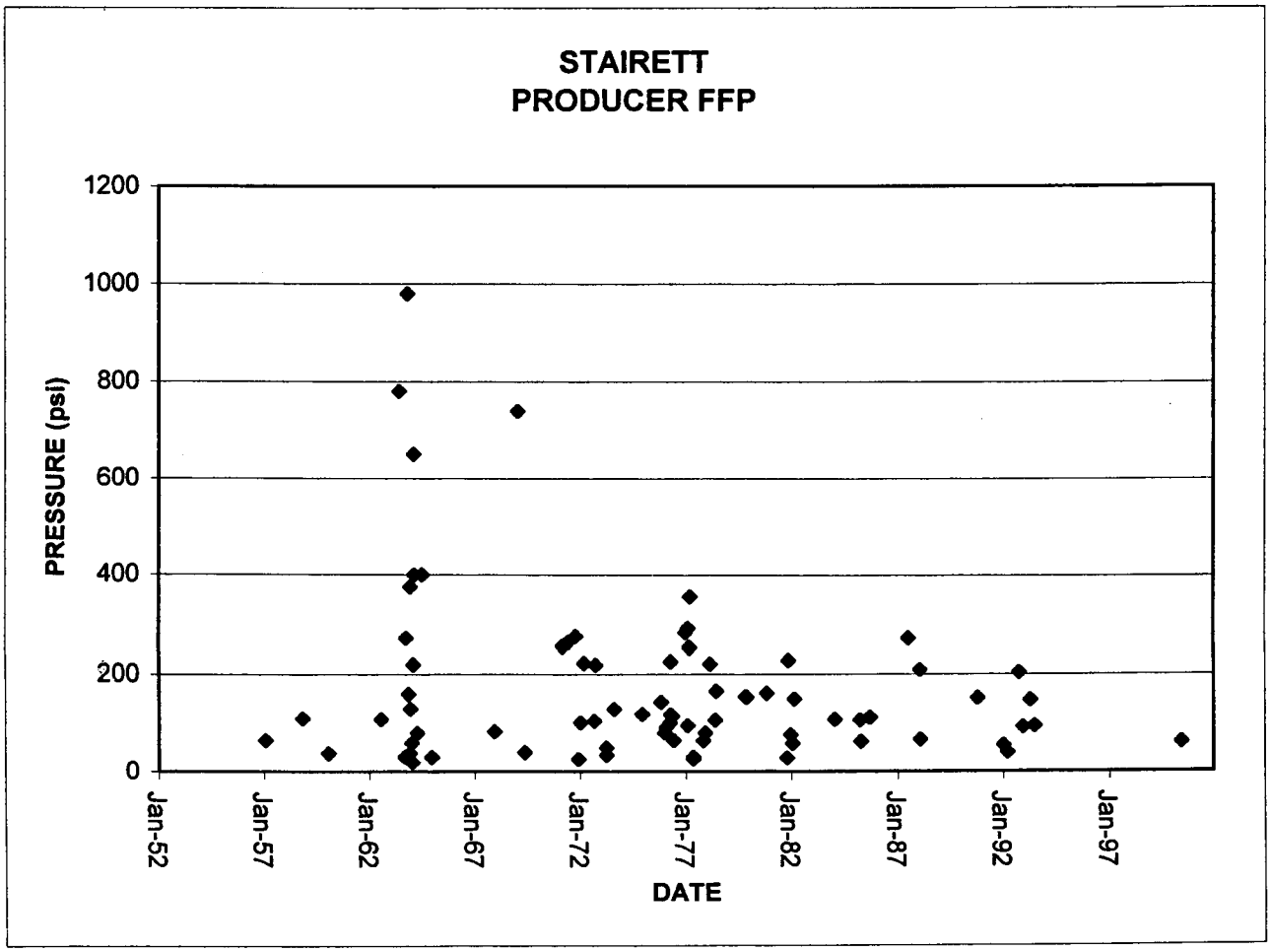


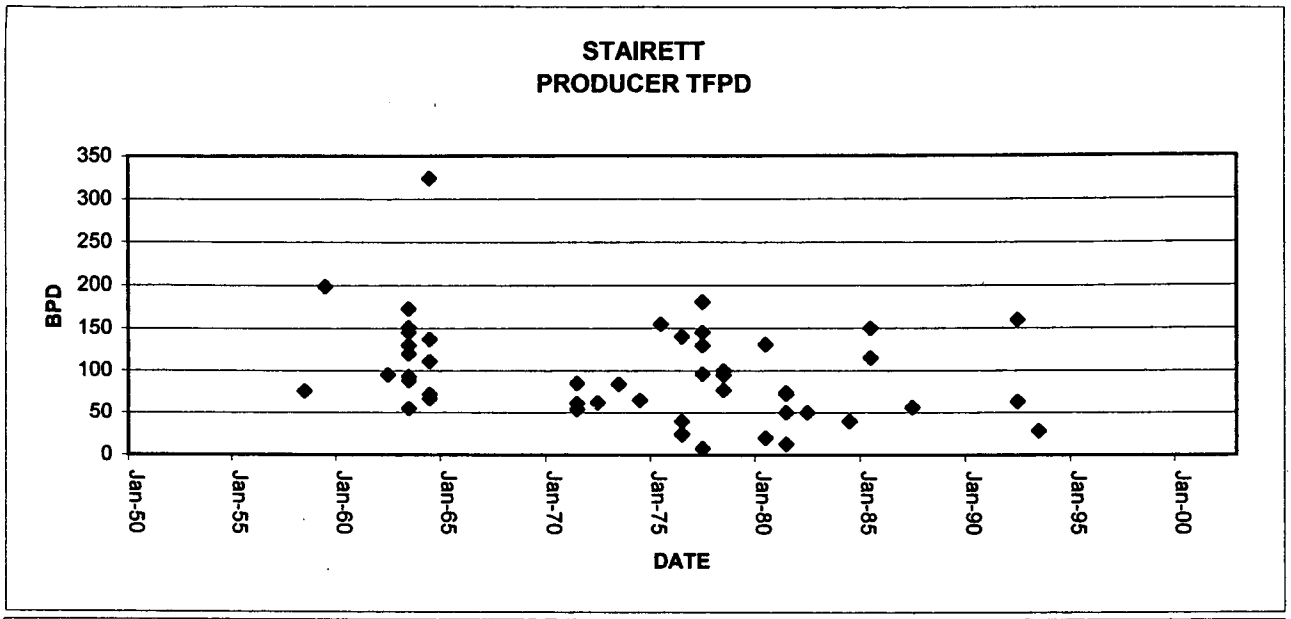
STAIRETT FIELD

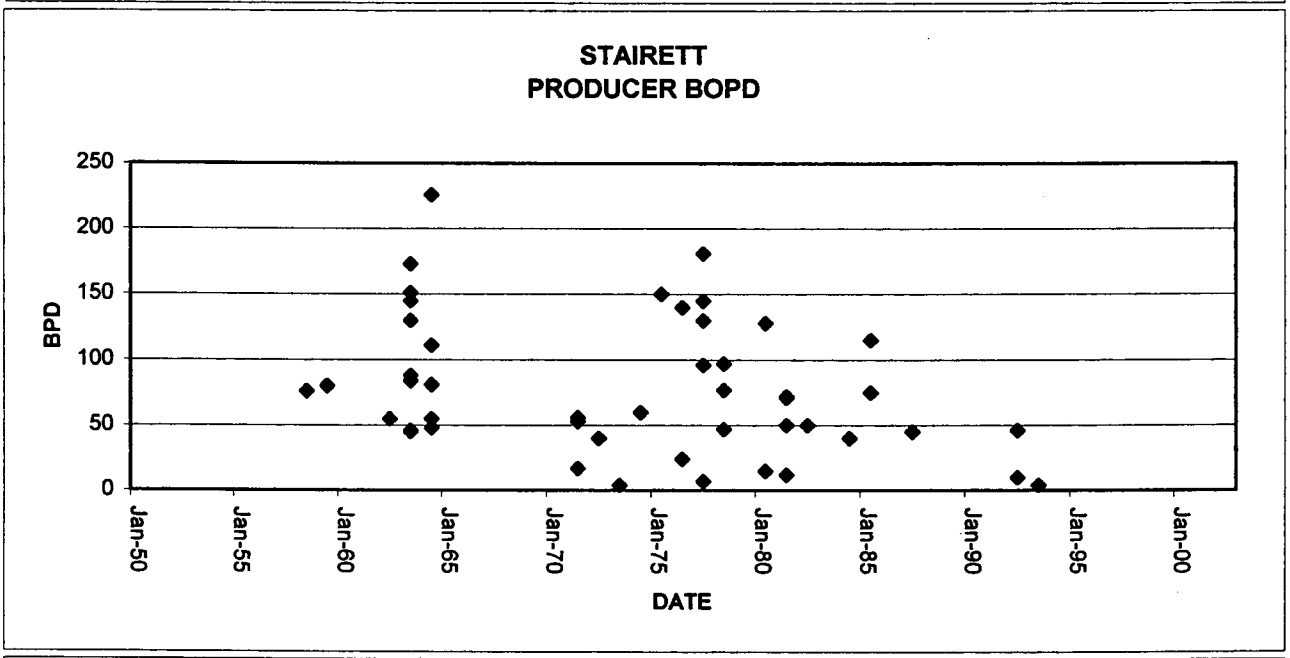
PAY ISOPACH

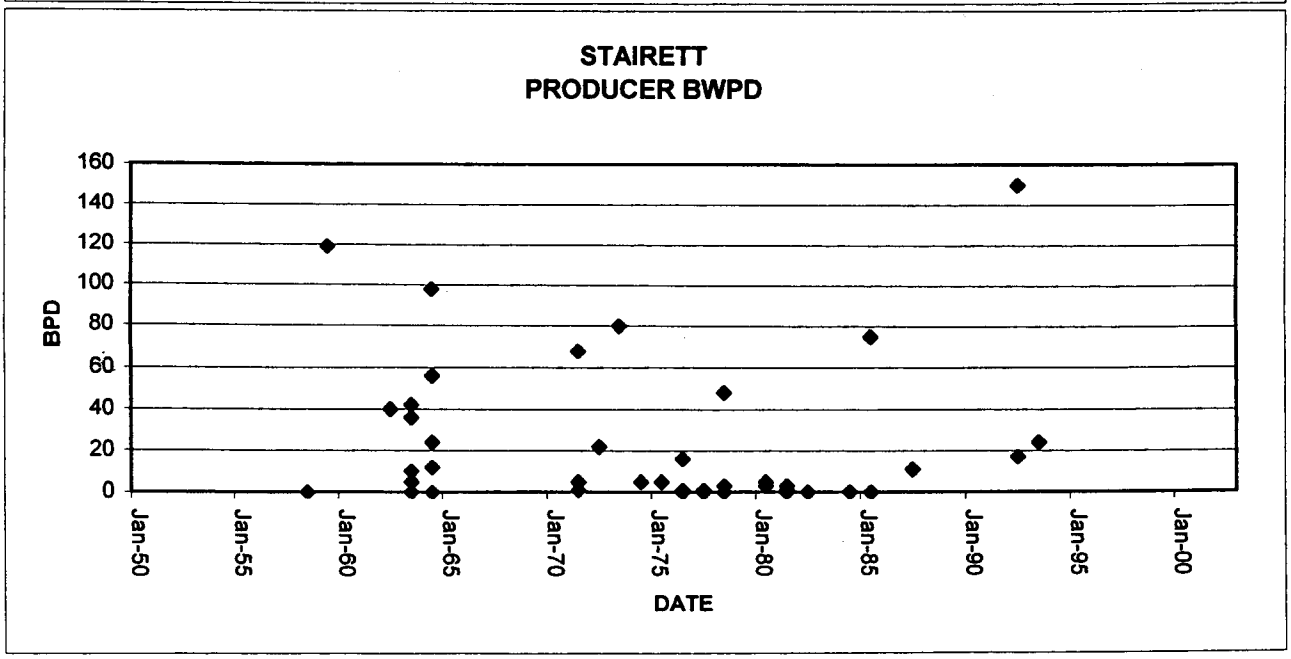
FIELD OUTLINE


STAIRETT
PRODUCER FSIP
PRESSURE (psi)
1600
1400
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE


STAIRETT
PRODUCER FFP
PRESSURE (psi)
1200
1000
800
600
400
200
0
Jan-52
Jan-57
Jan-62
Jan-67
Jan-72
Jan-77
Jan-82
Jan-87
Jan-92
Jan-97
DATE


STAIRETT
PRODUCER TFPD
BPD
350
300
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


STAIRETT
PRODUCER BOPD
BPD
250
200
150
100
50
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE


STAIRETT
PRODUCER BWPD
BPD
160
140
120
100
80
60
40
20
0
Jan-50
Jan-55
Jan-60
Jan-65
Jan-70
Jan-75
Jan-80
Jan-85
Jan-90
Jan-95
Jan-00
DATE

Schlumberger

DUAL INDUCTION - LATEROLOG
WITH LINEAR CORRELATION LOG

COUNTY HODGEMAN
FIELD STAIRETT
LOCATION SEC. 13-21S-25W
WELL MINER A-3
COMPANY GULF OIL EXPLORATION

COMPANY GULF OIL EXPLORATION AND PRODUCTION COMPANY
WELL MINER NO. A-3
FIELD STAIRETT
COUNTY HODGEMAN STATE KANSAS

LOCATION: Con SE NW

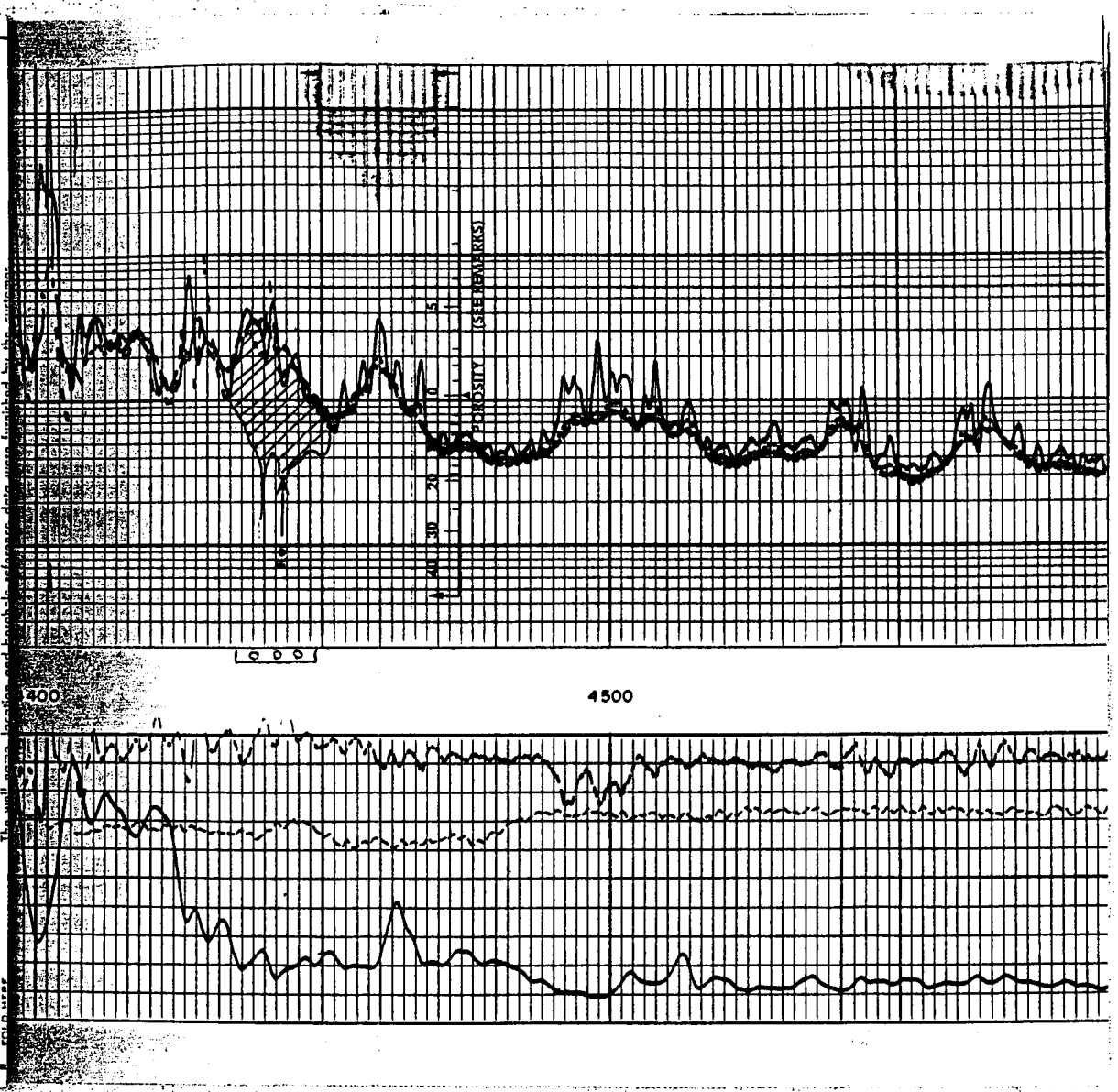
API SERIAL NO.	SEC.	TWP	RANGE
	13	21S	25W

Other Services:
CNL-FDC-GR
CST-U

Permanent Datum: GROUND LEVEL ; Elev.: 2326
Log Measured From K.B. 9 Ft. Above Perm. Datum
Drilling Measured From K.B.

Elev.: K.B. 2335
D.F.
G.L. 2326

Date	5-13-81			
Run No.	ONE			
Depth—Driller	5200			
Depth—Logger	5204			
Btm. Log Interval	5201			
Top Log Interval	602			
Casing—Driller	8 5/8@500	@	@	@
Casing—Logger	602			
Bit Size	7 7/8			
Type Fluid in Hole	MUD			
Dens. / Visc.	9.8 / 57			
pH / Fluid Loss	6.5 / 13.6ml	ml	ml	ml
Source of Sample	CIRCULATED			
Rm @ Meas. Temp.	.608 @69 °F	.37 @117 °F	@ °F	@ °F
Rmf @ Meas. Temp.	.49 @69 °F	.30 @117 °F	@ °F	@ °F
Rmc @ Meas. Temp.	@ °F	@ °F	@ °F	@ °F
Source: Rmf / Rmc				
Rm @ BHT	@ °F	@ °F	@ °F	@ °F
Circulation Stopped	1000			
Logger on Bottom	1530			
Max. Rec. Temp.	117 °F	°F	°F	°F
Equip. / Location	7714 / GT. BEND			
Recorded By	ISBISTER			
Witnessed By	THOMPSON			



FOLD HERE

Schlumberger

SIMULTANEOUS
COMPENSATED NEUTRON-FORMATION DENSITY

COMPANY GULF OIL EXPLORATION AND PRODUCTION COMPANY

WELL MINER NO. A-3

FIELD STAIRETT

COUNTY HODGEMAN STATE KANSAS

COUNTY HODGEMAN
FIELD STAIRETT
LOCATION SEC. 13-21S-25W
WELL MINER NO. A-3
COMPANY GULF OIL

LOCATION: CEN SE NW

API SERIAL NO. | SEC. 13 | TWP. 21S | RANGE 25W

Other Services:
DIL-GR
CST-U

Permanent Datum: GROUND LEVEL ; Elev.: 2326
Log Measured From K.B. 9 Ft. Above Perm. Datum
Drilling Measured From K.B.

Elev.: K.B. 2335
D.F.
G.L. 2326

Date	5-13-81			
Run No.	ONE			
Depth—Driller	5200			
Depth—Logger	5204			
Btm. Log Interval	5203			
Top Log Interval	602			
Casing—Driller	8 5/8@600	@	@	@
Casing—Logger	602			
Bit Size	7 7/8			
Type Fluid in Hole	GEL MUD			
Dens. / Visc.	9.8 / 57			
pH / Fluid Loss	6.5 / 13.6ml	ml	ml	ml
Source of Sample	CIRCULATED			
Rm @ Meas. Temp.	.608 @69 °F	.37 @117 °F	@ °F	@ °F
Rmf @ Meas. Temp.	.49 @69 °F	.3 @117 °F	@ °F	@ °F
Rmc @ Meas. Temp.	@ °F	@ °F	@ °F	@ °F
Source: Rmf / Rmc				
Rm @ BHT	@ °F	@ °F	@ °F	@ °F
TIME Circulation Stopped	1000			
TIME Logger on Bottom	1830			
Max. Rec. Temp.	117 °F	°F	°F	°F
Equip. / Location	7714 / GT. BEND			
Recorded By	ISBISTER			
Witnessed By	THOMPSON			

ACC DPHI 21%
AVG DPHI 9%
AVG 15%