

BEFORE THE INDUSTRIAL COMMISSION
OF THE STATE OF NORTH DAKOTA

IN THE MATTER OF A HEARING CALLED ON A
MOTION OF THE COMMISSION TO CONSIDER THE
TEMPORARY SPACING FOR THE DEVELOPMENT OF
AN OIL POOL DISCOVERED BY THE C & K PETRO-
LEUM #1 KOCH WELL LOCATED IN SECTION 28,
T162N, R89W, BURKE COUNTY, NORTH DAKOTA,
DEFINE THE LIMITS OF THE FIELD, AND ENACT
SUCH SPECIAL FIELD RULES AS MAY BE NECESSARY.

CASE NO. 2245
ORDER NO. 2524

TEMPORARY ORDER OF THE COMMISSION

BY THE COMMISSION:

Pursuant to legal notice this cause came on for hearing at 1:30 p.m. on the 21st day of September, 1981, in Dickinson, North Dakota, before an examiner appointed by the Industrial Commission of North Dakota, hereinafter referred to as the "Commission."

NOW, on this 21st day of October, 1981, the Commission, a quorum being present having considered the testimony adduced and the exhibits received at said hearing, and being fully advised in the premises,

FINDS:

(1) That due public notice having been given as required by law, the Commission has jurisdiction of this cause and the subject matter thereof.

(2) That geological and engineering evidence presented to the Commission relative to the matter of well spacing indicates that the Minnesota-Madison Pool, as classified and defined in this order, should be developed on a pattern of one well to 80 acres with wells located not less than 500 feet from a spacing unit boundary, nor closer than 1320 feet from a well permitted to or producing from the pool in order to drain efficiently the recoverable oil from said pool, assure rapid development, avoid the drilling of unnecessary wells, and prevent waste in a manner that will protect correlative rights.

(3) That temporary 80-acre spacing in the Madison Pool in this field will result in the efficient and economical development of the field as a whole and will operate so as to prevent waste and provide maximum ultimate recovery, will avoid the drilling of unnecessary wells, and will protect correlative rights.

(4) That the unrestricted flaring of gas produced from the Minnesota-Madison Pool, could be considered waste, and in order to minimize such, production from the pool should be restricted until the wells producing therefrom are connected to a gas gathering and processing facility.

(5) That certain special field rules are necessary to prevent waste and protect against the contamination and pollution of surface lands and fresh waters.

IT IS THEREFORE ORDERED:

(1) That the following described tracts of land in Burke County, North Dakota, be, and the same are hereby designated the Minnesota Field:

TOWNSHIP 162 NORTH, RANGE 89 WEST, 5TH PM

All of Sections 21 & 28, and the W/2 of Sections 22 & 27.

together with those additional quarter-quarter sections or governmental lots corresponding thereto as may be proven productive by wells drilled on lands adjacent to the boundaries of the field as set forth above, provided further that such extensions of the field boundaries shall include only sufficient acreage to form a spacing unit for such wells, and any intervening lands.

(2) That the Minnesota-Madison Pool be, and the same is hereby defined as that accumulation of oil and gas found below the base of the Last Charles Salt and above the top of the Lodgepole Formation within the limits of the field as set forth above.

(3) That effective this date, the temporary spacing for the development of the Minnesota-Madison Pool be, and the same is hereby set at one well to 80 acres.

(4) That all wells hereafter drilled to said pool shall be located not less than 500 feet from a spacing unit boundary nor closer than 1320 feet to a well permitted to or producing from the pool. Wells presently permitted to or producing from the pool that do not conform to this spacing pattern shall be considered exceptions.

(5) That spacing units in the Minnesota-Madison Pool shall consist of any two adjacent quarter-quarter sections or governmental lots corresponding thereto within the same quarter section, and hereafter such spacing units shall be determined by the location of the well; the spacing units shall be in a direction so as to allow the first well in a quarter section to be nearest to the center of the spacing unit; spacing units for wells being equi-distant from the mid-section lines shall be designated by the operator; however, the Commission shall have continuing jurisdiction, and in the event that spacing units hereafter formed by this policy do not coincide with the geological and physical nature of the reservoir, the Commission may alter specific spacing units upon application by any interested party, after due notice and hearing.

(6) That no well shall be drilled hereafter in the Minnesota-Madison Pool except in conformity with the regulations above without special order of the Commission after due notice and hearing.

(7) That the following rules concerning the casing, tubing and equipping of wells shall apply to the subsequent drilling and operation of wells in the Minnesota-Madison Pool;

(a) The surface casing shall consist of new or reconditioned pipe that has been previously tested to 1000 pounds per square inch. The casing shall be set and cemented at a point not less than 50 feet below the base of any fresh water aquifer in the area. Sufficient cement shall be used to fill the annular space outside the pipe to the surface of the ground, or the bottom of the cellar, and sufficient scratchers and centralizers shall be used to assure a good cement job. Cement shall be allowed to stand a minimum of 12 hours before drilling the plug or initiating tests.

(b) The producing or oil string shall consist of new or reconditioned pipe that has been previously tested to 3000 pounds per square inch. Casing shall be set and cemented at a point not higher than the top of the producing formation. Sufficient cement shall be used and applied in such manner as to adequately protect and isolate all formations containing oil and/or gas, protect the pipe through salt sections encountered, and to isolate the Dakota-Lakota Series. The cement shall be allowed to stand a minimum of 24 hours before drilling the plug or initiating tests. After cementing, the casing shall be tested by application of pump pressure of at least 2000 pounds per square inch. If, at the end of 30 minutes this pressure shall have dropped 150 pounds per square inch or more, the casing shall be repaired. Thereafter, the casing shall again be tested in the same manner. Further work shall not proceed until a satisfactory test has been obtained.

(c) All well-head fittings and connections shall have a working pressure in excess of that to which they are expected to be subjected.

(d) All wells shall be equipped with tubing; all tubing shall be of sufficient internal diameter to allow the passage of a bottom-hole pressure gauge for the purpose of obtaining bottom-hole pressure measurements.

(8) That the gas-oil ratio of each well shall be measured during the month of July, and the reservoir pressure of flowing wells shall be measured in the month of July, and in pumping wells when the rods are pulled but at least once annually and reported to the Commission within 15 days following the end of the month in which they are determined. Pressure measurements shall be made at or adjusted to a subsea datum of 3920 feet after the well has been shut in for 48 hours. All gas-oil ratios and reservoir pressure determinations shall be made under the supervision of and by methods approved by the Chief Enforcement Officer. The Chief Enforcement Officer is authorized to waive these requirements if the necessity therefor can be demonstrated to his satisfaction.

(9) That no salt water shall be stored in unlined pits in this field. Material used to line pits must be approved by the Chief Enforcement Officer.

(10) The Dakota-Lakota Series in and under the Minnesota Field, is hereby designated a disposal reservoir, and the Chief Enforcement Officer is authorized to approve requests to utilize wells in the field, as herein defined, for salt water disposal purposes.

(11) That for the purposes of division of production to owners of interests in spacing units established by this order, and proven productive prior to the date hereof, this order shall be retroactive to the date of first production.

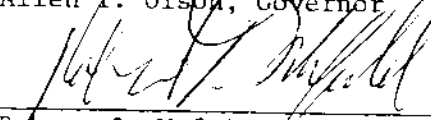
(12) That all wells in the Minnesota-Madison Pool shall be allowed to produce at an unrestricted rate for a period of 60 days commencing on the first day oil is produced through well-head equipment into tanks from the ultimate producing interval after casing has been run; after that, oil production from such wells shall not exceed an average of 200 barrels per day for a period of 60 days; after that, oil production from such wells shall not exceed an average of 150 barrels per day for a period of 60 days, thereafter, oil production from such wells shall not exceed an average of 100 barrels of oil per day; if and when such wells are connected to a gas gathering and processing facility the foregoing restrictions shall be removed, and the wells shall be allowed to produce at a maximum efficient rate.

(13) That this order shall cover all of the Minnesota-Madison Pool, common source of supply of crude oil, natural gas as herein defined, and shall continue in full force and effect until the 1st day of April, 1983. That the proper spacing for the pool will be considered by the Commission on or before the regularly scheduled meeting in March, 1983.

DONE, in Bismarck, North Dakota, this 2nd day of October, 1981.

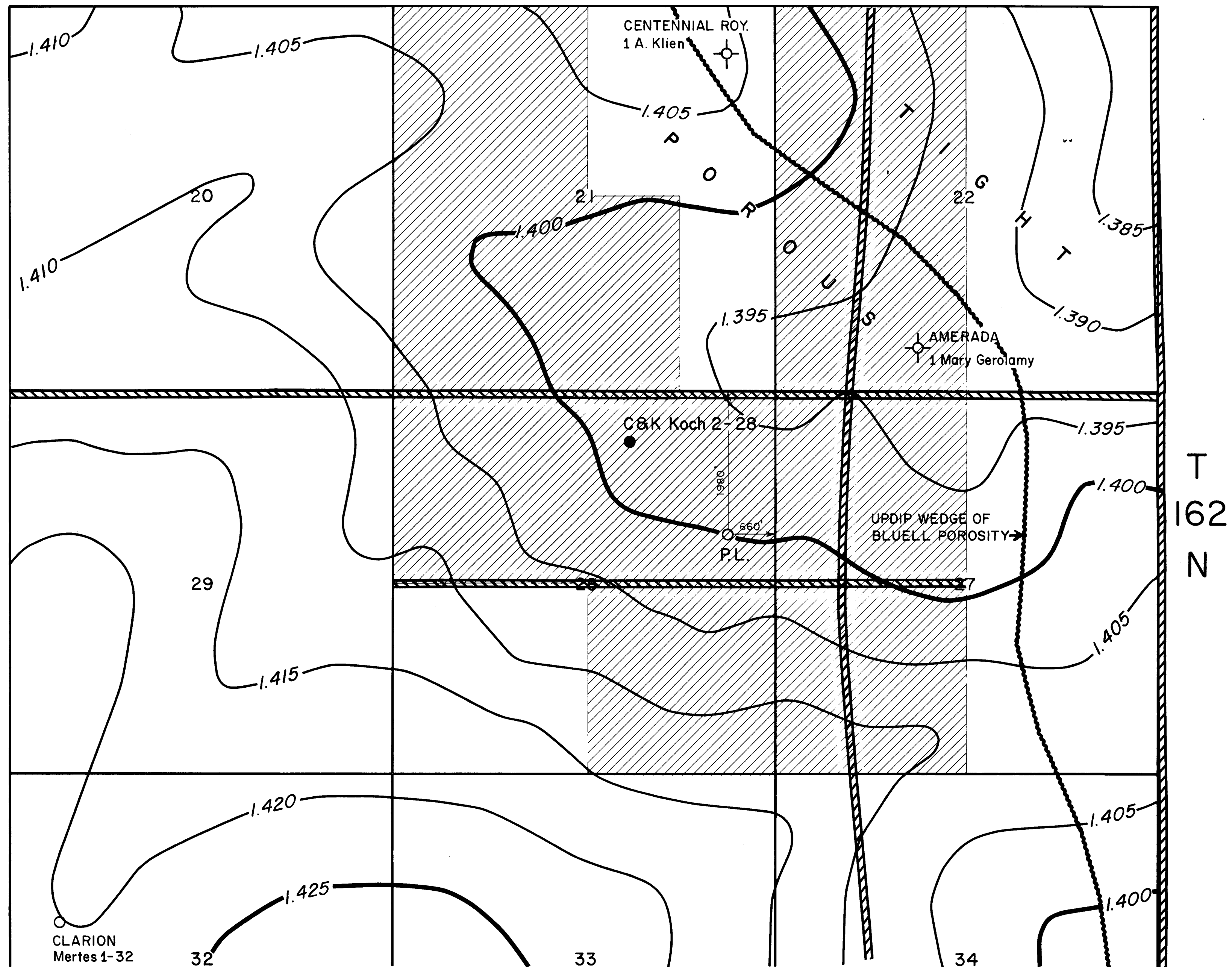
THE NORTH DAKOTA INDUSTRIAL COMMISSION


Allen I. Olson, Governor

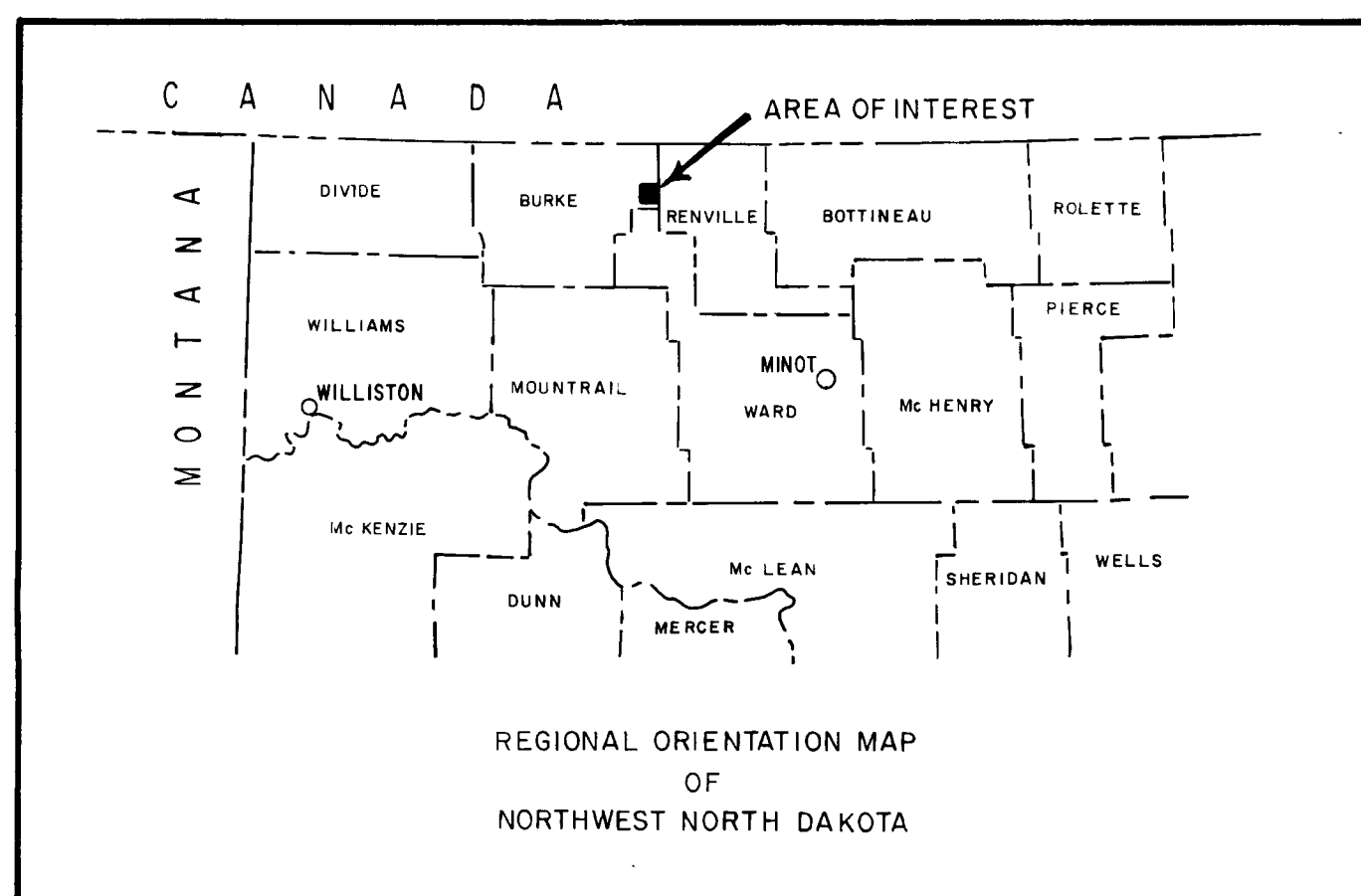

Robert O. Wefald, Attorney General


Kent Jones, Commissioner of Agriculture

R 89 W



INDUSTRIAL COMMISSION
STATE OF NORTH DAKOTA
Date 9/21/81 Case No. 2245
Introduced by C&K Petro. Inc.
Exhibit 1, 2, 3
Classified by Dale Wiegand, Geologist



C&K ACREAGE
 SEISMIC LINES
 PROPOSED LOCATION
P.L.

Petroleum, Inc.
ROCKY MOUNTAIN REGION
1125 17TH ST. SUITE 2040 - DENVER, COLORADO 80202

SUMMERS AREA
BURKE COUNTY, NORTH DAKOTA
STRUCTURE BAKKEN
C.I. = 5 MS

Exhibit 1

Case No. 2245

Scale 1" = 1000'

Date 9-21-81
File No. D-E-4

WILLISTON
Schlumberger

COMPUTER
PROCESSED
LOG

COMPANY C & K PETROLEUM, INCORPORATED
WELL KOCH 2-28
FIELD WILCOAT
COUNTY BURKE STATE NORTH DAKOTA
LOCATION NW/4E 52E-T162N-R87W
ELEVATION KB 1957 OF GL 1957 API NO

Schlumberger Cyberlook
WELLSITE COMPUTATION
A CSU Service

Date	7-28-51
Run No.	0245
Depth-Driller	7105
Depth-Logger	7105
Run Log Interval	7007
Top Log Interval	5700
Casing-Driller	5816 @ 609
Casing-Logger	5816 @ 609
Bit Size	7 7/8
Type Fluid in Hole	5.11 @ 7 7/8
Dens.	10.2
Visc.	2.0
pH	6.0
Fluid Loss	0.0
Source of Sample	MUD TANK
Run @ Meas. Temp.	0.07 @ 75 F
Run @ Meas. Temp.	0.07 @ 75 F
Run @ Meas. Temp.	0.07 @ 75 F
Source Rmt Rmc	7 7/8
Rm @ BHT	0.039 @ 155 F
Circulation Stopped	3800
Logger on Bottom	1200
Max. Rec. Temp.	141
Equip. Location	0094 WILCOAT
Witnessed By	R. W. R. G. 204

FOLD HERE

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

All interpretations are opinions based on inferences from electrical or other measurements and we cannot and do not guarantee the accuracy or correctness of any interpretations, and we shall not, except in the case of gross or willful negligence on our part, be liable or responsible for any loss, costs, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. These interpretations are also subject to our General Terms and Conditions as set out in our current Price Schedule. *A mark of Schlumberger.

COMPUTATION PARAMETERS

DEPTH	R _w		GR		SP		NEUTRON		SHALE INDEX USED		PMAX	MD	DO	DO2	SPDR	MATR	BS
	Free	Bound	Clean	Shale	Clean	Shale	Clean	Shale	GR SP BOTH	Neutron Used Y/N	PHI MAX	Clean Matrix Density	Depth Offset Tape 1	Depth Offset Tape 2	SP Drift	Neutron Matrix	Bit Size
7007	.02	.1	5	50	-	-	-	-	GR	N	.45	2.71	-	-	-	TIME	7 7/8

COMPUTATION CONSTANTS

Service Order Number 213209

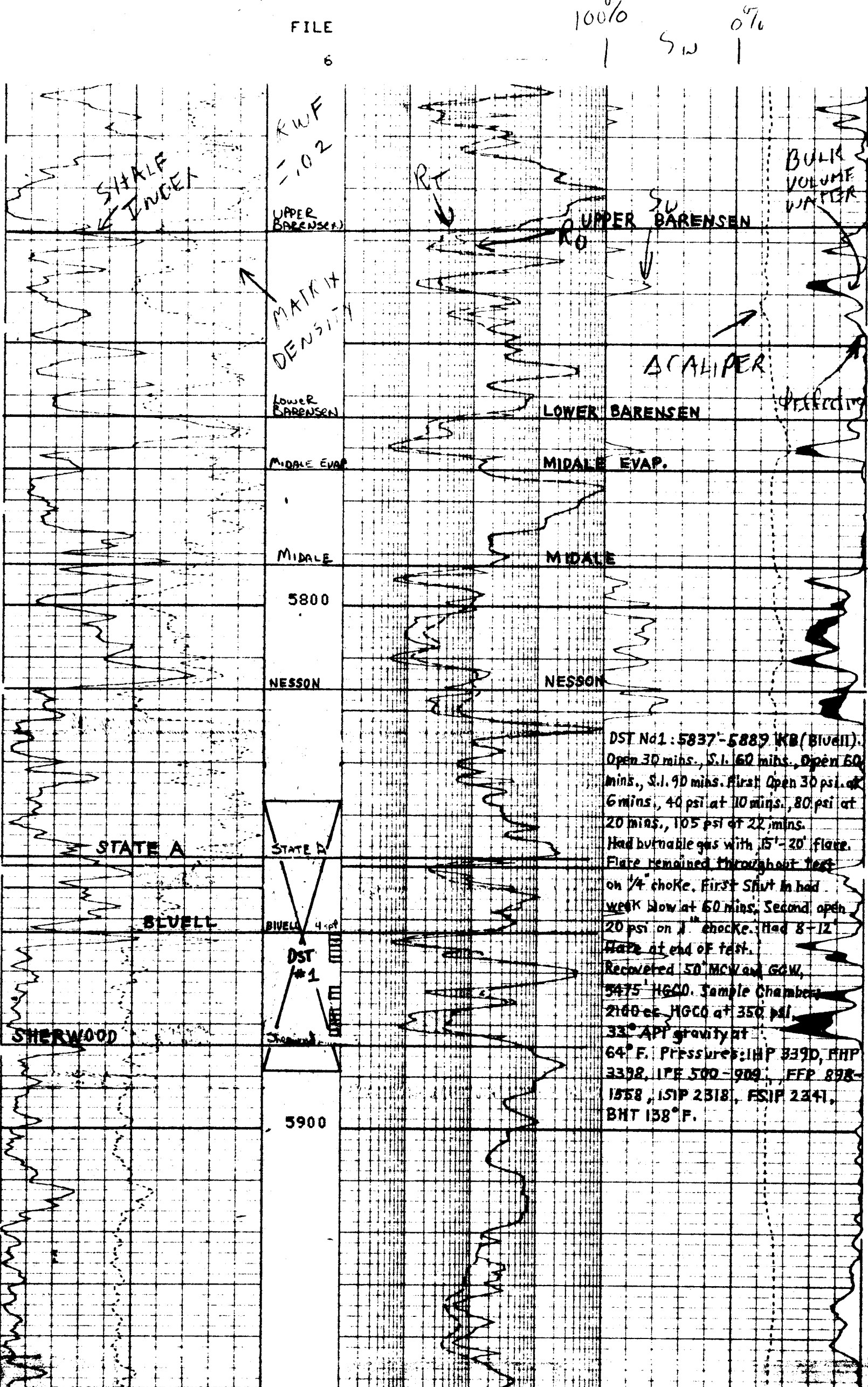
MUD FILTRATE DENSITY: 1.137/cc

REMARKS: Computation used the following logs D.H./R.A.B. W.M. = 10.2
F.D./C.N. C.L.M. = 14.3 7007

*RWF VALUE PER CLIENT REQUEST

PARAMETERS								
NAME	UNIT	VALUE	NAME	UNIT	VALUE	NAME	UNIT	VALUE
DLLM		0.3500	GULM	GAPI	30.00	BS	INCH	7.875
LSWB		ALLD	MDET	NEIT		NLIM		0.01000
GDCL	G/C3	0.0	GDSH	G/C3	2.900	FRTC		MSFL
TPDM		8.700	TPFM		7.200	DRUL	G/C3	0.3000
FEPT		NDNE	FESX		DISA	TPSM		7.200
RWB	DHMM	0.1000	FCAL		PRES	PQUT		LIME
NPCL		0.0	NPSH		0.5000	RHF	DHMM	0.02000
GRSH	GAPI	50.00	SPCL	MV	-200.0	SPSH	MV	0.0
NGSI		NEIT	PMAX		0.4500	GRCL	GAPI	5.000
CLIM	IN	16.00	WMUD	LB/G	10.30	SINP		GR
BHT	DEGF	150.8	SDNI		PRES	RXOF		PRES
MATR		LIME	HC		CALI	RTLF		DISA
FPHI		PHIX	MDEN	G/C3	2.710	FD	G/C3	1.100
DD		0.0	BHS		OPEN			

2.500	RHGF(G/C3)	3.000	0.1000	R0 (DHMM)	1000.	0.5000	DCAL(IN)	10.00
0.0	MSI ()	1.000	0.1000	RT (DHMM)	1000.	0.5000	VHX0 (%)	0.0
							VH (%)	0.0
							PHIE (%)	0.0



Petroleum, Inc.
ROCKY MOUNTAIN REGION
1725 SEVENTEENTH STREET - SUITE 2040, DENVER, COLORADO 80202

SUMMERS AREA
BURKE COUNTY, NORTH DAKOTA
C & K Koch 2-28

Exhibit 2

Case No. 2245

Vert. Scale 1" = 20'

Date 9-21-81
File No. D-E-4

Exhibit 3

Case No. 2245

C & K Petroleum, Inc.
 Summers Prospect
 KOCH 2-28
 Burke County, North Dakota
 660' FNL & 1980 FEL Section 28-T162N-R89W

DST #1: Bluell - 5837-5889* corrected depths
 - Op. 30, S.I. 60, Op. 60, S.I. 90
 - Recovered in pipe - 5525' total fluid: 50' mud & gas cut
 sulfur water, 5475' highly gas cut oil

IHP	3325	FHP	3351
IFP1	565	FIFP1	969
SIP1	2623		
IFP2	985	FFP2	1669
SIP2	2615		

- Average Permeability from DST - 494.96 md for an estimated -
10 feet of effective porosity
- Initial Production - 525 BOPD & 472.5 MCF (Est.)
- Gas to Oil Ratio - 894:1 (ft³ of gas per BBL of Oil) (Est.)
- Gravity of Oil - 30.1 API at 60°F
- Current Production - 240 BOPD & 14 BWPD on 12/64" AC at 350 psi FTHP

<u>Perf. Interval</u>	<u>Perm. Meas. (md)</u>	<u>Por. Meas. (%)</u>	<u>Water Sat. 20 Meas. (%)</u>
5863 - 64	0.01	2.6	57.0
5864 - 65	0.01	0.6	67.9
5865 - 66	0.04	1.1	40.6
5866 - 67	255.00	10.1	29.7
5867 - 68	0.04	10.1	18.9
5873 - 74	17.00	6.3	32.7
5874 - 75	19.00	3.6	29.1
5877 - 78	27.00	9.8	31.7
5878 - 79	0.21	14.4	38.4
5879 - 80	106.00	9.7	39.3
5880 - 81	274.00	11.7	28.2
5881 - 82	0.02	8.2	58.1

<u>Perf. Interval</u>	<u>Porosity %</u>			<u>SW% (avg. Cyberlook)</u>
	<u>Sonic (avg)</u>	<u>Neutron (avg)</u>	<u>Density (avg)</u>	
5863 - 64	17	18	10	95
5864 - 65	16	18	11	75
5865 - 66	10	10	7	87
5866 - 67	5	5.5	5.5	90
5867 - 68	5.5	4	4	100
5873 - 74	4.5	4.5	6	60
5874 - 75	5	3.5	6	70
5877 - 78	9	11	10	70
5878 - 79	9.5	14	11.5	45
5879 - 80	9.5	14.5	12.5	47
5880 - 81	11.5	12.5	11.5	52.5
5881 - 82	8.5	6	6	72.5

<u>Perf. Interval</u>	<u>Sonic Por.</u>	<u>Rw</u>	<u>Rt</u>	<u>Rw/Rt</u>	<u>SW%</u>
5863 - 64	17	.021	2	.0105	60.3
5864 - 65	16	.021	2	.0105	64.0
5865 - 66	10	.021	6.5	.0032	56.6
5866 - 67	5	.021	18	.0012	69.3
5867 - 68	5.5	.021	59	.0004	36.4
5873 - 74	4.5	.021	24	.0008	62.9
5874 - 75	5	.021	22	.0010	63.2
5877 - 78	9	.021	10	.0021	50.9
5878 - 79	9.5	.021	5	.0042	68.2
5879 - 80	9.5	.021	6	.0035	62.3
5880 - 81	11.5	.021	4	.0053	63.3
5881 - 82	8.5	.021	7	.0030	64.4

$$SW = \sqrt{\frac{RW}{RT} \frac{1}{0.2}}$$

Rw - interpreted from produced water

Rw = .047 Ohm - Meter at 77°F

Rw = .021 Ohm - Meter at 138°F

(2245)