

 **Robert D. Dougherty**

Certified Professional Geologist

Member: American Institute of Professional Geologists  
American Association of Petroleum Geologists

P. O. BOX 1065

Great Bend, Kansas 67530

AREA 316 - 793-9055

## GEOLOGIC REPORT

Aspen Drilling Company  
No. 1 Owen  
S/2 N/2 NE/4 Section 21-24s-13w  
Stafford County, Kansas

CONTRACTOR: H-30 Drilling Co. SURFACE CASING: 8 5/8" @ 312 ft.

SPUD: June 12, 1973 PRODUCTION CASING: 5½" @ 2001 ft.

COMPLETED: June 16, 1973 MEASUREMENT: Kelly Bushing

ELEVATION: 1927 feet - KB

### Geologic Formation Tops

Anhydrite	773 +1154
Base Anhydrite	791 +1136
Hollenberg	1820 +107
Herrington	1855 +72
Winfield	1908 +19
Towanda	1971 -44
Rotary Total Depth	2002 -75

The above measurements are from the electric log and are in close agreement with rotary measurements.

The following logs were run by Welex, Inc.  
Radiation-Guard, Microseismogram, Compensated Density,  
Compensated Acoustic.

A core was taken from 1966 feet to 2002 feet in the Towanda. A Baroid gas detector was on the well from 1800 feet to rotary total depth.

The #1 Owen was under geologic supervision from 1850 feet to rotary total depth.

I. STRATIGRAPHY and LITHOLOGY

HOLLENBERG 1820 (+107)

Dolomite: Light gray to gray, very fine grain, earthy, mostly dense, anhydritic, spotted with dark minerals, poor intergranular porosity, looks tight, slight show of gas to 5 units.

This zone was not tested further.

HERRINGTON 1855 (+72)

1855-1874

Dolomite: White to light gray, very fine grain, earthy, mostly dense, anhydritic, slightly cherty in part, poor intergranular (matrix) porosity, very scattered vugular porosity, slight show of gas to 6 units.

1874-1893 (Krider)

Dolomite: Gray, fine grain, slightly anhydritic, granular, friable, few scattered dark minerals and spotty "carbonaceous material", dense in part, good intergranular, pinpoint and small vugular porosity, show of gas to 21 units.

The Herrington-Krider section was tested further by Drill Stem Test #1.

DRILL STEM TEST #1 1833-1895

Tool Open: Initial 60 minutes + Final 120 minutes = 3 hours  
Fair blow increased to good with gas to surface in 108 minutes, gauged as follows:

6.33 mcf/120 min.	7.51 mcf/150 min.
6.72 mcf/130 min.	7.51 mcf/160 min.
7.12 mcf/140 min.	7.51 mcf/180 min.

Gas burns readily and has fair odor.

Recovered: 360 feet heavily gas cut mud (Chlorides = 142,000 ppm)

ISIP: 513#/60 min.	IFP: 25-34#
FSIP: 513#/120 min.	FFP: 85-119#
HP: 944#	BHT: 98°F.

Mud: Weight 9.6#, Vis. 49, WL 4.0

After Drill Stem Test #1, gas = 200+ units for 23 minutes

WINFIELD 1908 (+19)

1908-1928

Limestone: White to light gray, very fine grain, earthy, mostly dense, dolomitic in part, cherty with light gray chert, poor intergranular porosity, looks tight.

1928-1940

Limestone: White, very fine grain, earthy to chalky, cherty with light gray to gray chert, good (very fine) intergranular porosity (looks tight)

1940-1948

Limestone: As above, become very chalky.

Shows of gas were, not obvious from the Winfield, however it is believed that small shows of gas could be "masked" by gas after Drill Stem Test #1 and the recycles that followed. The Winfield was tested by Drill Stem Test #2.

DRILL STEM TEST #2 1907-1966

Tool Open: Initial 60 minutes + Final 60 minutes = 2 hours  
Weak blow throughout

Recovered: 90 feet of thin mud

ISIP: 527#/90 min.

IFP: 29-39#

FSIP: 527#/90 min.

FFP: 51-71#

HP: 1031#

BHT: 97°F.

Mud: Weight 10.0, Vis. 43, WL 3.6

Gas trap was not turned on immediately after circulation, however, gas after Drill Stem Test #2 recorded 22 units as soon as trap was turned on.

TOWANDA 1971 (-44)

The Towanda section was cored from 1966 feet to 2002 feet (rotary measurements). (1968 feet to 2004 feet - electric log measurements) No shows of gas were encountered while coring. Slight shows of (gas 3 to 4 units) were recorded while reaming core hole. The following description is based on rotary measurements.

CORE #1 1966 feet to 2002 feet  
Core 36 feet - Recover 36 feet

1966-1966½

Limestone: Dark gray, micrograin to very fine grain, dolomitic thin bedded, saturated with dark organic material, poor intergranular (matrix) porosity.

1966½-1969

Limestone: Gray, micro to very fine grain, thin bedded, dolomitic, brown "organic material" "saturated" in very thin beds, shaley, scattered anhydrite nodules, poor visible intergranular (matrix) porosity.

1969-1971

Limestone: White, very fine grain, dolomitic, chalky, dense, scattered anhydrite nodules, very poor visible intergranular porosity.

1971-1977

Limestone: Light to dark gray, very fine grain, dolomitic, scattered anhydrite nodules, gray chert nodules (1975-1976), saturated in part with brown to black "organic material" scattered streaks of bleeding gas, mostly poor visible intergranular porosity (to 1975½ feet) poor to fair intergranular porosity (1975½-1977), looks tight.

1977-1980½

Limestone: Gray, fine grain, anhydritic, saturated with light brown and scattered specks of black "organic material", mostly dense with poor visible intergranular porosity, "streaks" of fair intergranular porosity, looks mostly tight. Bleeding gas at 1980 feet.

1980½-1982

Dolomite: Light gray, very fine crystalline, "clean", saturated with light brown "oily" "organic material" spotted with black carbonaceous material, fair to good intergranular and pinpoint porosity.

1982-1985

Limestone: Dark gray, very fine to fine grain, dolomitic, anhydritic, scattered anhydrite nodules, speckled with black carbonaceous material, saturated with brown "oily" organic material, poor to fair intergranular and scattered small (fine) pinpoint porosity.

1985-1994

Limestone: Gray, fine to medium grain, (grain size increases downward), dolomitic, fossiliferous to psuedo-fossiliferous, saturated with brown "oily" organic material, speckled with black carbonaceous material, scattered anhydrite nodules, fair to good intergranular, pinpoint, and small vugular porosity, appears to be fair to good reservoir. Bleeding gas from 1988 to 1994.

1994-1995

Dolomite: Texture etc. as above

1995-1997

Limestone: Texture etc. as above

1997-2000

Limestone: Gray, very fine to fine grain, (grain size decreases) texture etc. as above, fair intergranular and small pinpoint porosity. Bleeding gas from 1999 to 2000.

2000-2002

Limestone: Light gray, fine grain, crystalline in part, fossiliferous, scattered anhydrite nodules, chalky in part, poor to fair intergranular and pinpoint porosity. Bleeding gas at 2002.

ROTARY TOTAL DEPTH 2002 (-75)

The Towanda was tested by Drill Stem Test #3.

DRILL STEM TEST #3 1969-2002 (TOWANDA)

Tool Open: Initial 60 minutes + Final 120 minutes = 3 hours  
Weak blow throughout

Recovered: 220 feet thin mud.

ISIP: 496#/60 min.

IFP: 42-59#

FSIP: 515#/120 min.

FFP: 80-111#

HP: 1055#

BHT: 106°F.

Mud: Weight 9.3, Vis. 36, WL 5.0

The #1 Owen was logged after Drill Stem Test #3 without going back in the hole. No opportunity to record any shows of gas after Drill Stem Test #3.

## II. STRUCTURAL GEOLOGY

The #1 Owen encountered the Winfield in approximately a normal regional structural position. The Winfield is 4 feet low to the Dunne-Gardner - #1 Brown, SE NW NE Sec. 21, 330 feet west and 7 feet low to the Petroleum Incorporated - #2 Beckerdite in the center NW/4 section 21. A detailed structural comparison is tabulated below.

Formation	#2 BECKERDITE	#1 BROWN	#1 OWEN
Elevation KB	1926	1929	1927
Anhydrite	+1169	+1164	+1154
Base Anhydrite	+1149	+1144	+1136
Marker	+144	+139	+133
Hollenberg	+116	+113	+107
Herrington	+80	+77	+72
Winfield	+26	+23	+19
Towanda	-40	-40	-44
Anhydrite-Winfield	1143	1141	1135

III. REMARKS

It was recommended that production casing be set to further test the gas potential in the upper Chase Group.

The following intervals are recommended for further testing through perforations.

Towanda: 1972-1976 and 1982-1998

Winfield: 1930-1943

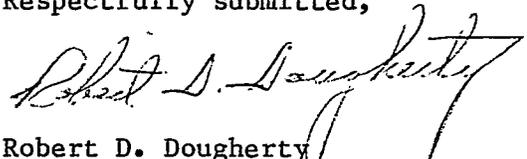
Krider: 1880-1888

Based on Drill Stem Test #1, the Krider is considered to have the best productive potential. Sample analysis, gas show and electric log analysis all indicate the Krider is potentially productive.

The Towanda is considered to be potentially productive based on core analysis and core description. Gas shows were only very slight. Drill Stem Test #3 indicates good bottom hole pressure and possibly some water production. Electric log analysis indicates high water saturation and poor separation between the neutron and density porosities.

The Winfield is considered potentially productive based primarily on the separation of the neutron and density porosity and the bottom hole pressures recorded on Drill Stem Test #2. The absence of notable gas shows and electric log analysis indicate the possibility of some water production.

Respectfully submitted,



Robert D. Dougherty  
Certified Professional Geologist