

Geologic Data on Injection and Confining Zones

Zelman #1 Injection Well

Formation tops and thickness data were projected utilizing data from offset wells 37-033-20333 and 37-033-20327. The wells are located approximately 1481 feet and 1380 feet north and south of the Zelman #1 well, respectively.

The injection zone is the Huntersville Chert-Oriskany formation. The Huntersville Chert is projected from 7306 to 7358 with a gross thickness of 52'. The Oriskany is projected from 7358 to 7387 with a gross thickness of 29' feet. Fracture Gradient for this formation has been calculated to be .9518 psi/ft. Please see attachment "I" for data and calculations.

The confining zones are the Onondaga Limestone (upper) and the Helderberg Limestone (lower) formations. The Onondaga is projected from 7292 to 7306 with a gross thickness of 14 feet. The top of the Helderberg is projected to be at 7387 to an unknown depth. Fracture data on the Onondaga and Helderberg is unavailable however confinement by these boundaries has been established by Gas Storage in the Oriskany pools throughout Pennsylvania.

Geologic sample logs were utilized from wells within the Penfield Quadrangle to provide the following lithologic descriptions:

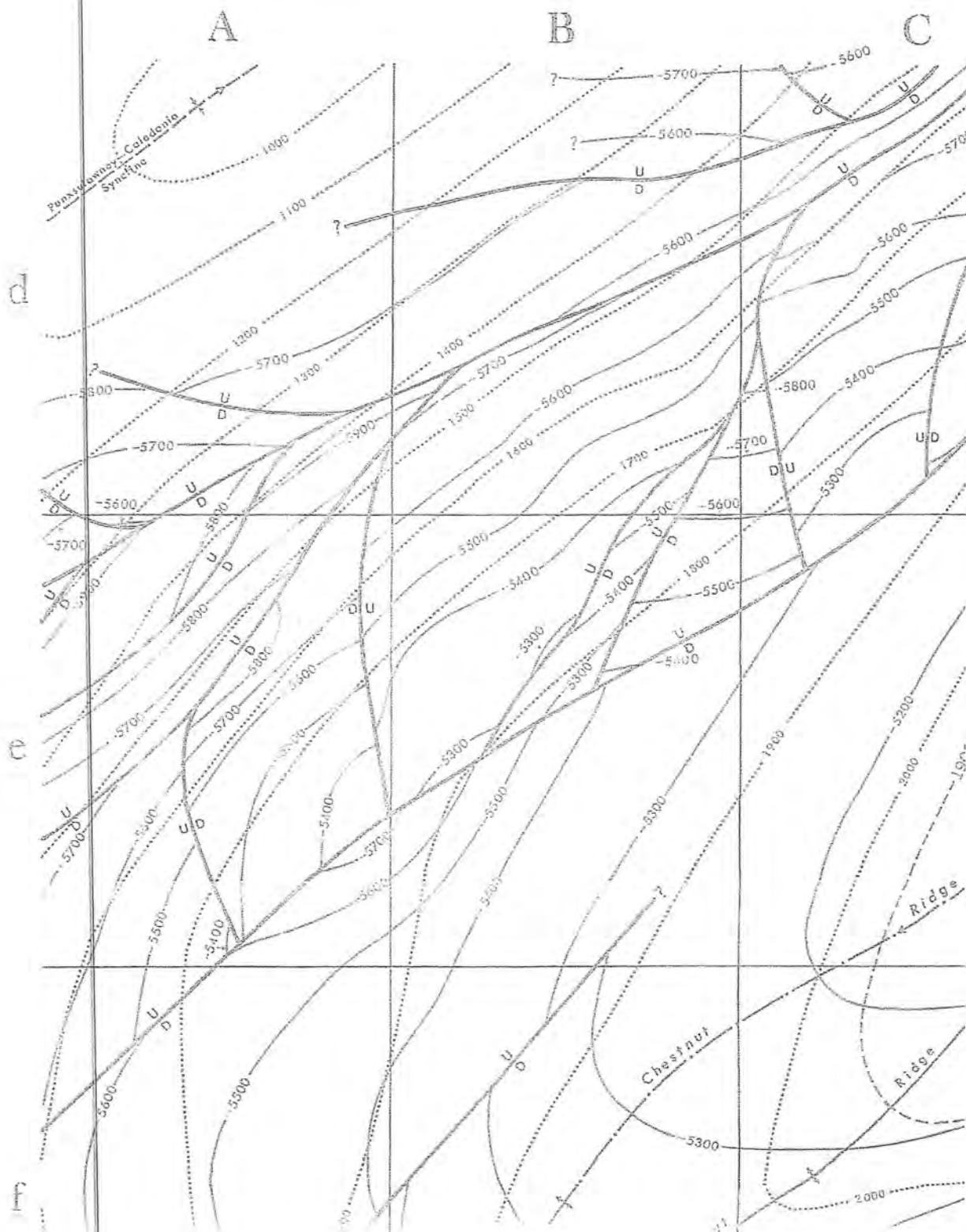
7295-7306	Onondaga Limestone-	Dark gray to black, hard, argillaceous, micro crystalline.
7306-7358	Huntersville Chert -	Dark gray to olive, translucent, argillaceous, micro fractured, dense.
7358-7387	Oriskany Sandstone -	Light gray, fine grained, well cemented quartz sand. Inter-granular porosity with calcite and silica cement.
7387-?	Helderberg Limestone -	Dark gray, micro crystalline, hard, silty, argillaceous.

Published data by the Pennsylvania Geologic Survey on faulting in the area identifies (2) faults within the AOR. (Publication A74 cd -Geology of the Southern Half of the Penfield Quadrangle). Location of these faults are shown on the attached map. Our study confirms the location of the southern fault due to the Onondaga Limestone being displaced by a -397 between wells 37-033-20327 and 37-033-20325. However, we found no data to support the northern fault as shown. Subsurface data from well records from wells 37-033-20341, 20333, 20327, 20336 and 20328 indicate the Onondaga ; Chert and Oriskany formations are in the same block dipping to Northwest. A tabulation of the sub-surface data and well records are attached.

There is substantial data available from the operation of existing storage and production wells drilled into the Huntersville Chert-Oriskany formation that establishes faulting through these formations as traps with definitive boundaries.

Permit #	Elevation	TD	Tully	Onondoga	Chert	Oriskany	Onon. Sub sea
20325	1628	7637	6638	7616	7635	-	-5988
20341	1633	7365	6712	7281	7296	7351	-5648
20333	1642	7344	6686	7248	7266	7314	-5606
20327	1640	7318	6642	7219	7233	7288	-5579
20336	1544	7271	6610	7195	7213	7269	-5651
20328	1569	7227	6568	7133	7144	7198	-5564

PENNSYLVANIA GEOLOGICAL SURVEY



PENFIELD G 206

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF MINES

EPA Permit# PAS2D020BLCE
DEP Permit# 37-033-27255-0

EPA Permit# PAS2D020BLCE
DEP Permit# 37-033-27255-00-00

1.990' S 41°05'00"
10.200' W 78°42'30" (4)

LUTHERSBURG
QUADRANGLE: Penfield

Oil and Gas Division
HARRISBURG

033-20325-P

☒ 7 1/2' ☒ 15'

PERMIT NO. CHE-225-P

MAP REFERENCE: 10S 17W S64 W117

KIND OF WELL: Gas Dry
(Oil, Gas, Other)

WELL RECORD

COMPANY: New York State Natural Gas Corporation	Size of Casing and Tubing	Used in Drilling	Left in Well	Packers: Type, Size and Depth
ADDRESS: #2 Gateway Center, Pittsburgh 22, Pa.	13-3/8"	60'	60'	
FARM John R. Potter ACRES 68	9-5/8"	1156'	294'	BHS @ 1152
WELL(FARM)NO. #1 CO. SERIAL NO. N-782	Vent 2"		274'	
ELEVATION: 1627.80 LEASE: 58357				
TOWNSHIP: Brady COUNTY: Clearfield				
DRILLING COMMENCED: 8/7/60 COMPLETED: 10/13/60				
PRODUCTION: Dry Hole - Plug and Abandon				PERFORATIONS AT:
ROCK PRESSURE: psig hrs.				
WELL TREATMENT: (Shooting, Acidizing, Fracturing Etc.)				
CEMENTING DATA: (Size Pipe, Depth, No. Bags, Date)				
8/8/60 - 13-3/8" cem. w/50 sacks				
8/11/60 - 9-5/8" cem. @ 1152' w/50 sacks cem. and 15 sacks aquagel				
RESULTS AFTER TREATMENT:				
ROCK PRESSURE AFTER TREATMENT:				

REMARKS:

FORMATION	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (Fresh or Salt Water)	REMARKS
Cellar	0	18				
Sand & shale	18	210			FW 50	
Lime & shale	210	220				
Sand & shale	220	255				
Coal or shale	255	265				
Sand	265	319				
Sand & shale	319	409				
Coal	409	415				
Sand & shale	415	2885				
Shale & sand	2885	3295				
Sand & shale	3295	4130	3324(show)			
Shale & sand shells	4130	4515				
Sand & shale	4515	4922				
Shale & sand	5060	5255				
Sand & shale	5255	5555				
Shale & sand	5555	5907				

(Over)

N-782

FORMATION	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (Fresh or Salt Water)	REMARKS
Shale & shells	5907	6075				
Sand & shale	6075	6175				
Shale & shell	6175	6637				
Tully lime	6637	6754				
Shale & shells	6754	7617				
Onondaga	7617	7635				
Chert	7635					
Total depth		7637 (In Chert)				
<u>Sample Study</u>						
Tully	6638					
Onondaga	7616					
Chert	7635					

DATE November 15, 1960

APPROVED New York State Natural Gas Corporation, OWNER

BY P. L. Barger TITLE
Superintendent Operations

LUTHERSBURG (1 1/2)

WELL RECORD

033-20325-P

Name John R Potter #1 Co. Clearfield Twp. Brady No. 3279

2200 from N

Owner NYS N-782 Contr.

22000 from E

Date _____ Elev. 1628 Product Oil Drill _____

Obtained by

Authority

Quad.

Drill _____

Luttrelyburg
Potter &

Locate by Sketch

Geol. Name	Thick-ness	From	To	Geol. Name	Thick-ness	From	To
AUG 12 1960				2200 ft S 41° 45' E 78° 45'			
AUG 19 1960				Moving in rotary			
AUG 20 1960				9 5/8" @ 1152			
Tully		6635					
Onondaga		7617					
chert		7635					
TD			7637				
Sept 2-1960							
P & A							
Completed to 15-60							
Mauch Chunk		635					
Catskill		1430	1850				
Pink rock		2300					

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF MINES AND MINERAL INDUSTRIES
OIL AND GAS DIVISION

033-20341-P

Coal seams un-workable

SEE-34-P

DRANGLE: DuBois ☐ 7 1/2' ☒ 15'
Sec. "F"PERMIT NO. ~~Mapa 34-P~~MAP REFERENCE: 29,650' S/NL
550' W/ELKIND OF WELL: Gas
(Oil, Gas, Other)

WELL RECORD

COMPANY:	Size of Casing and Tubing	Used in Drilling	Left in Well	Packers: Type, Size and Depth
Felmont Oil Corporation	13 3/8"	228.22'	228.22'	
ADDRESS: P. O. Box 354, Bradford, Penna.	8 5/8"	1312.00'	1312.00'	
FARM Josephine Carison, et al ACRES 48	5 1/2"	7370.22'	7370.22'	
WELL FARM NO. 1 CO. SERIAL NO. F-128 Sylvania #6972				
ELEVATION: 1644' RT LEASE: FPaL-9673				
TOWNSHIP: Brady COUNTY: Clearfield				
DRILLING COMMENCED: 11/1/60 COMPLETED: 11/26/60				
PRODUCTION: 4,150,000 cu. ft.				PERFORATIONS AT:
ROCK PRESSURE: 2839 psig. 20 hrs.				
WELL TREATMENT: (Shooting, Acidizing, Fracturing Etc.)				
11/25/60 - Halliburton hydrafrac from 7299' - to 7365' with 11,900 gal. frac fluid; propping agent 9,000# 20-40 sand, 3,500# 10-30 sand; 1,000 gal. MCA acid; 500# WG-4 gel agent; 200# CW-1 breaker agent; 30 gals. Howco de; 3,500# sand; Max. pressure: 4500#.				
CEMENTING DATA: (Size Pipe, Depth, No. Bags, Date)				
11/6 - Set 13 3/8" drive pipe @ 230' with 175 sacks of Regular cement.				
11/9 - Set 8 5/8" casing @ 1320' with 375 sacks of Regular cement.				
11/18 - Set 5 1/2" casing @ 7299' with 125 sacks of Regular cement and 40 sacks of Aqualgel.				
RESULTS AFTER TREATMENT: 5,000,000 cu. ft.				
ROCK PRESSURE AFTER TREATMENT: 2810# - 72 hrs.				

REMARKS: Gas Tested At:

7355' - 2,500,000 cu. ft.

7360' - 3,200,000 cu. ft.

7365' - 4,150,000 cu. ft.

FORMATION	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (Fresh or Salt Water)	REMARKS
Clay	0	40				
Shale	40	107			107' (fresh)	
Sandy Shale	107	186				
Coal	186	188				
Shale	188	243			200' (fresh)	Set 13 3/8" @ 230'
Sand - Water Sand	243	248				
Sand & Shale	248	268				
Sand	268	280			275' (fresh)	
Shale	280	304				
Sand	304	308				
Shale	308	329				
Coal	329	331				

(OVER)

023-20341-P

EPA Permit# PAS2D020BLCE
DEP Permit# 37-033-27255-00-00

FORMATION	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (Fresh or Salt Water)	REMARKS
ale	331	417				
oal	417	419				
and	419	423				
Sand & Shale	423	471				
Shale	471	485				
Sand & Shale	485	505				
Shale	505	515				
Sand	515	520				
Sand & Shale	520	524				
Sand	524	554				
Sand & Shale	554	561				
Sand	561	630				
Sand & Shale	630	675				
Sand	675	735				
Sandy Shale	735	760				
Sand	760	804				
Little Red	804	810				
Sandy Shale	810	890				
Sand & Shale	890	945				
Shale	945	965				
Sand w/little shale	965	1020				
Sandy Shale	1020	1025				
Sand	1025	1050				
Sand streak red rock	1050	1055				
Sand	1055	1060				
Sandy shale	1060	1075				
Sand	1075	1090				
Shale	1090	1100				
Sand	1100	1125				
Shale	1125	1130				
Sandy Shale	1130	1150				
Shale	1150	1155				
Sandy shale	1155	1165				
Sand	1165	1180				
Sandy Shale	1180	1225				
Sand	1225	1260				
Sand & Shale	1260	1280				
Sand	1280	1290				
Shale	1290	1300				
Sandy Shale	1300	1320				Set 8 5/8" @ 1320'
Sandy Shale	1320	1710				
Shale	1710	1780				
Red rock & Shale	1780	1790				
Sandy Shale	1790	1830				
Sandy red rock	1830	1835				
Sandy Shale	1835	1848				
Red rock	1848	1854				
Sandy shale	1854	2550				
Sand	2550	2640				
Sandy Shale	2640	2710				
Sand	2710	2820				
Sandy Shale	2820	2900				
Shale	2900	3040				

Date January 12, 19 61APPROVED FELMONT OIL CORPORATION, OwnerBy [Signature]
(Title) Vice President

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF MINESOil and Gas Division
HARRISBURG

083-20333

QUADRANGLE:

L. H. Asbury
Penfield☒ 7 1/2' ☐ 15'PERMIT NO. ~~CLE-993~~

MAP REFERENCE: 9S 17W S63 W117 & 118

KIND OF WELL: GAS
(Oil, Gas, Other)

WELL RECORD

COMPANY:	New York State Natural Gas Corporation	Size of Casing and Tubing	Used in Drilling	Left in Well	Packers: Type, Size and Depth
ADDRESS:	2 Gateway Center, Pgh. 22, Penna.	13 3/8"	96'	96'	
FARM #	H. E. Ginter Est. ACRES 172	9 5/8"	1285'	1285'	BHS @ 1287
WELL (FARM) NO.	1 CO. SERIAL NO. N-796	7"	7335'	7335'	BHS @ 7267
ELEVATION:	1642.34 LEASE: 60986				
TOWNSHIP:	Brady COUNTY: Clearfield				
DRILLING COMMENCED:	12-1-60 DRILLING COMPLETED: 12-23-60				
PRODUCTION:	10,504,000 cubic feet				PERFORATIONS AT:
ROCK PRESSURE:	2340 psig 70 hrs.				
WELL TREATMENT:	(Shooting, Acidizing, Fracturing Etc.)				
12-22-60-Fractured w/20,000 gals. water, 200 lb. gel, 1,000 gal acid and 20,000 lb sand. Break-					
n pressure 3000 lbs; maximum pressure 3750 lbs					
final open flow of 48,000 cubic ft. in chert					
3825,000 cubic ft. in Oriskany increased to					
405,000 cubic ft. A/F. R.P. b/f 2450 lbs					
24 1/2 hrs. dead weight.					
RESULTS AFTER TREATMENT:					20 sax aquagel
ROCK PRESSURE AFTER TREATMENT:					12-16-60 - 7" cem @ 7267 w/125 sax

REMARKS: *Well Permit Request and all initial Records Referred to this Well as "DuBois Deposit National Bank Trustee Etal". They are in fact Successor Trustee Under the Henry E. Ginter Deed of Trust. In the Interest of Brevity, We have Established and are Using the Farm Name as Recorded Above.

FORMATION	TOP	BOTTOM	GAS AT	OIL AT	WATER AT (Fresh or Salt Water)	REMARKS
Surface	0	5				
Sand & shale	5	105				
Shale & Sand	105	150				
Sand & Shale	150	340				
Coal	340	345				
Sand & Shale	345	375				
Shale & Sand	375	468				
Coal	468	474			458	
Shale & Sand	474	532				
Sand & Shale	532	735				
Sand	735	785				
Sand & Shale	785	1720				
Shale & Sand	1770	2165				
Sand & Shale	2165	4310	3385-92 (Show)			
Shale & sand	4310	5170				
and & Shale	5170	5405				

(Over)