

MS
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#137

JEC
8/66

SUBSURFACE LIMESTONE RESOURCES OF VERMILION COUNTY

Introduction

Vermilion County is the site of the Fairmount quarry of Materials Service which is operating in the Millersville Limestone of Pennsylvanian age. The limestone is not known to exceed 20 feet thick. It probably is an erosion remnant occurring in a syncline. No other limestone deposits considered to be of commercially workable character at present are known to be present in the county, hence the possibilities for subsurface limestones that might be mined underground is of interest. This study is a preliminary evaluation of the depth and character of the sub-Pennsylvanian limestones and dolomites, as these are thought to be the most likely sources of limestone of commercial grade consistently 25 feet or more thick. The study is restricted to the Salem, Devonian, and Niagaran strata as they are the shallowest potentially promising sub-Pennsylvanian strata.

In the main, the geologic correlations used herein are those appearing on the well records used in the study, the controlling data being wells studied by Atherton. The Niagaran is treated as a unit for convenience and because of the difficulty of consistently recognizing the subdivisions thereof in the logs at hand.

Aerial Distribution of the Sub-Pennsylvanian Strata

The Pennsylvanian rocks are the first bedrock encountered in Vermilion County. They rest on an eroded surface composed of Mississippian rocks. In roughly the south quarter of the county, the Salem Limestone

underlies the Pennsylvanian rock. North of this Osage strata are the sub-Pennsylvanian bedrock.

Structure of the County

Figure 1 shows the location of wells from which data are used herein. The limits of the county as shown are inexact, as are certain other features of the map. The map was used in its present form because no other map of similar ^{- 41} convenient scale was quickly available and because even with its deficiencies the map is adequate for the purposes of the report.

The structure on the top of the New Albany Shale, as drawn from the data in table 1, is shown in figure 2. It indicates a gradual dip to the north with a possibility of a roughly north-south synclinal structure plunging southward through the middle of the county. Figure 3 shows the structure on the top of the Devonian. With minor variations the features shown are similar to those in figure 2.

Salem Limestone

The depth to the top and the elevation of the top of the Salem Limestone are shown in figure 4. The variations in elevation at the top of the limestone appear to be considerably controlled by the unconformity at the top of the formation. Table 2 summarizes the character of the Salem as it is described in well records, and table 5 summarizes the data regarding those rock units whose character suggest they may have economic use.

The data in table 2 indicate that the Salem is a vertically variable unit. It includes considerable amounts of limestone and of dolomite both of which may be cherty, sandy, or silty. However, strata of apparently acceptable rock as much as 28 feet thick are present. The record of well 1,

which is a drillers log, reports 59 feet of seemingly promising stone. Before complete credence is placed on the data in tables 2 and 5, test drilling and further study is desirable.

The well records report that in a sandstone, which lies above the *Salem* limestone and has its base at 480 feet, salt water was met with which rose to within 132 feet of the top of the well and required 28 minutes to bail down. This suggests that the limestone, too, may carry water, although none is mentioned except "little salt water ?" at 516 to 524 feet.

Devonian Limestone and Dolomite

The depths to the Devonian limestone and dolomite are shown in figure 5. The shallowest (about 700 feet deep) limestone found is in the north part of the county in the general vicinity of Alvin (also spelled Alvan). Lack of data in other parts of northern Vermilion County makes specific statements regarding the depth impossible but the Devonian may also be similarly shallow at other places.

Table 3 and figure 6 indicate the character of the Devonian as known from wells, chiefly those having cuttings. There appears to be as much, if not more dolomite, reported as there is limestone. Both types of rock are consistently described as being buff, brownish, brown gray or tan. Depending on its intensity, the brown color could be a commercial handicap to the rock, unless it is demonstrably not harmful, as outcropping brown dolomites and limestones in Illinois often are not acceptable for the full scale of uses, particularly as high type concrete aggregate. Many beds are sandy or silty, but thicknesses of dolomite up to 63 feet that may be commercially suitable are reported, table 5. Thirty-two feet was the maximum thickness of Devonian Limestone recorded.

Silurian

Limestone and dolomite of Silurian age are encountered at various depths in Vermilion County but are shallowest in the north part of the county with the data at hand pinpointing a depth of around 770 feet in the vicinity of Alvin, figure 7. From well cuttings (table 4) the Silurian is seen to be principally dolomite; considerably^e thicknesses are silty. Most of the stone is described as gray or white. Figure 8 shows selected logs graphically. Table 5 gives data of the thickness of the stone of possible commercial character in the Silurian and indicates the presence of as much as 90 feet of such stone. Vesicular dolomite or dolomitic limestone, possibly reef type stone, occurs in thicknesses up to 67 feet.

Relation of Population to Subsurface Stone

Danville with its population of more than 42,000 is the largest town in Vermilion County, followed by Hoopeston with 6,600 and Georgetown with 3,500. The center of population, therefore, is at Danville. The Salem appears unlikely to be present at Danville. The depth to the Devonian is between 1,125 and 1,170 feet. The Silurian would be an estimated 135 feet deeper. From the standpoint of depth the Devonian or Silurian in the Alvin area or the Salem in the Georgetown, Ridgefarm, and Sidell area, figure 1, would seem to have maximum possibilities for supplying the Danville market.

Water

A little information on water in the Salem in well no. 1 has been given previously. Other data provided by the well records regarding water was very meager. Possibly a study of the records by a ground-water specialist would give further information; however, the report "Groundwater Geology in East-Central Illinois" (Circular 248, p. 33) gives no details, stating only

that the quality of the water in the sub-Pennsylvanian formations below depths of 150 to 300 feet may be unsatisfactory for domestic use. It is probable that some, perhaps many, or even all of the sub-Pennsylvanian limestone or dolomite strata mentioned above may be water-bearing, but it is unfair to state this as a fact or possibly even as an implication. Test drilling only will give adequate information on the presence or absence, occurrence, quantity, and character of the ground water. A matter of importance may be how saline the water is, to what extent the limestone or dolomite carries saline water within it, and the effect of such contained water on the use of such stone. At first glance very much saline material in the stone would seem to be undesirable for most uses, both chemical and physical.

Test Drilling

The data given herewith are regarded satisfactory for the uses made of them herewith. However, test drilling is a necessity to provide a continuous record of the nature of the limestone and dolomite and to afford sizable samples for studying and testing. Its relation to the presence or absence of water has been mentioned.

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TABLE 2

(For locations of wells see Table 1)

Character of Salem

Well 1 - Limestone, gray and brown, hard or very hard. A little salt water - 59'

*Well 2 - Limestone, medium gray and buff, crystalline; either contains interbedded sandstone or shale, or, as is likely, these are caved - 50'

Well 3 - No data.

*Well 4 - Limestone, oolitic, light brown gray, medium to coarse; dolomite, brown gray, extra fine; trace chert and shale - 18'

Dolomite, calcareous, cherty - 34'

Limestone, light brown gray, fine to coarse, fossiliferous - 10'

Dolomite, gray, extra fine - 28'

Limestone, cherty, fine to coarse; dolomite, gray, extra fine - 16'

Wells 5 - 11 inclusive - No data.

Total 106'

Well 12 - No data.

*Well 13 - Limestone, slightly sandy, dolomitic, gray to brown, fine to medium, fossiliferous - 10'

Limestone, silty, sandy and cherty; partly oolitic - 7'

Dolomite, argillaceous, silty - 28'

Limestone, cherty, slightly sandy and dolomitic, brown gray, fine to coarse, fossiliferous, oolitic; partly silty - 20'

Total 75'

Well 16 - Not recognized.

Well 17 - Not recognized.

Well 18 - Not mentioned.

Well 19 - Samples not studied. Drillers log calls the probable Salem "Ste. Genevieve" lime.

*Sample study

Well 20 - No data.

Well 21 - No data

Well 22 - Absent

Wells 23, 24, 25 - No data.

Not proofread

TABLE 3

Character of Devonian

(For locations of wells see Table 1)

- Well 1 - No data
- *Well 2 - No data
- Well 3 - No data
- *Well 4 - Dolomite, cherty, gray, very fine - 10'
- Dolomite, gray brown, fine - 10'
- Limestone, in part slightky dolomite, fine to coarse, fossiliferous;
mostly gray or brown gray - 32'
- Dolomite, sandy - 5'
- Dolomite, marly - 5'
- Chert - 5'
- Dolomite, marly - 5'
- Dolomite, brownish, extra fine - 10'
- Dolomite, sandy, brown gray, very fine - 58'
- Dolomite, dark brown, very fine, trace shale - 42'

Total 182'

- Wells 5, 6, 7, 8 - No data
- *Well 9 - Limestone, tan, lithographic - 3.4'
- Limestone, brown gray, fine to medium, fossiliferous - 13.6'
- Dolomite, brown gray, chalky; shale streak - 4.5'
- Dolomite, light tan; chalky chert common - 3.5'

Thickness described is not total thickness

- Wells 10, 11 - No data
- Well 12 - Interbedded limestone and sandy limestone
- Well 13 - No data
- Wells 14, 15 - No data

*Sample study

TABLE 3

Character of Devonian

(For locations of wells see Table 1)

Well 1 - No data

*Well 2 - No data

Well 3 - No data

*Well 4 - Dolomite, cherty, gray, very fine - 10'

Dolomite, gray brown, fine - 10'

Limestone, in part slightky dolomite, fine to coarse, fossiliferous;
mostly gray or brown gray - 32'

Dolomite, sandy - 5'

Dolomite, marly - 5'

Chert - 5'

Dolomite, marly - 5'

Dolomite, brownish, extra fine - 10'

Dolomite, sandy, brown gray, very fine - 58'

Dolomite, dark brown, very fine, trace shale - 42'

Total 182'

Wells 5, 6, 7, 8 - No data

*Well 9 - Limestone, tan, lithographic - 3.4'

Limestone, brown gray, fine to medium, fossiliferous - 13.6'

Dolomite, brown gray, chalky; shale streak - 4.5'

Dolomite, light tan; chalky chert common - 3.5'

Thickness described is not total thickness

Wells 10, 11 - No data

Well 12 - Interbedded limestone and sandy limestone

Well 13 - No data

Wells 14, 15 - No data

*Sample study

FOR LOCATIONS OF WELLS
SEE TABLE 1.

TABLE 3

Character of Devonian

Well 1 -	no data	
* " 2 -	no data	
" 3 -	" "	
* Well 4 -	cherty	
Dol, chky, gr, vry f -	10'	10
Dol, gr brw, f, -	10'	20 ✓
Ls, in part shly dol, f - ch, fossil, mostly		✓
gr or brw gr -	32'	52
Dol, sdy -	5'	57
Dol, marly -	5'	62
Chert -	5'	67
Dol, marly -	5'	72
Dol, brownish, xtra f -	10'	82 ✓
Dol, sdy, brw gray, vry f. -	58'	140
Dol, dk brw, vry f, brn sh -	42'	182 ✓
Total 182'		
Wells 5, 6, 7, 8 -	no data	
* Well 9 -	lithographic chert	
Ls, tan, lithog -	3.4'	
Ls, brn gr, f - med, fossil -	13.6	
Dol, brn gr, chalty; shale streak -	4.5'	
Dol, lt tan; chalty chert common	3.5'	
But Then' dec'd & not total thickness		
Well 10, 11.	no data	
Well 12.	Sandy Interbedd ls + sdy ls.	
Well 13.	no data	
Well 14 + 15	no data	
* Sample study		

Character of Devonian, p. 2

- Well 16. Limestone - 44' }
 Dol - 33' } Total 105'
 Limestone - 28'
- Well 17. Ls, lt brw, slightly mottled, xthn - 4'
- Well 18. Dol, slty - 2'
 Ls, tan, crinoidal, slty dol, fossil
 hash - 19 1/4'
 Sh, brn-tk with streaks 0.7'
 Ls, tan, lithog 1.2"
- Well 19. Samples not studied. Driller's log says ^{Says} "L"
- Well 20. Electric log tops
- Well 21. *
 Dol, f - slty vesicular, slty chky to chky 11 1/2' ✓
 Dol, gray brw, f - vy f gr - 6' 18 ✓
 Dol, lt gr - dk gr, vy f, silty at top, sdy
 at bottom, otherwise cherty - 39' 57
 Dol, gr brw - gr, xtra f - 15' 72 ✓
 Dol, sdy or chky - 13' 85
 (Dev. - Sil. contact not certain)
 Sh + sh - 17' 102
 Dol, gr, partly sandy - 10 112
 Dol + sh - 37' 149
 Dol, lt gr, vy f - 41' 190 ✓
 Dol + sh - 18' 208
 Dol, lt gr, vy f, partly pyritic - 63' 271 ✓
 Dol, f - sublt, a little sh - 264 535 ✓
 (Base at 1545)

Character of Devonian, p. 3

Well 22 *	Dol, alternating beds of chky or sdy	- 13'	13 ✓
	L, lt buff, f-cs, partly sdy	- 20'	33 ✓
	L, cherty	- 13'	46 ✓
	L, lithog	- 3'	49 ✓
	Dol, chky	- 10'	59
	Dol, wh, xtra f, scattered sand	- 6'	65

Bottom 780'

Well 23 *	L, dolomic, gray or buff, chky &/or sdy	- 23'	73
	L, buff, or lt gr & wh, co coarse	- 5'	78
	L, sdy or chky, partly dolomic	- 22'	50
	L, lithog, lt buff	- 2'	52
	Dol, chky or sdy	- 26'	78

Base at 783'

Wells 24 & 25 - no details

not proofread

TABLE 4

(For locations of wells see Table 1)

Character of Silurian
(Selected wells)

*Well 4.

Niagaran - top at 1692'

Dolomite, silty, partly cherty - 146'

Shale and dolomite, silty - 40'

Limestone, silty, sub-lithographic - 6'

Limestone, brown gray, sub-lithographic - 5'

Limestone, dolomitic, silty, very fine - 8'

Shale and dolomite - 47'

Dolomite, silty - 21'

Dolomite, light gray, rather dense - 15'

Dolomite, silty - 20'

Dolomite, gray and brown, extra fine - 90'

Limestone, very dolomitic, gray, very fine - 22'

Dolomite, light gray, very fine - 18'

k Alexandrian

Dolomite, sandy, cherty or shaly - 17'

*Well 19.

Niagaran - top at 1400'

Dolomite, white to gray, fine to medium, vesicular - 22'

Dolomite, cherty and/or silty - 46'

Limestone, dolomitic limestone and dolomite; pink grains; a few silty or shaly chert beds - 70'

Limestone, dolomitic, silty, sub-lithographic - 8'

*Sample study

Dolomite, calcareous, silty - 11'

Limestone, partly dolomitic, pink grains, gray - 26'

Dolomite, vesicular, light gray - 12'

Alexandrian

Dolomite, vesicular, mostly cherty, vesicular - 17'

Siltstone - 6'

*Well 21.

Niagaran - top at 1545'

Dolomite, light gray, very fine - 81'

Limestone, mostly dolomitic, pink grains - 55'

Dolomite, calcareous, trace of chert and of greenish clay - 16'

Total 1701'

*Well 23.

Niagaran - top at 783'

Dolomite, white to gray, very fine to medium, vesicular - 25'

Dolomite, as above but slightly vesicular - 42'

Total 850'

Alexandrian

Dolomite, vesicular, mostly cherty, vesicular - 17'

Siltstone - 6'

*Well 21.

Niagaran - top at 1545'

Dolomite, light gray, very fine - 81'

Limestone, mostly dolomitic, pink grains - 55'

Dolomite, calcareous, trace of chert and of greenish clay - 16'

Total 1701'

*Well 23.

Niagaran - top at 783'

Dolomite, white to gray, very fine to medium, vesicular - 25'

Dolomite, as above but slightly vesicular - 42'

Total 850'

TABLE 5

ROCK UNITS APPARENTLY OF SUITABLE CHARACTER FOR COMMERCIAL USE

LITHOLOGY BASED ON SAMPLE STUDIES

Well No.	Kind of rock	Thickness	Depth	Comments
<u>Salem</u>				
1	Limestone	59	480	Gray and brown, hard and very hard
4	Limestone and dolomite	18	660	Oolitic; trace chert and shale
	Limestone	10	678	Brown gray, fossiliferous
	Dolomite	28	688	Gray, extra fine grained
<u>Devonian</u>				
4	Dolomite	10	1520	Fine grained, gray brown
	Limestone	32	1530	Slightly dolomitic, fine to coarse, gray or brown gray
	Dolomite	10	1582	Brownish, extra fine
	Dolomite	42	1640	Dark brown, very fine, trace of shale
21	Dolomite	15	1098	Gray, extra fine
	Dolomite	41	1160	Light gray, very fine
	Dolomite	63	1219	Light gray, very fine, partly pyritic
<u>Silurian</u>				
4	Dolomite	15	1965	Light gray, dense
	Dolomite	90	2000	Gray and brown extra fine
	Limestone, dolomitic	22	2090	Gray, very fine
	Dolomite	18	2112	Light gray, very fine
19	Dolomite	22	1400	White to gray, fine to medium, vesicular
	Limestone, dolomitic	26	1557	Gray
	Dolomite	12	1583	Vesicular
21	Dolomite	81	1545	Light gray, very fine
	Limestone, dolomitic	55	1626	Light gray, vesicular
23	Dolomite	67	783	Slightly to medium vesicular

VERMILION CO. HOOPSTOWN

RANKIN

(MAP BASE INEXACT)

23

•26

ROSSVILLE

22

•25

ALVIN (ORALVAN)

•22

23

•24

21

COLLISON

21

20

•19

•20

19

16

15

14

DANVILLE

17

18

CATLIN

18

13

FAIRMOUNT

•9

•10

•12

•11

GEORGETOWN

17

•7

•8

•5

SIDELL

•6

•4

•1

•2

•3

RIDGE FARM

FIG. 1

14

13 E. NE DIETZEN CO. NO. 12

11

RANGE - WEST

TOWNSHIP - NORTH

LOCATION OF WELLS BY NUMBER

VERMILION CO.
STRUCTURE ON TOP OF NEW ALBANY
(NOT EXACT - BRASS)

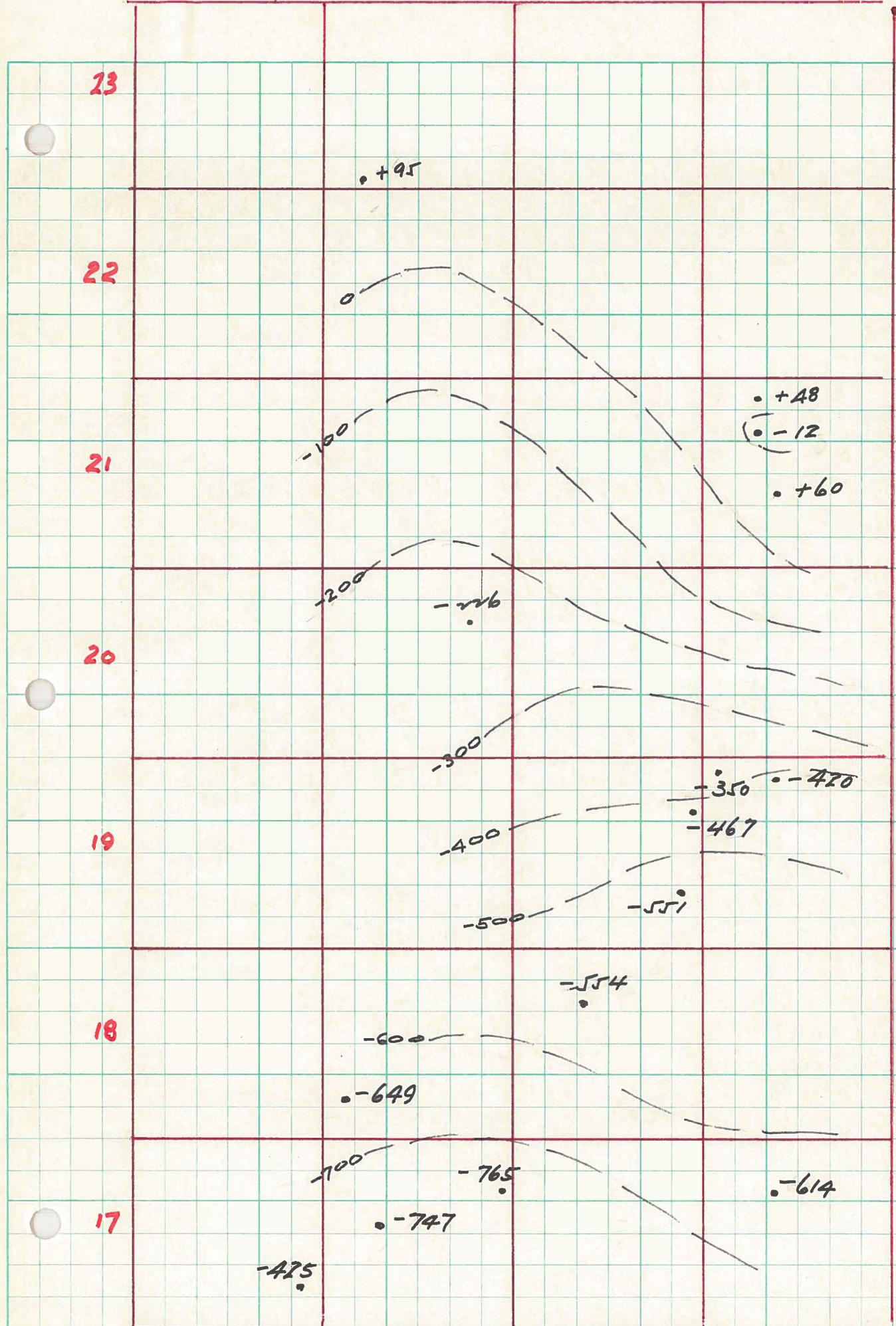


FIG. 2

VERMILION CO.
(NOT EXACT)

STRUCTURE - TOP OF DEVONIAN

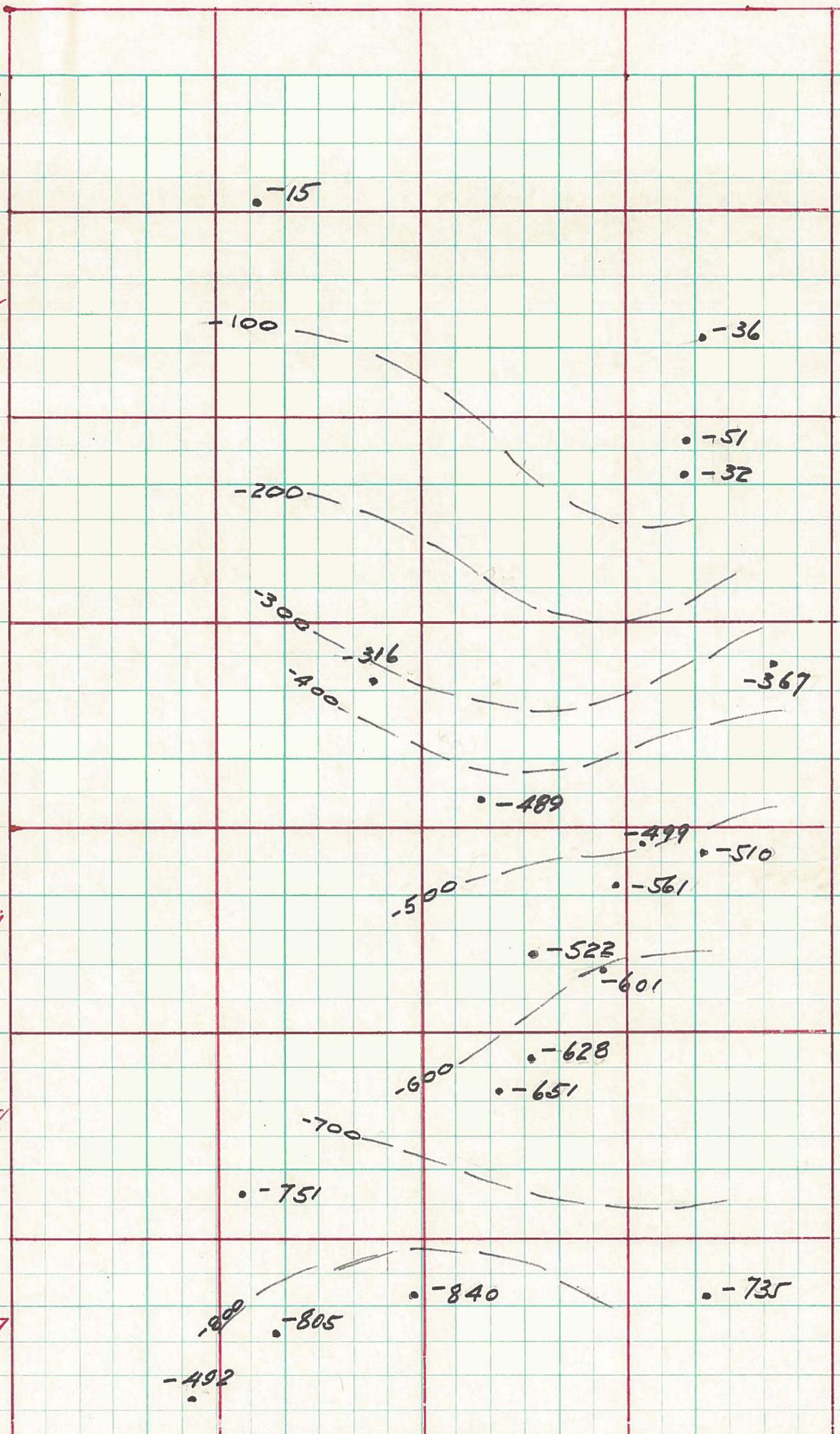
23
22
21
20
19
18
17

14

13 EUGENE DIETZGEN CO. NO. 12E

11

FIG. 3



VERMILION Co.
BASE NOT EXACT

13

• 585? (212?)

12

DEPTH TO TOP OF SALEM (BLACK)
ELEVATION TOP OF SALEM (GREEN)

11

10

• 612
(29)

19

18

• 630 (47)

• 647? (27?) • 602? (76?)

• 480 (160)

• 600 (65)

17

• none

• 653 (19)

• 660 (10)

• 640?
(29?)

• 585 (65)

FIG. 4

14

11

VERMILION CO. (BASE INEXACT)

DEPTH TO TOP OF DEVONIAN

• 785?

• 716

• 711

• 710

• 1011

• 1008

• 1038

• 1149 • 1125

• 1170

• 1171 • 1254

• 1308

• 1327

• 1510

• 1400

• 1477

• 1208

FIG. 5

DEPTH TO TOP OF NIAGARAN

VERMILION CO
(NOT EXACT)

23

• 765?

22

21

• 780
• 783
• 870
• 770

20

1545

• 1400

• 1130

19

1388

18

• 1447
• 1477?

• 1489?

17

• 815?

1692

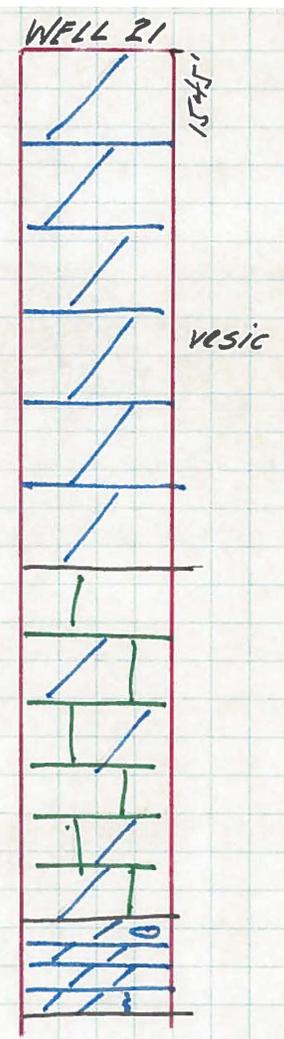
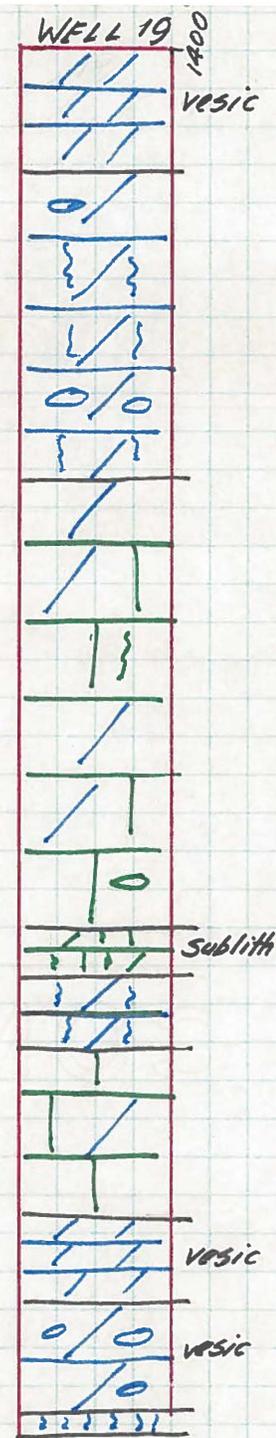
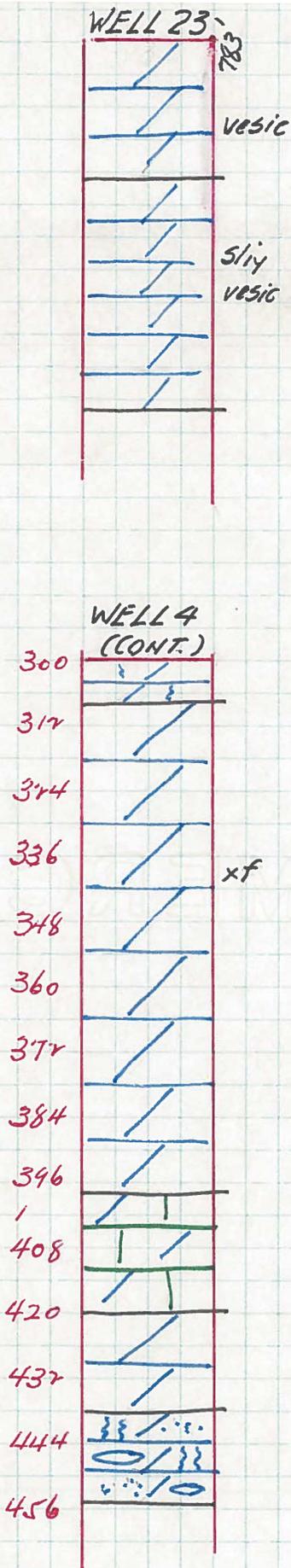
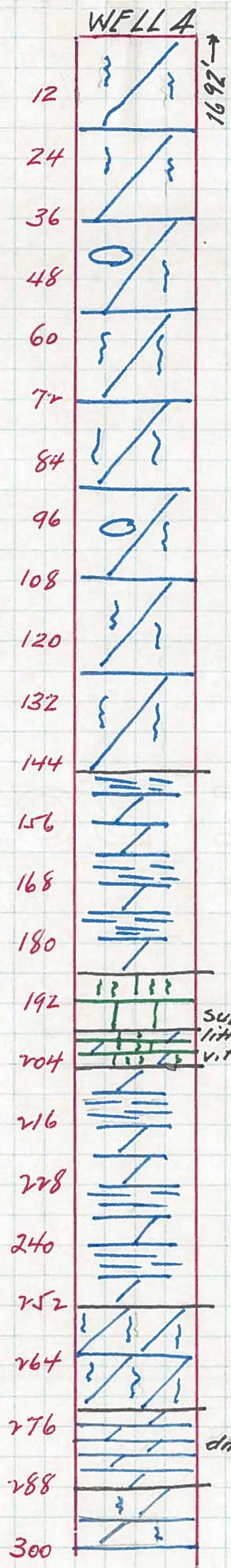
1305

FIG. 7

14

11

THICKNESS



SELECTED SILURIAN LOGS

FIG. 8

MS
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Uniontown Co.

17N, 11W - 3 - SE, NE. Miss ls, psby Salens, @ 451. El 648

17N, 11W - 9 - SW, SE, SW - El 665. New Alb. @ 1279. Dev.
ls @ 1406. El Dev ls top - 741

17N, 11W - 15. SE, NW, NW. El 659. Top Salens 514. Top
New Albany - 1195. Top Dev. 1318
El Dev ls top - 659

17N, 11W - 20 NW, NE, SE. ^{El 663} Top Miss, Salens? 640. Top Dev ls 1490?
^{El 670} El top Dev ls - 827?

* 17N, 13W - 12 SW NE SE, Salens @ 660 Otago 766
Dev ls 1510 El top Dev ls. - 840

17N, 13W - 17, ^{El 670} NE NE SE. Salens? @ 653 Dev ls 1477
El top Dev ls - 807

17N, 13W - 26. NW SW. El 650. Dev ls 925? Salens ??? 585
El top Dev ls - 275

17N 14W - 22 (no 14 sec given) El 701. Dev ls @ 760. 1st sub. Pa just Otago
El top Dev ls. - 59

17N, 14W 25 NW SE SW. El 715 Dev ls @ 1207?
El top Dev ls - 492

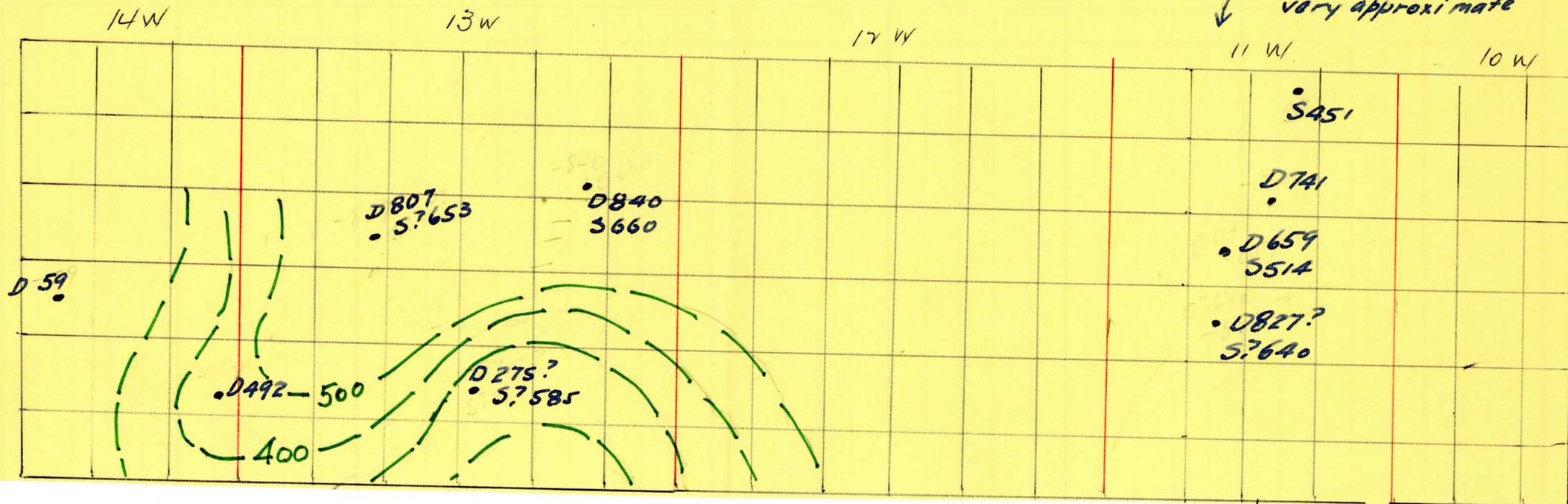
* Samples

MS
Lamar, JE
NS # 157

Fig. 3. Elevations on top of Devonian
Limestone in Southern Vermilion Co.
(Elevations are minus)

Locations
very approximate
↓

D - elevation
top Dev. Ls.
S - depth to
Salem F. 17N



VERMILION COUNTY

TABLE I.
(depth to)

Tops of rock units and their elevations

Well No.	Location	Elevation (surface)	Salem		Osage		New Albany		Devonian		Niagaran		Maquoketa		Kimmiswick		TKness Salem	TKness Dev. 15.
			Top	El.	Top	El.	Top	El.	Top	El.	Top	El.	Top	El.	Top	El.		
✓ 1	SE NE - 3 - 17N, 11W	648	480	168							1325						59	
✓ 2	SW SW SW 9 17-11	665	600	65			1779	-614	1400	-735							50	
✓ 3	SW NE, SE 20 17-11	669	640?	29?													30	
✓ 4	SW NE, SE 12 17-13	670	660	10	766		1435	-765	1510	-840	1692		2147		2390		106	
✓ 5	NE, SE, SE 17 17-13	672	653	19			1400	-747	1477	-805							54	
✓ 6	SW, NW SW 26 17-13	650	585	65													-	
7	- - - 22, 17-14	701	none				680?				815?						-	
8	NW NE SW 25 17-14	715					1140	-425	1207	-492							-	
9	NW SE SW 3 18-17	680							1308	-628	1447						-	
✓ 10	SE SW SW 9 18-12	676					1230	-554	1327	-651	1477?						-	
11	NW NE NE 26- 18-13	678	602?	76?													198	
✓ 12	NE NE, SE 30 18-13	674	647?	27?			1323	-649	1425	-751	1489?						43	
✓ 13	SE cor SW 13 18-14	677	630	47	705												75	
14	NW SE SW 4 19-11	615	?				1035	-420	1125	-510							-	
15	- - - 6 19-11	650					1000	-350	1149	-499							-	
16	SE SW SE 12 19-12	609					1076	-467	1170	-561							-	
17	SE NW SW 22 19-12	649							1171	-522							-	
18	SE SE NW 25 19-12	653					1204	-551	1254	-601	1388						-	
19	SW SE NW 21 20-11	641	612	29					1008	-367	1400							
20	NW SE NE 32 20-12	557							1036	-489	1130							
21	SW NW SE 11 20-13	645					921	-226	1011	-316	1545							
22	N 1/2 NW SE 5 21-11	660	Absent				612	+48	711	-51	780							
23	NW, SE 8 21-11	678					690	-12	710	-32	783							
24	NW SW NE 16 21-11	680									870							
25	SE, SE, SW 21 22-11	680					618	+60	716	-36	770		1298					
26	SW SW SW 32 23-13	770	585+	212??			675+	+95	785+	-15								

(Detailed description of Silurian)

(Detailed sample description of Silurian)

+ Correlation uncertain