

W-0352 Ft. Dodge, Ia
City Well #14

Sample Range -

No Samples to 120'

120' - 335' @ 5' intervals

340' - 375' " " "

380' - 440' " " "

445' - 940' " " "

960' - 970' " " "

Cuttings washed away:

335' - 340'

940' - 960'

Missing -

0 - 120

335 - 340

375 - 380

440 - 445

940 - 960

970 - 980

Verified ERC

Punched FCH

U. S. DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

Water Resources Division Well Schedule Form

MASTER CARD

Record by D. AARONSON Source of data FILE Date 1/18/66 Map 1:62,500 FT. DODGE, IOWA

State IOWA County (or town) WEBSTER 94

Latitude: 42° 30' 24" N Longitude: 094° 11' 55" W Sequential number: 1

Local well number: 08928W19CACAAA Other number: W-0352

Local use: 00352 CITY 14 Owner or name: FT. DODGE #19

Ownership: County, Fed Gov't, City, Corp or Co, Private, State Agency, Water Dist M

Use of water: Air cond, Comm, Dewatering, Fire, Dom, Irr, Ind, P, S, Stock, Instit, Unused P

well: Anode, Drain, Seismic, Obs, Oil-gas, Recharge, Spring, Test, Unused, Withdraw, Waste, Destroyed W

DATA AVAILABLE: Well data 1 Freq. W/L meas.: INVENTORY 0 Field aquifer char. 2

Hyd. lab. data: 73

Qual. water data; type: COMPLETE 74 C

Freq. sampling: IRREGULAR 75 Pumpage inventory: yes 76 no; period: 77

Aperture cards: 77

Log data: GEOLOGIST LOG 78 79

WELL-DESCRIPTION CARD

SAME AS ON MASTER CARD Depth well: 980 ft 980 Meas. 6

Depth cased: 256 ft 256 Casing type: STEEL 20 20 accuracy 24

Finish: porous gravel w. concrete, (F) gravel w. (G) gravel w. (H) horiz. open (O) open (P) perf., (S) screen, (T) sd. pt., (W) shored, (Z) other X

Method (A) (B) (C) (D) (H) (J) (P) (R) (T) (V) (W) (Z) other 31

Drilled: air bored, cable, dug, hyd jetted, air rot, rot., (R) reverse, (T) trenching, (V) driven, (W) drive wash, other 32

Date Drilled: OCT. 1935 935 Pump intake setting: 36 ft 38

Driller: THORPE WELL CO. DES MOINES, IA.

Lift (type): air, bucket, cent, jet, (C) multiple, (J) multiple, (N) none, (P) piston, (R) rot, (S) submerg, (T) turb, other 39 Deep 40 Shallow

Power (type): diesel, elec, gas, gasoline, hand, gas, wind, H.P. 41 Trans. or meter no. 42

Descrip. MP LSD ft above below lsd, Alt. MP 982.20

Alt. LSD: 982 982 Accuracy: INSTRUMENT 47 0

Water Level: 20 ft above below MP; Ft below lsd +20 Accuracy: DRILLER'S LOG 52 D

Date meas: OCT. 1935 035 Yield: 3000 gpm 3000 Method determined 61

Drawdown: 0 ft 0 Accuracy: 65 Pumping period: 66 hrs 68

QUALITY OF WATER DATA: Iron 1.4 ppm 5 Sulfate 151 ppm 5 Chloride 9.0 ppm 0 Hard. 467 7

Sp. Conduct 926 K x 10⁶ 4 Temp. 54 °F 54 Date sampled 3/13/56 356

Taste, color, etc. 79

089-28W-19 CAAA

Well Number 42 30 24 094 11 55

HYDROGEOLOGIC CARD

SAME AS ON MASTER CARD Physiographic Province: CENTRAL LOWLAND 12 Section: WESTERN

LAKE B Drainage Basin: DES MOINES 258 Subbasin: MW

Topo of well site: local depression, flat surface, hilltop, hillside, terrace, valley flat, 27

MAJOR AQUIFER: DEVONIAN MIDDLE D2 WAPSIPINICON MW

Lithology: MEDIUM DOLOMITE 2D Origin: MARINE 6 Aquifer Thickness: 925 ft

Length of well open to: 55 ft 55 Depth to top of: 925 ft 925

MINOR AQUIFER: 44 45 aquifer, formation, group 46 47

Lithology: 48 49 Origin: 50 Aquifer Thickness: 51 52

Length of well open to: 53 ft 54 55 56 Depth to top of: 57 58 59

Intervals Screened: NONE

Depth to consolidated rock: 60 61 Source of data: 64

Depth to basement: 65 66 Source of data: 69

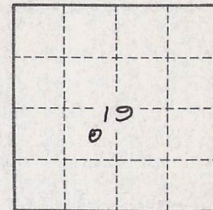
Surficial material: 70 71 Infiltration characteristics: 72

Coefficient Trans: 73 gpd/ft 74 Coefficient Storage: 76 78

Perm: 75 gpd/ft² 3000 / 0 Spec cap: 79 gpm/Ft; Number of geologic cards: 79

CASING:

20" PIPE FROM -1 TO -256 FT.
16" PIPE FROM 650-735'3"



Webster

January 3, 1947

Mr. John W. Pray, Manager
Department of Utilities
Fort Dodge, Iowa

Dear Mr. Pray:

In response to your letter of December 20, we are having several copies of the drawing of your No. 14 well prepared. There has been a slight delay in obtaining the prints, but we expect to be able to forward them to you within the next few days.

I am glad to have your remarks about your No. 8 well. Do you plan to do any additional testing during the next few months?

Best wishes for 1947.

Very truly yours,

H. G. Hershey

HGH:BH

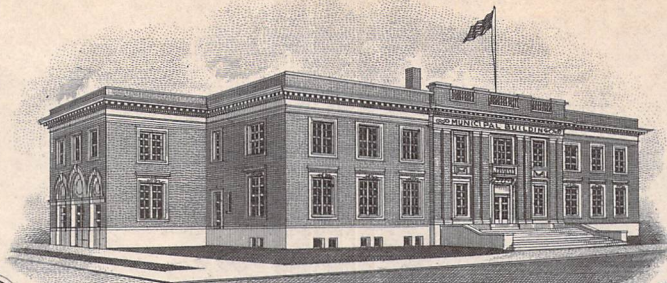
J. M. POOLE
MAYOR

H. R. SITTING
CLERK

DEC 23 1946

W. E. JOHNSTON
DEPARTMENT OF ACCOUNTS,
FINANCES AND PUBLIC SAFETY

C. B. PILCHER
DEPARTMENT OF PARKS AND
PUBLIC PROPERTY
STREETS AND PUBLIC IMPROVEMENTS



FORT DODGE, IOWA

December 20, 1946

Dr. H. G. Hershey
Geology Annex
State University of Iowa
Iowa City, Iowa

Dear Dr. Hershey:

Some time after the completion of our well #14 your office made a very complete record of the formations and well construction on a tracing. I have had quite a number of prints and I am today sending out the last one which I have in the file. Can you either send me the tracing or make a half dozen prints so that I may have available to supply schools and other interested parties with this record? I, of course, could make a tracing from the print I have but it is much simpler to print them from your tracing.

As you probably know, we have finished our testing project this fall and very much satisfied with the results. Although #8 did not turn into the producer that #9 is, we will have to be satisfied with the 1000 gallon per minute which we can take from #8, which I guess on the average is a pretty good producer.

With Best Wishes for a Happy Holiday, I am

Yours very truly,

DEPARTMENT OF UTILITIES
BY

John D. Tracy
Manager

JWP:po

CLASS OF SERVICE

This is a full-rate Telegram or Cablegram unless its deferred character is indicated by a suitable symbol above or preceding the address.

WESTERN UNION

1201

(173)

SYMBOLS

- DL = Day Letter
- NL = Night Letter
- LC = Deferred Cable
- NLT = Cable Night Letter
- Ship Radiogram

A. N. WILLIAMS
PRESIDENT

The filing time shown in the date line on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

MRM34 13 COLLECT=FORTDODGE IOWA 7 1103A

H G HERSHEY=

1944 DEC 7 AM 11 14

IOWA GEOLOGICAL SURVEY GEOLOGY ANNEX

WILL SURGE WELL 14 FOR 2 OR 3 DAYS PUMPING AT 4000'

W E HALE.

x710

DUPLICATE OF TELEPHONED

036A

14 2 3 4000.

To: *W E HALE*
 From: *H G HERSHEY*
 Time: *11 14 AM*
 By: *[Signature]*
 1944 DEC 7 AM 11 14
 WESTERN UNION
 FORT DODGE, IA.

CLASS OF SERVICE

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(32)

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MRM20 6=FORT DODGE IOWA 4 918A

DR H G HERSHEY=

1944 DEC 4 AM 9 34

GEOLOGY ANNEX

READY TO PUMP NO 14 THURSDAY=

JOHN W PRAY.

710

1944 DEC 4 AM 9 44
 IOWA CITY IA
 Telephone No. _____
 Telephone _____
 Time Believed _____

14.

DUPLICATE OF TELEPHONED TELEGRAM

OCT 12 1944 Oct 11, 1944

Dear Dr. Hershey,

Arrived in Ft. Dodge last evening & first thing this morning met Prey & Tom Thorpe. They hadn't anywhere then - just started to set up over #11. First thing tomorrow morning they will set in the 5" so that we can install the recorder & start measurements. We have found the gages to be inaccurate at the low pressures but the manometer works swell - though it is a little awkward.

Thorpe's plan for testing is more complete than we had anticipated as it may take a month or more. He plans to put pumps on #12 & #14, make careful readings of production, drawdown & recovery so we should have a pretty good idea of what this field will do when done.

Today we spent getting ready ourselves & taking some measurements. Expect to come in Saturday as they will be working on #12 next week.

Bill & Stan



THIS SIDE OF CARD IS FOR ADDRESS

Dr. H. Garland Hershey
Geology Annex
Iowa City, Iowa

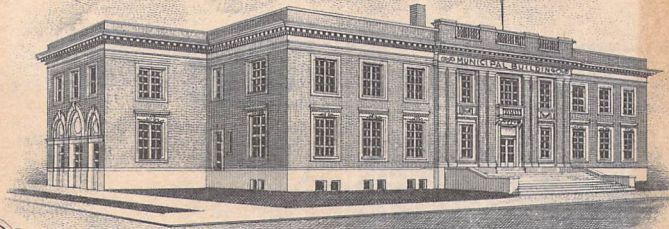
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W. L. ENGELBART
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Park Superintendent
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City Treasurer

CITY OF FORT DODGE

FORT DODGE, IOWA

April 8, 1936

Mr. A. C. Tester,
Asst. State Geologist,
Iowa City, Iowa.

Dear Mr. Tester:

I am sending you a copy of analysis of the water from Well #14 made by Mr. Galligan at Ames.

At the time this well was drilled, it appeared to be a softer water and we were anxious to know what sort of water we were getting at 930', so we ran a 2" pipe down to this vein and took samples, the results of which are shown in this analysis by Galligan.

As Mr. Galligan suggests, this water is similar to the water produced in our Well #12. The water furnished by the wells ~~is~~ further south ~~and~~ seems to be considerable harder.

I hope to be able to see you next week.

Yours very truly,

John W. Pray
WATER WORKS SUPT.

JWP:MF
Inlc.

Copy of letter from
Wm. E. Galligan
Ames, Iowa.

June 17, 1935.

Mr. John Pray
Water Superintendent
Ft. Dodge, Iowa

Dear John:

I am sending you the analyses of the two waters you delivered here but I have not yet had an opportunity to make any mixing and softening tests.

I am sorry to report that there is only a slight difference in the two waters.

	Composite Sample	Sample from 930' depth
Silica	26.2	16.4
Fe ₂ O ₃ + AL ₂ O ₃	8.0	4.0
Ca	107.	109.
Mg	41.1	44.
SO ₄	141.	142.
Total solids	636.	647.
Total hardness	437.	453.
Carbonate hardness	393.	395.
Non-carbonate hardness	44.	58.

There is really no significant difference in the two waters that might not be accounted for in the sampling. The iron content is considerably less in the 930' vein but sometimes a new well does not deliver the iron that it will after it has been used for awhile. The sulphate hardness is more in the deeper water but with only 58 p.p.m. non-carbonate hardness there is suggested softening with lime alone.

This well water is very much similar to that of your number 12 well and I think you are using good judgment in going for water in this direction.

Cordially yours,

Signed: W. E. Galligan.

March 13, 1936

Mr. John W. Pray
Superintendent of Water Works
Fort Dodge, Iowa

Dear Mr. Pray:

Thank you for your letter of March 10. I recognized that the 16" pipe was set as a liner but thought possibly it might have a special type of seal to assist in holding it in place or that other methods of construction might have been used. I am glad to have this matter cleared as you have explained it.

By separate cover I am sending to you a blue print of our interpretation of the well cuttings and also the method of construction and setting of casing with a notation concerning the production, which is derived from the information you furnished us.

I certainly appreciated receiving the complete set of samples of this well but regret that we did not have the upper 120 feet of material represented.

As promised you before, I am planning to make rather extensive studies concerning the deep wells of the Fort Dodge area. I hope to be able to do this work this summer.

Yours very truly,

A. C. Tester

ACT:A

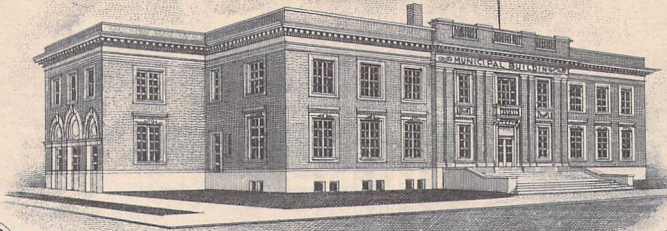
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CITY OF FORT DODGE

FORT DODGE, IOWA

March 10, 1936

Mr. A. C. Tester,
Asst. State Geologist,
Iowa City, Iowa.

Dear Mr. Tester:

I find that your letter of March 3
was laid to one side and therefore was not answered
promptly.

For your information, there is no
seal whatever between the 16" and the 20" pipe on
our Well #14. As you will note by the records,
there are several hundred feet of open hole between
these two lines. Each pipe is equipped with a steel
drive shoe and driven into the rock. This, we expect,
has made sufficient seal.

When this well was shut off, there
were no leaks apparent coming up around the outside
of the casing and it was our opinion that the shales
from above would make a perfectly tight seal.

Yours very truly,

WATERWORKS SUPT.

Information Desired For City Well No. 14
Fort Dodge, Iowa.

1. Curb elevation Above City Datum 12.32 Sea Level 981.65
2. Measured flowing capacity of well 3000 g.p.m.
3. Head of water above curb 20', diameter of pipe measuring flow 20"
4. Casing information; please give the exact length of each diameter of pipe and the exact depth at which each size is set and indicate the amount of overlap and the nature of seal between each size of casing 268' 20" O.D. Curb Down 16" O.D. Lining Bottom 735' Below Curb - Top 650' Below Curb
5. Exact location, such as street position 300' West of North End of First St. N.W. Corner W.W. Property
6. Date drilling started June 17th 1935
7. Date well completed Oct-23rd 1935, and put in service Oct-25th 1935 3 P.M.

Out information indicates total depth 980 feet, but we do not have samples between 970 and 980 feet. What is the correct and complete drilling depth? 980'

If the well was plugged at the bottom and present depth is different, please indicate.

Samples were taken from test well which stopped at 970' formation the same 970 to 980

March 3, 1936

Mr. John W. Pray
Superintendent of Water Works
Fort Dodge, Iowa

Dear Mr. Pray:

Thank you for the information on your
new well No. 14.

Just as soon as our blue print is
ready, I will send you a copy.

You did not indicate the type of
seal between the 16" and 20" pipe. I would
like to have this information to put on
the print. Was any cement used in the
upper part of the hole?

Yours very truly,

A. C. Tester

ACT:A

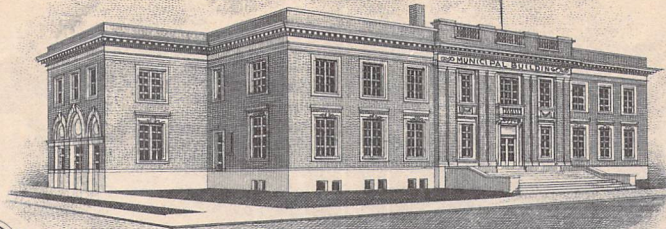
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CITY OF FORT DODGE

FORT DODGE, IOWA

March 2, 1936

Mr. A. C. Tester,
Asst. State Geologist,
Iowa City, Ia.

Dear Mr. Tester:

I am very sorry that I have not been able to supply you with the information and layout which I promised you last fall. We just got nicely into this job when we were hit by the extreme cold weather with lots of snow and the job therefore is not completed. However, as soon as it is complete, I will send you the plat, which will show the correct location and elevation of each well. I am filling out the questionnaire which you included and hope this will supply the desired information in regard to well #14.

You suggest that the total depth indicated is 980' but that you only have samples to 970'. This is due to the fact that samples were taken when the test hole was being drilled and just to be sure we were not missing anything, we went down another 10' on the main well and found the formation was exactly the same as it was at 970'.

We will be very much interested in having a print of this well, which you are making, and appreciate very much the work you have done here and the interest you have taken in our water supply problem.

Yours very truly,

John W. Pray
WATER WORKS SUPT.

February 28, 1936

Mr. John W. Pray
Superintendent of Water Works
Fort Dodge, Iowa

Dear Mr. Pray:

We have completed our study of the cuttings from your new well No. 14 and have prepared a diagrammatic log which is already for blue printing, except for certain information that we have been hoping to get from you.

You will recall that we discussed this subject some time ago, and I have been more or less waiting to hear from you. Just as soon as you supply the information, I will send you a copy of our blue print showing the log and description of the formations.

I will appreciate your filling out the enclosed questionnaire which covers the information that I wish on this well. Your early reply will be appreciated.

Yours very truly,

A. C. Tester

ACT:A

Information Desired For City Well No. 14
Fort Dodge, Iowa.

1. Curb elevation _____
2. Measured flowing capacity of well _____ g.p.m.
3. Head of water above curb _____, diameter of pipe
measuring flow _____
4. Casing information; please give the exact length of each
diameter of pipe and the exact depth at which each size
is set and indicate the amount of overlap and the nature
of seal between each size of casing _____

5. Exact location, such as street position _____
6. Date drilling started _____
7. Date well completed _____, and put in service

Out information indicates total depth 980 feet, but
we do not have samples between 970 and 980 feet. What is
the correct and complete drilling depth? _____

If the well was plugged at the bottom and present depth
is different, please indicate.

THORPE WELL COMPANY

2340 SIXTH AVENUE
DES MOINES, IOWA

Drilled for City of Ft. Dodge at Ft. Dodge, Iowa

Well is located _____ miles N-E-S-W and _____ miles N-E-S-W from _____

in the _____ 1/4 _____ 1/4 Section _____ Township _____ Range _____

Drilling started _____ 19 _____ Completed 6/10/35 19 _____

Well No. 14 Kind of Well _____ Depth 973' Size hole started 18" in.

Finish 18" G. P. M. 3000 natural flow head _____ Drawdown _____

Water was first encountered at 6' in Gravel Approx. Amt. _____ Temp. _____

Remarks First flow at 257' - increase in flow 325' to 340' - 494' to 522'
522' to 590' - 595' to 638' - 925' to 965' - 19" hole drilled
from top to 735' 3" - 18" hole from 735' 3" to 970'

RECORD OF PERMANENT PIPE					TEMPORARY PIPE	
SIZE PIPE	AMOUNT OF PIPE	DEPTH TO BOTTOM OF PIPE	DEPTH TO TOP OF PIPE	MAKE OF PIPE	SIZE PIPE	AMOUNT
20"	255	256'	1'			
16"	85' 3"	735' 3"	650'			

Driller _____ From Surface to _____ feet

Driller _____ From _____ feet to _____ feet

Driller _____ From _____ feet to _____ feet

AMOUNT IN FEET	KIND OF SOIL OR FORMATION (BE SPECIFIC)	TOTAL DEPTH FEET
2'	Soil	2
23	Sand & gravel	25
15	Blue mud	40
2	Hard pan	42
39	Black shale	81
12	Sandy lime- some water	93
19	Black shale	112
3	Lime stone	115
21	Black shale	136
11	Blue limestone	147
23	Lime shells & black shale	170
15	Sandy limestone	185
5	Gray shale	190
23	Red shale	213
13	Limestone	226
9	Green shale	235
11	Red shale	246
6	Limestone	252
18	Sandy limestone	270
8	Gray limestone	278
8	Brown sandy limestone	286
2	Green shale- increase in flow at 286'	288
22	Sandy limestone	310
28	Gray lime- hard- increase in flow at 325'	338
4	Limestone- no samples-increase in flow at 340'	342
30	Limestone	372
6	Broken lime & shale	378
27	Limestone- gray & hard	405
85	" white (no grit)	490

(OVER)

Amount in feet	Kind of soil or formation	Total depth feet
100	Limestone- brown- hard increase in flow at 494'	590'
		522'
		555 to 570'
48	Gray sandy limestone	638
17	Gray & brown limestone- very hard	655
4	Green shale	659
11	Broken lime- white shale	670
3	Gray shale- limey	673
30	Gray shale	703
7	Brown limestone	710
5	Blue limestone- hard	715
12	Brown limestone-hard- water milky at 724'	727
48	Gray limestone- hard	775
92	Sandy limestone-water milky at 785'	866
2	White shale	868
47	Limestone- water milky at 905'	915
15	Gray limestone	930
5	Brown sandy lime	935
30	No samples	965
8	Brown limestone- big increase in flow 933 to 942'	973

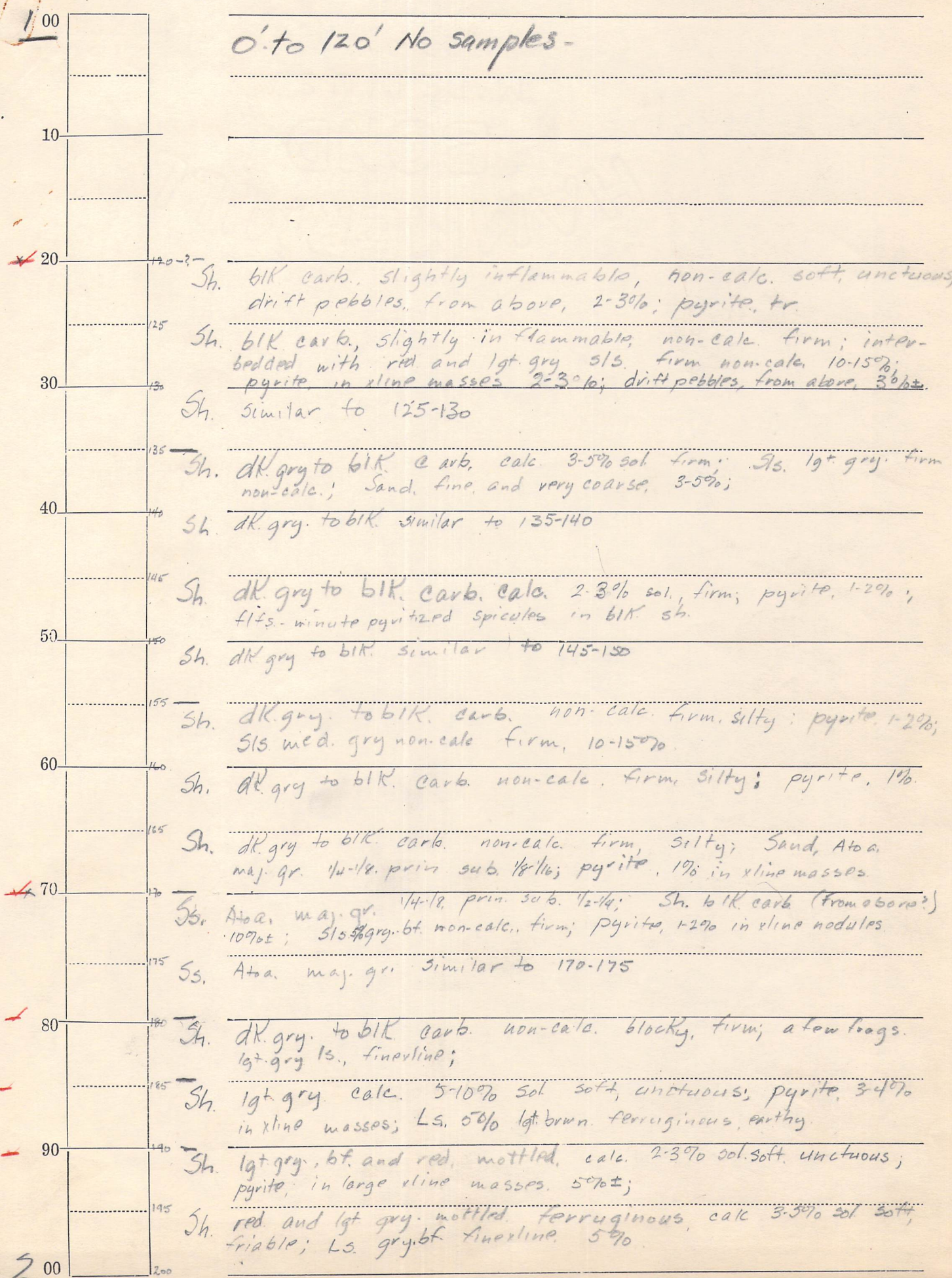
Ft. Dodge No. 14 Drillers Log

- 0-2 Soil
- 2-25 Sand + Gravel
- 25-40 Blue Mud Set 35' 8" 12" casing
- 40-42 Hard pan
- 42-81 BIK. shale
- 81-93 Sandy lime Some Water
- 93-112 Black Shale
- 112-115 Limestone
- 115-136 BIK sh.
- 136-147 Blue Ls Set 140' 10" casing
- 147-170 Lime shells + BIK. sh.
- 170-195 Sandy lime
- 185-190 Gray sh.
- 190-213 Red sh.
- 213-226 Ls.
- 226-235 Grn. sh.
- 235-246 Red sh.
- 246-252 Ls. Set 8" casing 246'
- 252-270 Sandg. ls. small flow
- 270-278 Gry. ls.
- 278-286 Brwn. sdy. ls.
- 286-288 Grn. sh. Increase in flow 286 ft.
- 288-310 Sdy. ls.
- 310-338 Gry. ls. (hard)
- 338-342 Ls. No sample. Increase in flow 325'
- 342-372 Ls. very little sample " " 340'
- 372-378 Broken lime shale
- 378-405 Ls. gry.-brwn hard
- 405-490 Ls. wh. no grit Milky water at 480'
- 490-590 Brwn. ls. hard (Increase in flow 494'
- 590-638 Gry. sdy. ls. W.B. ^{little} sample " " 522'
- 638-655 Gry. Brwn. ls. hard. No water " " 555-570'
- 655-659 Grn. sh.
- 659-670 Broken lime-wh. sh.
- 670-673 Gry. sh. limy
- 673-703 Gry. sh.
- 703-710 Brwn. ls.
- 710-715 Blue ls. hard

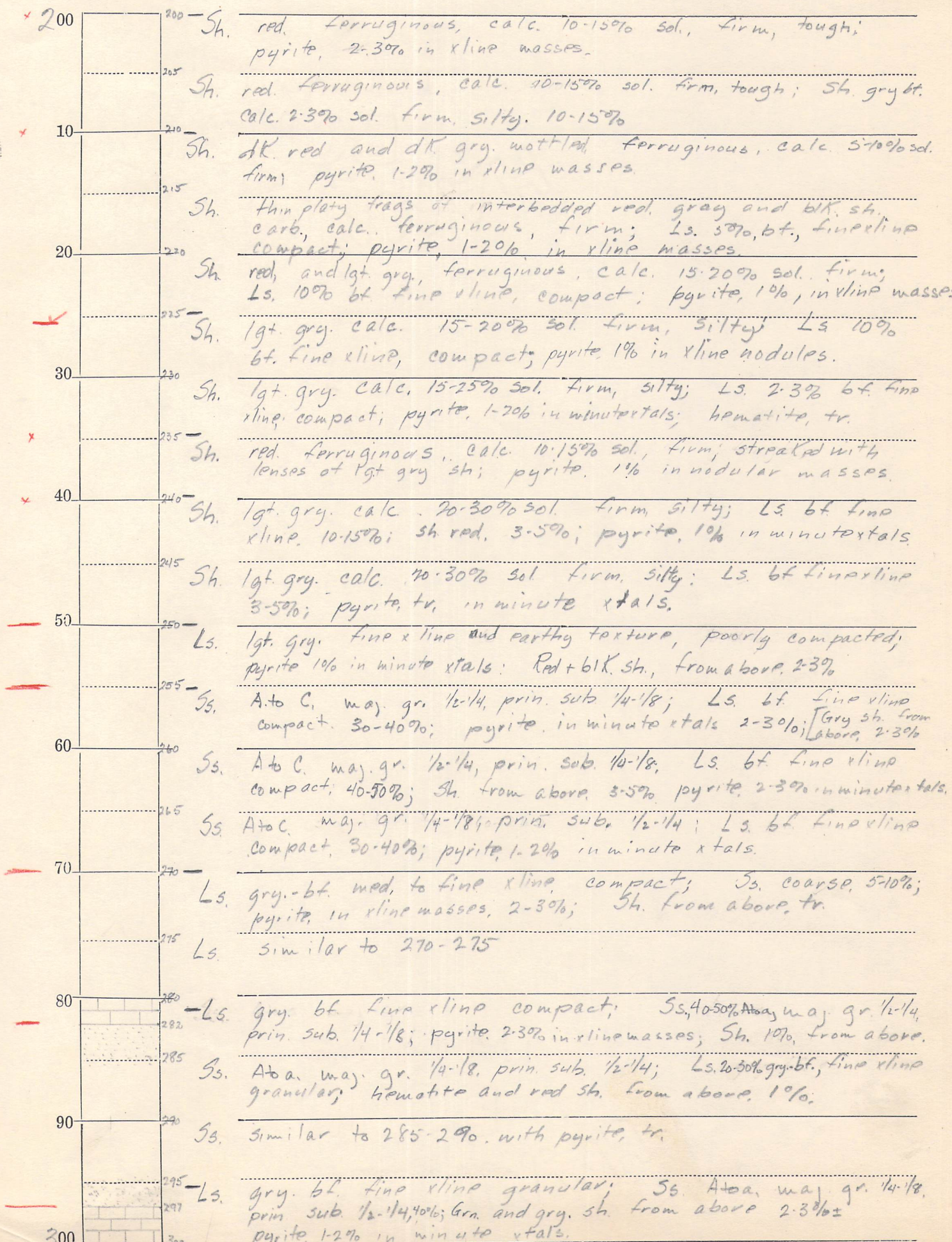
715-727	Brown ls. hard	Milky water at 724'
727-775	Grp. ls. hard	" " " "
775-866	Sdy. ls.	" " " 785'
866-868	wh. sh.	" " " "
868-915	ls.	" " " 900'
915-935	Grp. ls.	Big increase in flow
935-965	No Cuttings	933-942
965-973	Brown ls.	

973' Total depth.
 980 accurate measurement.

0' to 120' No samples -



Location Ft. Dodge Iowa Date Drilled _____ Analyst Talley



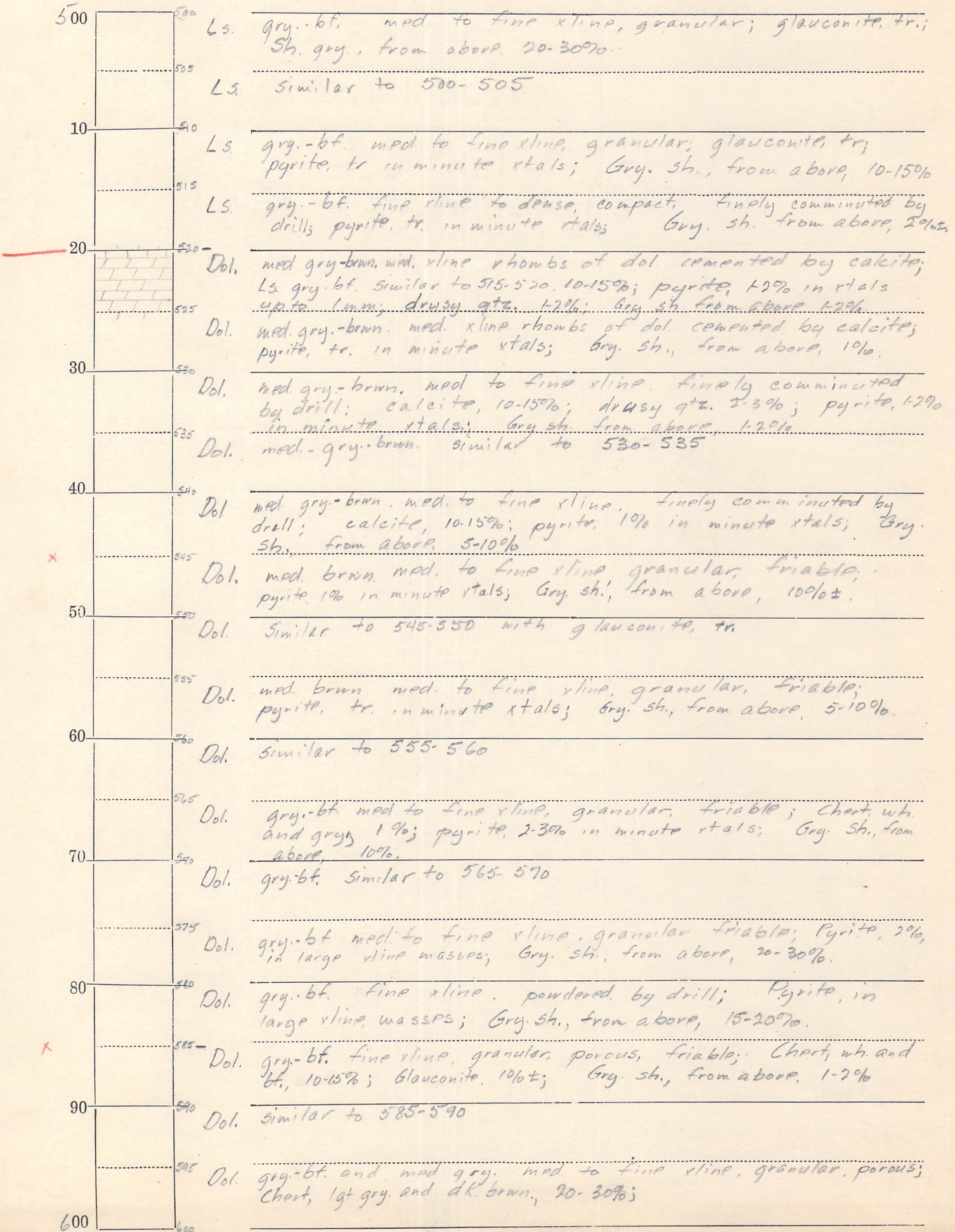
Location Ft. Dodge Iowa Date Drilled _____ Analyst Talley

300	300	Ls.	lgt. to med. gry. med. to fine xline, compact; chert, 15% wh. and lgt gry, fresh; pyrite, 1-2% in minute xtals; Gry. sh. from above, 2-3%
	305	Ls.	lgt to med. gry. slightly dol. med. to fine xline compact, chert, 3-5% wh. and lgt. gry fresh; pyrite, 1-2% in minute xtals;
10	310	Ls.	Similar to 305-310.
	315	Ls.	med. gry. med. to fine xline granular, porous; pyrite, 1-2% in xline masses; Sand, fine, 2-3%; Gry. sh. from above, tr.
20	320	Ls.	med. gry.-bf. med. to fine xline, granular, porous; Drusy qtz, 1%; Gry and red sh, from above, 5%±
	325	Ls.	similar to 320-325
30	330	Ls.	med. gry.-bf. med. to fine xline, granular, porous; Drusy qtz, and euhedral qtz xtals, 2-3%; pyrite 1% in minute xtals; Gry. and red sh, from above 10-15%. glauconite, tr.
	335	N.S.	Cuttings washed away
40	340	Ls.	med. gry. med. xline granular, porous; Gry and red sh. from above, 5-10%; pyrite, 1% in minute xtals.
	345	Ls.	med. gry. med. to fine xline, granular, porous;
50	350	Ls.	med. gry. fine xline, compact; pyrite, tr. in minute xtals [40% of sample]; Gry and red sh. from above, 6% of sample
	355	Ls.	med. brown, med. to fine xline granular, friable (broken into small xline aggregates by drill); pyrite, 1% in minute xtals; Gry and red shale from above, 10% of sample
60	360	Ls.	Similar to 355-360 with drusy quartz, 1%±
	365	Ls.	cream med. to coarse xline, granular, slightly, and or very finely (1/4mm.) oolitic; pyrite, tr. in xline aggregates.
70	370	Ls.	lgt. to med. gry. med. to fine xline, compact, slightly silty, (10-15%); pyrite, tr. in minute xtals; qtz in angular coarse grains, tr.
	375	N.S.	(probably same as samples above & below)
80	380	Ls.	lgt. to med. gry. med. to fine xline compact, silty (IR 30-40%); pyrite, tr. in minute xtals; Gry sh. from above, 1%.
	385	Ls.	gry.-bf. dense, compact; pyrite, tr., in minute xtals, Gry and red sh. from above, 3%±
90	390	Ls.	gry.-bf. dense, similar to 385-390.
	395	Ls.	cream med to coarse xline, slightly oolitic; pyrite, 1%, in minute xtals.
400	400		

Location Ft. Dodge, Iowa Date Drilled _____ Analyst Talley

400	400	Ls.	lgt. gry. fine xline, compact, <u>oolitic</u> , (oolites up to 1mm. 30-40%); pyrite, 1% in minute xtals; Gry sh. from above, 1%.
	405	Ls.	lgt. gry. similar to 400-405, with <u>oolites</u> up to 1/2mm 10-20%.
10	410	Ls.	lgt. gry med to coarse xline <u>oolitic</u> , (oolites up to 1/2mm. 40-50%); Gry. sh. from above, 1%.
	415	Ls.	lgt. gry fine xline, compact; Gry sh., from above, 10-15%.
20	420	Ls.	Similar to 415-420 with gry sh. from above, 2-3%.
	425	Ls.	med. gry. med. to fine xline, granular, finely comminuted by drill; Gry. sh., from above, tr.
30	430	Ls.	lgt. gry. med. to fine xline, friable; pyrite, tr; Gry. sh., from above, 1%.
	435	Ls.	Similar to 430-435
40	440		N.S.
	445	Ls.	lgt. gry. fine xline, friable ^{slightly oolitic} & pyrite, 1% in minute xtals.
50	450	Ls.	lgt. gry. med. to fine xline, friable; slightly <u>oolitic</u> ; pyrite 1% in minute xtals.
	455	Ls.	Similar to 450-455
60	460	Ls.	lgt. gry med xline, granular, <u>oolitic</u> (oolites up to 1/2mm. 30-40%), pyrite, tr in minute xtals;
	465	Ls.	lgt. gry. med. to coarse xline <u>oolitic</u> (oolites up to 1mm. 30-40%) friable; pyrite, tr; Gry. sh. from above, 2-3%
70	470	Ls.	Similar to 465-470
	475	Ls.	lgt. gry. med. to coarse xline, granular, <u>oolitic</u> ; pyrite, 1% in minute xtals.
80	480	Ls.	lgt. gry. similar to 475-480
	485	Ls.	gry.-bf. med. to fine xline granular, friable, ^{slightly} <u>oolitic</u> ; pyrite, 1-2% in xline masses; Gry sh., from above, 2-3%.
90	490	Ls.	gry.-bf. similar to 485-490 with gry. sh. from above 10%±.
	495	Ls.	gry.-bf. med. to fine xline, granular, friable, porous; pyrite, 1-2% in minute xtals; Gry sh., from above 5%±.

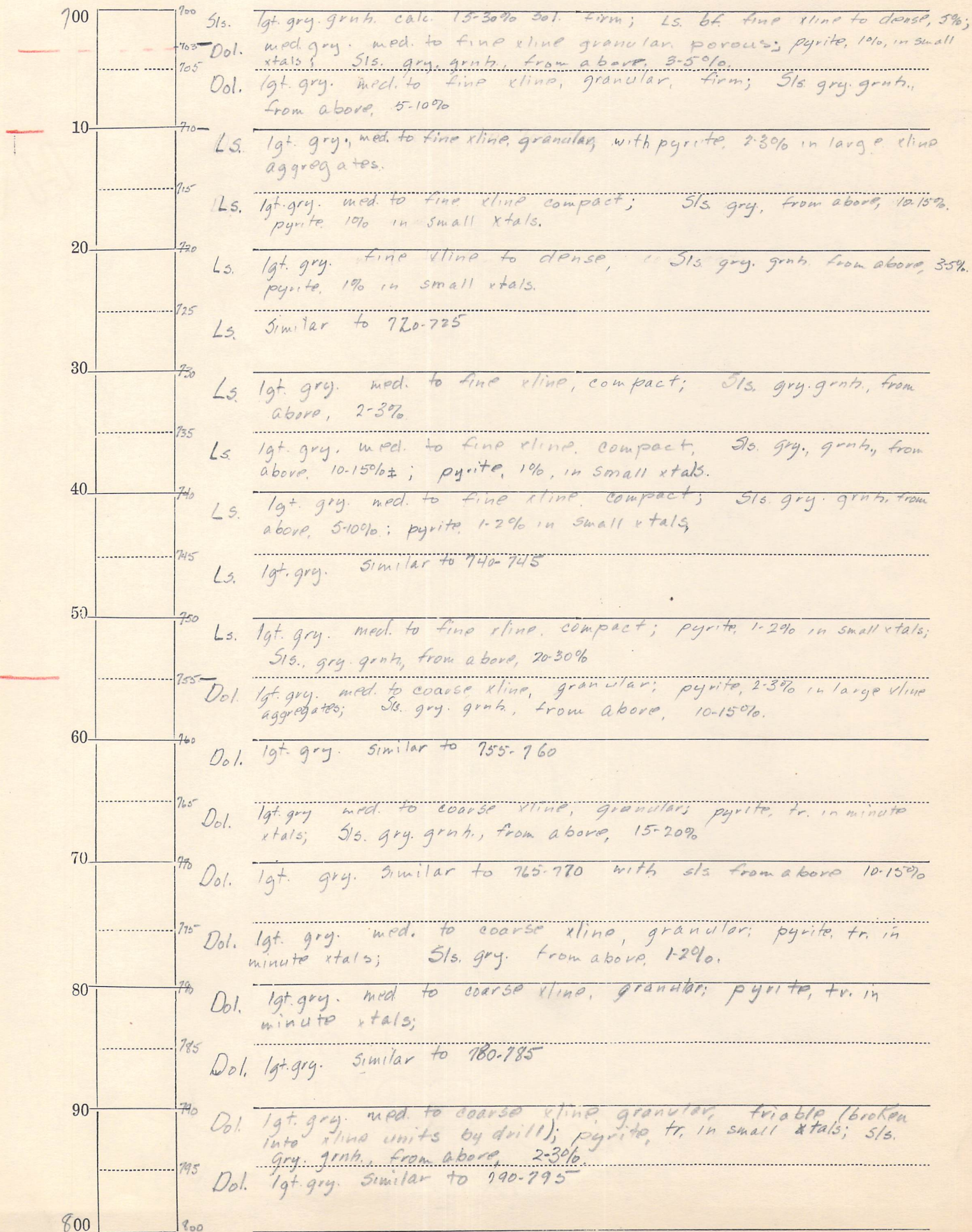
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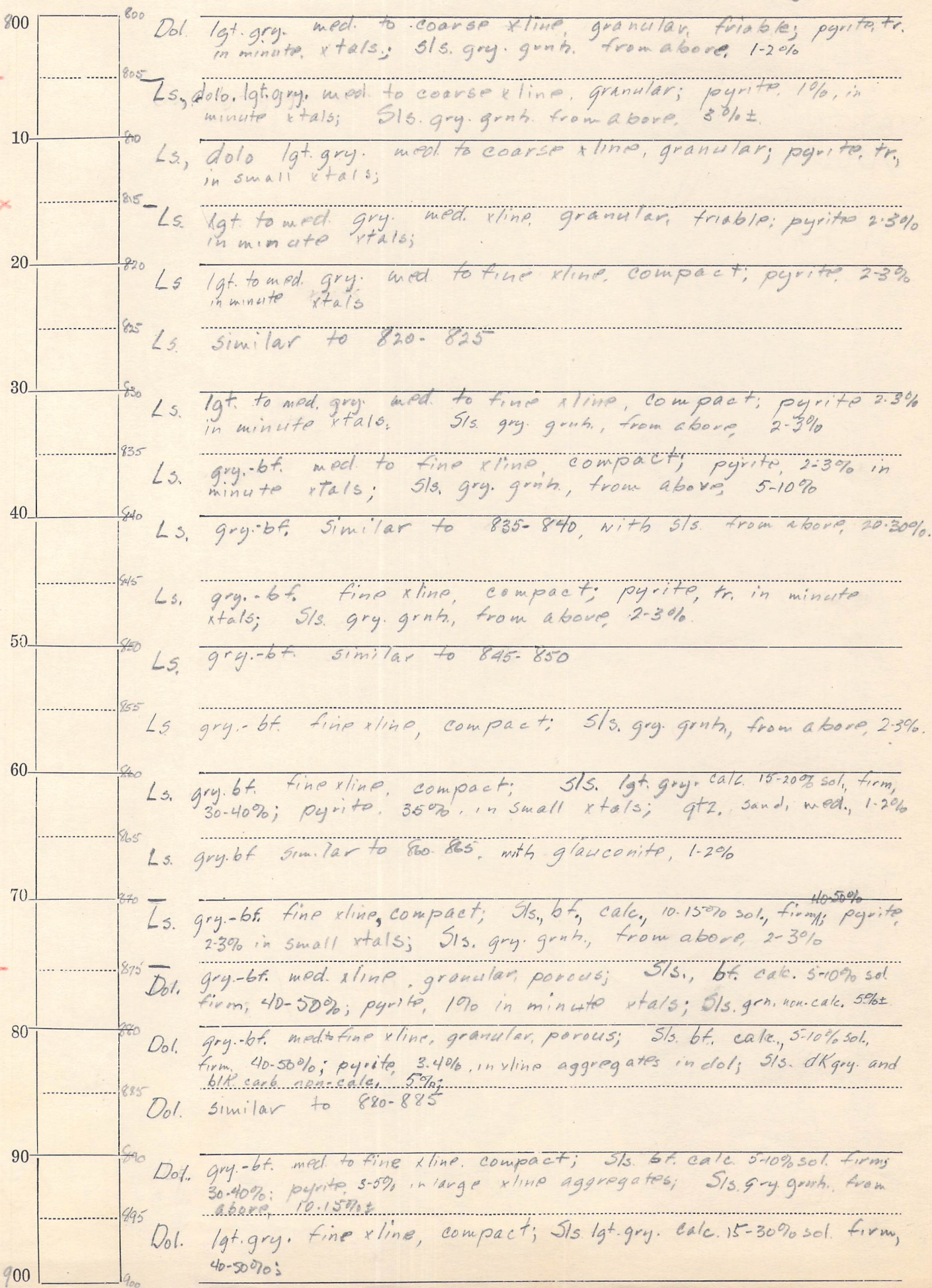
Location Ft. Dodge, Iowa Date Drilled _____ Analyst Talley

600	600	Dol.	gry.-bf. med. to fine xline, granular, friable; Chert, med gry. and brwn. 30-40%±; glauconite, tr.
	605	Dol.	gry.-bf. similar to 600-605
10	610	Dol.	med. gry. med. xline, granular, porous; Chert, lgt. and med. gry., fresh, 30-40%; pyrite, 1-2% fresh, in large xline aggregates
	615		Gry. sh. from above 10-15%
	620	Dol.	med. gry. med. to fine xline, granular, porous; Chert, lgt. gry. and gry.-bf. fresh, 30-40%; Gry. sh. from above, 2-3%
20	620	Dol.	med. gry. similar to 615-620 with chert 20-30%
	625	Dol.	med. gry. med. to fine xline, compact; pyrite 1-2% in small xtals; Chert, lgt. and med. gry., fresh, 100%±.
30	630	Dol.	similar to 625-630
	635	Ls.	med. gry. med. to fine xline, compact; Sh. gry. from above, 3-5%; Chert, 2-3% lgt. gry., fresh.
40	640	Ls.	med. gry. med. to fine xline compact; Sh. gry. from above, 3-5%; pyrite 1-2% in large xline aggregates, (may be from above)
	645	Ls.	similar to 640-645
50	650	Ls.	dolo. med. gry. med. to fine xline, compact, pyrite, 1-2% in small xtals; Chert lgt. gry., tr; Gry sh., from above, 5-10%
	655	Sh.	grn. calc. 5-10% sol. firm, unctuous; Ls. 10% med. gry. fine xline, compact; (Drillers Note: 655-659 green shale)
60	660	Sls.	lgt. gry. calc. 5-10% sol. firm; pyrite, tr. in small xtals; Ls. 5-10% med. gry. fine xline compact. (Drillers Note from 659 - broken line and white shale)
	665	Sh.	lgt. to med. gry. calc. 3-5% sol., firm, silty;
70	670	Sh.	lgt. gry., grnh. calc. 3-5% sol. firm, silty; limonite concretions, 2-3% small (1-2mm.)
	675	Sls.	lgt. gry. grnh. calc. 10-15% sol. firm; pyrite, 2-3% in small weathered xtals; limonite concretions, 10%±.
80	680	Sls.	lgt. gry. grnh. calc. 10-15% sol., firm, with thin streaks of blk. carb. material, and limonite;
	685	Sls.	similar to 680-685 with glauconite, 10%.
90	690	Sls.	lgt. gry. grnh. calc. 15-20% sol. firm; glauconite, 10%
	695	Sls.	lgt. to med. gry. calc. 15-20% sol., firm, micac., shaly; containing thin streaks of blk. carb. material.
700	700		

Location Ft. Dodge, Iowa Date Drilled _____ Analyst Talley



Location Ft. Dodge, Iowa Date Drilled _____ Analyst Talleg



Location Ft. Dodge, Iowa Date Drilled Analyst Talley

900 Dol. lgt. gry. med. to coarse xline granular; Sls. bt and lgt. and dk. gry. calc. 15-25% sol. firm; 20-30% pyrite, in small xtals, 2-3%;

905 Dol. lgt. gry. med. to fine xline similar to 900-905

10 910 Dol. lgt. gry. med. to fine xline, compact; Sls. grn. calc. 5-10% sol. firm. 10-15%; pyrite, 2-3% in small xtals;

915 Dol. med. gry. med. to fine xline, compact; Sls. grn. calc. 5-10% sol. firm. 10-15%; ^{from above;} pyrite, 1-2% in small xtals; glauconite, tr.

20 920 Dol. med. gry. med. to fine xline, compact; Sls. grn. calc. 5-10% sol. firm, from above; pyrite 1-2% in minute xtals.

925 Dol. med. gry. similar to 920-925 with Sls. grn. from above, 30-40%.

30 930 Dol. med. gry. fine xline compact; Sls. sh. ls. from above 60-70% of sample. (Drillers Note - 930-935 Big increase in flow most cuttings washed away.)

935 Dol. med. gry. fine xline, compact; Sls, sh. and ls. from above 15-25%; glauconite, tr.

40 940

No Samples from 440-460.

(Drillers Note - Cuttings from 940-960 washed away flow 875 g. p. m.)

50

60 960 Dol. med. gry. med. to fine xline, compact; Sls. grn. 2-3%.

965 Dol. med. gry. med. to fine xline, compact, finely comminuted by drill;

70 970

No Samples

80 T.D. 280'

90

00

Fort Dodge No 14 -
Samples for I.R. by Sedw. Class -

Wood.

703-705

710-715

730-735

745-750

750-755

Nelson

750-760

770-775

775-780

785-790

800-805

Folk

810-815

825-830

840-845

855-860

870-875

Smith

885-890

895-900

905-910

915-920

920-925

Edmonds.

925-930

930-935

935-940

960-965

965-970

Messenger
Fort Dodge, Iowa

NOV 25 1935

Will Make Special Study Of Artesian Well Sites

Unusual Situation Brings State Geologist Here—Would Find
Outlet of Big Vein.

State Geologist J. W. Tester of Iowa City is planning to come to Fort Dodge this week to study the geological formations underlying the city's artesian wells.

Drilling of the last two wells, No. 13 and 14, has revealed a strange phenomenon which Mr. Tester who was in the city recently, is at a loss to explain, and feels it is a matter for research.

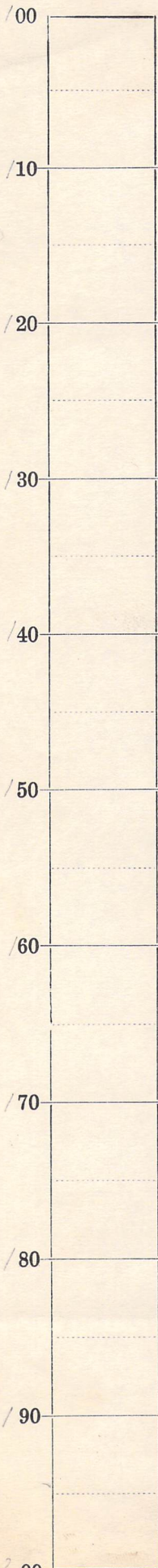
When plans were made several months ago for drilling an additional well, a site on the northeast corner of the waterworks property was selected. A test hole was sunk to a depth of 830 feet, but the flow was so small that it was abandoned. It also developed that the water from the test hole was from the same vein as well No. 12, which diminished the flow from No. 12.

A second site was selected, 240 feet west of the No. 13 test hole. The well was drilled to a depth of

933 feet and the biggest flow of any of the city thirteen wells was struck, 3,000 gallons a minute gushing from the new well.

For future information of the city, it was decided to go back to test hole No. 13 and sink it to the depth of No. 14 to determine the same vein underlies both wells. The test hole was drilled to the depth of No. 14, but there was no indication of the big vein which fed No. 14. Drilling was continued to a depth of 1,000 feet but the test hole failed to find the big vein.

Only 240 feet from the well which produces 3,000 gallons, City Water superintendent John Praeger and State Geologist Tester who was in the city last week, are at a loss to know where the big vein disappears. Mr. Tester thought it sufficiently unusual to make study of it and will return to the city this week for that purpose.



120-25	Shale, dark blackish gray; v.v. fine textured, v. finely micaceous, relatively soft, somewhat fissile.
125-30	Shale, as above, but harder 35% Coal; hard, fissile black carbonaceous material; poor quality coal seam, probably, rather thin; some underlay, carbonized wood, considerable pyrite material oxidizes to a light whitish, soft fluffy mass. 50% Underlay, light gray with brownish tinge, very smooth, soapy, rather soft, blocky. 10% Sand, white, fine, angular — very little sand. 5%
130-35	Coal, pyrite, and carbonized wood, as above 20% Underlay, as above, but micaceous and somewhat coarser textured. 70% Sand, as above, very little 2%
135-40	Shale, dark gray, very fine textured and v. finely micaceous, rather hard, fissile 60% Sandstone, very fine, white, rather hard, appears tight. 40%
140-45	Shale, gray, as above, 60% Sandstone, as above 40%
145-50	Shale, gray, very fine textured, very hard, poorly fissile to blocky 80% Shale, underlay or lagoonal mud type, light brownish drab, smooth, soapy, slightly slickensided, hard. 20% + " rare carbonized leaves in shale", light gray, somewhat soapy, slightly micaceous, hard, flaky tendency)
150-55	Shale, gray, as above. 25% Shale, underlay or lagoonal mud type; light colored, smooth, hard, soapy, slickensided; rare carbonized leaves; with little lensing interbedded blackish fine sandy siltstone 75%
155-60	Shale, gray, as above; more fissile 20% Shale, lagoonal mud type, considerably darker in color, very slightly micaceous; otherwise as above. 80%
160-65	Shale, lagoonal mud type, as above. 65% Shale, black, dense, hard, blocky 30% Sand, fine to medium angular loose grains. 5%
165-70	Coal, poor quality, considerable massive pyrite. 10% Sandy shale: gray, lensing, soft, structureless, slightly sandy, shale, and whitish, extremely sandy clay shale. 90% (Sand fine to med, ang. to rounded. 20% ss)
170-75	Sand, white, fine to medium, angular to rounded, loose; trace light calcite and clay shale cement — appears to have good porosity.
175-180	Sand, as above. 70% Shale, hard, dense, blocky, 15% + lagoonal mud type whitish gray, soapy, smooth textured, 15%
180-185	Sand, white, fine with some med. grains; angular to subrounded with light calcite to pale clay shale cement — abd. loose grains — probably very low if any porosity — has very thin, rare carbonaceous streaks. 35% Shale, black smooth fissile with streaks of thin white micaceous siltstone 40% Shale, pale lagoonal mud type 20% ls. pale whitish gray, almost earthy texture.
185-190	Shale, whitish gray, soft, structureless.
190-195	Shale, streaked, dull reddish, limonite yellow and some whitish gray, structureless, pyritic. (mostly yellowish)
195-200	Red beds: shale, dull reddish, streaked with pale grayish and some limonite yellow; structureless, some pyrite, slightly calcareous.

200	200-05	Shale, as above. calcareous.
	205-10	Shale, as above, but considerably more whitish gray, and less red.
210	210-15	Shale, as above, but more red, also little dark gray shale.
	215-220	Shale, as above, but with some grayish, soapy lagoonal mud type shale. 60% 40% Trace buff fine crystalline dolomite.
220	220-25	Shale, red bed type; dull reddish with streaks of pale whitish gray. light buff, fine crystalline, slightly pyritic dolomite - (very little)
	225-30	Shale, as above, but almost all pale whitish gray - very little red.
230	230-35	Shale, as above, but with a slight greenish cast to the whitish gray; and faint pinkish to purplish tinges taking the place of the red.
	235-240	Shale, reddish, with streaks of whitish gray; occasional small dolomite fragments embedded in shale.
240	240-45	limestone, grayish white, uniform v.v. fine crystalline - earthy, crinoid frag. - some has a purplish tinge. 80 Shale, red-bed reddish shale, calc. 20 Sand, fine to med. rounded grains - loose - very little - (in place?)
	245-250	Shale, whitish gray, with rare thin reddish streaks; calc. + limestone, tan, dense, hard (not very abd., but in large chunks) (from a ls. nodule or concretion in residual soil?)
250	250-55	Dolomite light buff, to light brown, fragmental (phenoclastic) - small rounded hard, light brown, v.v. fine crystalline pebbles in light buff, soft earthy appearing matrix - v.v. fine granular. + fragmental, light brown, hard, v.v. fine crystalline pebbles with clear calcite matrix Dolomite, light buff, with rather soft, earthy appearance. v.v. fine granular - has rare v. small isolated rounded pebbles.
	255-260	Sand, white, loose, fine to med. rounded, to coarse. Sub rounded to rounded, appears to have very light calc. or dolomitic cement - some pinkish grains. 75 Dolomite, light brown, hard, v.v. fine crystalline Chert, white, opaque - trace. + red dolomitic shale - trace
260	260-65	Sand, white, loose, v.v. fine to medium some large, mostly rounded, light dolomitic cement, some pinkish grains. 70 Dol. Sandy; pale whitish gray with slight greenish cast, v.v. fine granular 15 Shale, light greenish, dolomitic + pale green shale + maroon & mottled with grayish (very little) all dolomitic. Chert, grayish opaque, trace, to brown massive granular. (little)
	265-70	Dolomite, light buff, hard appearing, v.v. fine granular, - slightly porous 15 Sand, white, loose, fine to med, angular to rounded, 60 (trace calc. cement) Dolomite, light brown, very fine granular, with sharp crystal faces; poor development of porosity. 40 (Sub-glittering) Trace reddish dolomitic shale.
270	270-75	Dolomite, as above, but more finely granular, glass porosity. 85 Sand, as above, 15 Trace, gray opaque chert; trace red shale as above. Small rounded chert.
	275-80	ditto: Dolomite 70 Sand. 30 somewhat finer.
280	280-85	Ditto. Dol. 50 Sand. 50
	285-90	Ditto Dol. 10 Sand. 90 + shale, gray drab black, soapy, lagoonal mud type, rare carbon. frag. Trace,
290	290-95	Ditto. Dol. 15 55 95 shale, gray drab carbonaceous, + reddish + pale green Trace.
	295-300	Dolomite as above, 70% trace porosity. Sand, white, dolomitic, mostly loose, fine to med. 30% (+ phosphatic pelocypod shells - in place?)
300		

Location Date Drilled Analyst

300	300-05	Dolomite, brownish, fine granular, somewhat glauconitic, poor porosity. 85 sand loam, cave? Trace. Limestone, light buff gray, dense. 15 (M. wags, concretions, chalcidomy - associated with fine green Dol.)
	305-10	Ditto Dol. 85 Ls. 15 cht. v. little - fills porosity in dolomite. ss. cave?
310	310-15	Dol. light brown to light buff, dense to fine, v. fine granular, slight solution porosity. to crystalline. cht. trace, as above. (Dolomite appears to grade from crystalline to granular form.)
	315-20	Dol., light brown, fine granular, uniform, low intercrystalline & some solution porosity.
320	320-25	Ditto, Dol. as above, very fine to fine granular - better porosity. massive quartzite - white to brown - very little. shale, reddish green, trace. cave?
	325-30	as above: slightly more massive quartzite and shale, as above + grayish soapy type. cave?
330	330-35	as above, light brown dol. } 90% + massive quartzite. } + shale, pale greenish, soft, slight soapy appearance. 10%
	335-40	Dolomite, light whitish gray, fine to med. crystalline - hard, trace glauconite. (Trace) No Samples.
340	340-45	Dolomite, grayish to light brown, fine crystalline, trace glauconite. 95% (interstitial shale?) shale, flaky, paper shale grayish with greenish cast 5% in place? v. finely micaceous. tr. glau.
		Dol. as above - appears to have trace interstitial shale. 85 shale, as above. 15 vein aragonite, pyrite on surface. = (in plates) very little.
350		as above Dol. 55 sh. 40 + Trace Dol., brownish, v. fine to v. f. granular, little solution porosity (sub-glittering) 5%
	355-60	Brown granular dolomite, as above. with rather good porosity development. some calcite veining.
60		Dol. light brown to light brown with grayish cast, v. fine gran. to v. f. gran. respectively. cht. whitish, med. calcite veining. crystal clear quartz. v. little. (like fractured glass) +
70	365-70	limestone, light buff on fracture faces, grading into a whitish, flaky, floury appearing ls. - soft, in. poorly indurated. med. crystalline, spicular, rare fossil frags. + rare ostracod. (brownish leached) Trace green v. soft shale.
	370-75	Dolomite, light grayish buff, v. v. fine gran, sub-glittering. Trace, pale greenish & shaly sand.
		gap.
80		Dolomite, brown, fine crystalline to gran. + grayish, v. v. fine crystalline - some calcite.
	385-90	Trace ls. brown, sub-lith. + trace green, flaky, pyritic shale. ls. buff sub lithographic, calcite veining & vugs. rare ostracod. (Suggestion of small rare shells in ls.) + ll, grayish, dense, + small rounded pebbles or oolitic bodies, closely packed, (few pieces) Trace gray Het. cht.
90		ll. abd. buff dense small rounded pebbles or oolitic bodies in clear light buff calcite matrix an algal sort pls? ll to large
	395-400	ls, light buff gray, abd. tight packed, well developed oolitic bodies - some with glauconite casts & calcite matrix + occasional ostracods.
00		

Location Date Drilled Analyst

4 00

^{light buff}
Fragmatolite, crinoids, ostracods, poorly indurated - tight packed small orbitoid bodies, somewhat leached.

ditto

4 10

ditto except that lt. buff. calcite matrix is more apparent.
^(13.?)
sp. orbitoid bodies (round & long) small & somewhat tight packed.

ditto, with orbitoid bodies small to large, round to long.

4 20

(Case?) (Grayish v. finely micaceous paper shale)

lt. as above.

chert

chert, grayish, opaque - weathered to slightly triplicate. 57.

Dol. grayish, v.v. fine granular.

4 30

lt. lt. buff, algal to very small orbitoid.

lt. buff, slightly leached - as above.

4 40

gap

lt. as at 400-05 without crinoids.

4 50

lt. as above - fine to med. Xln. ^{formed, leached.} calcite to light buff matrix.

as above.

4 60

as above - orbitoid bodies small, better formed.

as above.

4 70

as above but with more Xln aspect. (fine to coarse) leached.

lt. as above.

leached.

4 80

lt. as above.

4 90

Dove Falls.

Dol. buff, fine to med. Xln. to gran. + shale, grayish, v.v. finely micaceous, papery (v.v. Little)

Dol. as above. 75
sh. as above. 25

Dol. as above - med. Xln, to slightly granular.

00

Location Date Drilled Analyst

6 00

Dol. lt. grayish brown, v.v.v. fine gran. to Xlu.
 chr. grayish white, slightly porous - tripolitic - weathered } 60%
 + grayish & brown mottled opaque

as above.

6 10

as above chr. mostly grayish white mottled, opaque 80%

as above.

6 20

as above but chr. less weathered - more dk. brown. (50%)

fossil shell common in chr.

as above

chr. 60%

6 30

as above.

Dol. lt. brown, v. finely Xlu.

chr. 15%

6 40

as above

chr. 8%

6 50

as above chr. trace.

dol. dark grayish brown, vv. finely Xlu.
 + little sandy dol. - fine ss. grain.
 + ss. white, friable - ss. fine to coarse, rounded, slightly pitted.

Sheffield?

Shale, lt. greenish gray, flaky, trace calcareous content. vv.v. finely micac.
 quite pyritic - rare fossil frag.?

6 60

as above v. finely micaceous (rare), fossils: lyellia fossils

+ dol. v.v.v. fine gran. shaly. (80%) + dol (conc?) brown, F to Xlu. + little coarse ss.

65-70

as above - Shale 80

shaly Dol.

+ dol. 0 fr. conc? little.

6 70

Shale, greenish, soft, structureless, slightly calc., slightly pyritic.

Shale, gray, flaky, vv.v. finely micaceous.

+ rare small brown vv.v. fine ^{Xlu} dol. nodules.

6 80

sh. as above but greenish in color

but nodules of buff, finely Xlu. pyritic ls.

sh. light grayish drab, flaky vv.v. finely micaceous 70

+ V. Dolomite sh. with greenish coat. 30

6 90

sh. pale greenish, as above.

+ lt. buff vv.v. fine granular, slightly shaly dol., with black asphaltic? streaks. 60

sh. grayish drab, as above.

7 00

+ dol. greenish, quite shaly, asphaltic streaked vv.v. finely gran.

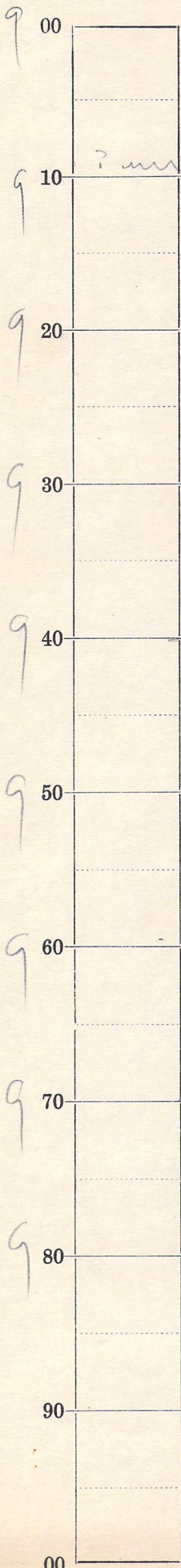
Location Date Drilled Analyst

700	700-03	Sh. gray drab with greenish cast, flaky, v.v.v. finely micaceous. 75 + Dol. shaly gran. + buff to brown v.v. fine gran. dol. 25
	703-05	Dol. oxidized, limonite yellow to light grayish; v.v.v. finely Xln; transparency. 25 trace milky quartz; pyrite. 25 granular in yellow
	705-10	Dol. lt. brown, v.v. fine gran. to Xln 50 Dol. lt. gray, v.v.v. fine Xln - argillaceous? 50
710		Dol. lt. gray, as above. 60 ls. white, med to med coarse Xln, pyritic. 75 lt. lt. buff to grayish, dense + white cherty texture of ls. dense, as above 60 ← leached? ls. white Chalky texture, as above, ← leached? 25 Sh. greenish, flaky, v.v.v. finely micaceous. 15
720		ls. brown, dense. 80 ls. lt. br. chalky texture - leached? 20
		Dol. lt. brown, v.v. finely Xln. 60% Dol. grayish, fine granular, very little. 5 Dol. v. finely Xln, grayish. v. little 5 ls. as above 20
730		Dol. lt. brown, med. Xln. 60 Dol. gray v. finely Xln. 20 ls. lt. grayish v.v. finely Xln. 20 ls. buff med. Xln, to chalky leached?
740		Dol. lt.?, grayish, med. dol. rhombs in v.v. fine granular matrix ls. altering to dol.?
		Dol. lt. buff, v.v. finely Xln. 90 + Dol. grayish to whitish buff, fine to med. gran. 10 Some pyrite.
750		Dol. as above (50-50 or 70) + Dol. med to med to coarse Xln, grayish white. v. little. Sand - loose, raw, white, fine to med to coarse, rounded frosted grains. Dol. grayish white, med Xln some coarse rhombs. (Dol. has drilled up to a dol. rhomb sand)
760		Dol. as above. — (some fine granular) some white (same?) + lt. greenish py. paper sh. 15% (in place?)
		Dol. as above - med to med to coarse. + (same?)? lt. gn. to grayish paper sh. (20%)
770		Dol. as above. med to coarse & coarse Xln with granular texture.
		Dol. as above med Xln.
780		as above med to co. Xln.
		as above.
790		as above
		Dol. as above med Xln.
800		

8 00		Dol as above.
8 10		As above med to med to co. Xln, v.v. rare ss. grains, as below
8 20		as above v.v. rare ss. grains, as below as above + Sand, loose, white, small to med rounded & frosted grain (rare grains) Dol. as above - 50% Dol. dk brown, + dol. light brown, [with traces of asphaltic material in small cavities of dol. l.] (ss. as above sandy) green flaky shal. con? Dol, dk. gray, med, & lt. brown, fine to med Xln.
8 30		Dol. as Above Dol. med brown, fine to med Xln.
8 40		little green flaky shal. Dol. as above Dol, pale grayish white, v.v. fine Xln (almost ^{hard} cherty, dense) to v. light buff utin to fine Xln. one is altering to the other?
8 50		Dol. as. above - to dense. as above
8 60	man?	Dol. as above Dol, grayish v.v.v. finely gran to Xln - argillaceous. - slightly sh, trace porosity development, 5% shale, dk green, waxy to olive green, slightly flaky. - v.v. finely micaceous - in place 20% Dol, as above. (except from dark) 70% Dol, white, v. fine, fine to med, gran - v.v. little pale green intercrystalline clay shale - rare loose fine sh. in place? 10% sh, light to bright greenish
8 70	v. h. w. s.	as above
8 80		Dol. pale grayish buff, earthy texture, fractured. 50 + Dol, med. br, med Xln to gran. 50 Dol, lt. br. to grayish white, fine to med to med Xln. 50 Dol. dk grayish buff, earthy, stylitic, fractured dol, as above. 50 little green sh. as above. Dol. as above + med br. med Xln dol. pyrite Dol, gray, v.v. fine Xln. - almost dense. 40
8 90		as above. pyrite
8 00		Dol, gray, fine to med Xln, Dol, grayish white, dense earthy texture. - coralline (molds) sh. trace lt. green gran. flaky sh. con? ss, gray, fine to med, light dolomite cement. (concent in ss)

17 20 21

v. h. w. s.



Dol. lk gray, with brown, med Xln to somewhat gran. 60
+ Dol as above 40%

Dol. as above

? micaceous

+ few loose ss, white, ^{med to co.} rounded, frosted grains. (in place?)

Dol, buff, fine Xln.

+ loose ss as above - (little loss)

Dol, as above, but v. fine Xln to gran.

(fine ss grains frosted embedded in brown dol. piece)

Dol. lk brown with v.v. fine gran
little shale, slightly green, flaky.

ss, abd. loose rounded frosted fine to med grain. (+ dol piece as above)

as above.

v. abd. fine ss. as above.

Dol. med brown, fine Xln to grain. 70

much greenish drab fine micaceous flaky shale. 30

as above.

stylolite

gap. cuttings from 940-60 washed away

Flow 87.5 - 9 PM

(interval probably dol, med br., v. fine to fine gran, v. friable, v. porous.)

Dol. med brown, v. fine granular, friable, slightly porous -

Dol. as above, but v.v. fine gran.

gap.

980.

10.



Well-14

Hale Has The Data