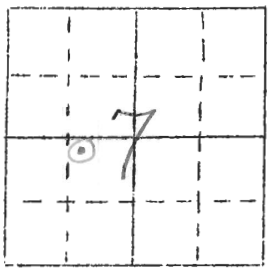
W-0110

IOWA GEOLOGICAL SURVEY
In Cooperation with U. S. Geological Survey

RECORD OF WELL



Location:

Town: Sutherland (N E S W); County O'brien

NW¼NE-SW sec. 7 T. 94 N., R. 39 E. W. Waterman Twp.

Well name and number Sutherland Town Well #2

Owner _____ Address _____

Tenant _____ Address _____

Contractor Rasmussen Bros. Address Sioux City

Drillers _____

Drilling dates completed June 1930 to 445' deepened 4/20/38 to 5/11/38

Well data:

Elevations: Drilling curb 1444 feet; Land surface _____ feet

Determined by _____

Topographic position Upland slope

Total depth: Reported 593 feet, Measured _____ feet

filled back with heavy gravel from 615' to 593'

Drilling method cable tool

Hole and casing data 420'3" of 10" casing from surface to 420'3"
(Give amount, size, kind, and depth of all casing; type and position of seals and packers; cementing; how finished--perforated pipe, screen, gravel pack, open hole, etc.)

Before deepened: 41' of 8" casing from 404' to 445'; bottom perforated with 5/8" diam. hole with 4" centers 420-445'

8" casing from 1'9" below top of 10" & extending to 537'6"

65' of 6" perforated casing (5/8" perf on 4" center) lapped 5' into 8" casing & sealed with lead seal above

Original depth to water 242.0 ft. below curb Date May 11, 1938

Original elevation of water level 1202 ft.; Source of data pumping test

Sources of water: Principal Dakota SS. 531-593; Others _____

IOWA GEOLOGICAL SURVEY
Well Log Record

No. ______

County: O'Brien

Name of Well: City Well No 2 Town: Sutherland

Location: NW¼, NE¼, SW¼ Sec. 7 T. 94 N., R. 39 E. ~~W.~~ Waterman Twp.

see G.O.C. Elev

Curb Elevation: ~~1461~~ Ft. Present Depth — Ft. Final Depth 445 Ft. before deepend

Static Level: (Depth to Water (~~Above~~) (Below) Curb) 190 * Ft. Pumping Level ______ Ft.

Contractor: Rasmussen Bros., Sioux City Date Drilled: 1930

Description*	FEET Thick	FEET From	FEET To
Yellow clay		0	32
Blue clay		32	175
Fine sand		175	185
Coarse sand & gravel		185	194
Fine sand		194	197
Coarse grav. mxd. with clay		197	200
Fine sd.		200	204
Blue clay		204	220
Brown sticky clay		220	235
Brown clay mixed with sd.		235	304
White clay		304	326
Fine yellow sand		326	395
Black sticky clay		395	401
Yellow sd. like ss.		401	410
Ylw. sd. will stand up to drill		410	420
White sandstone		420	430
"		430	440
"		440	445
Was not through sandstone			
(Above from minutes of Council		June 17, 1937	

Description*	FEET Thick	FEET From	FEET To
Note: 4' of gravel at bottom of well reported by Council March 18, 1938, H.G.H.			

See water analysis

*Abbreviate descriptions; use one line for each formation.

Remarks on water zones and casing: 10" casing from surface to 420'3". 41' of 8" casing from 404' to 445'; bottom perforated with 5/8" dia. holes with 4" centers, 420'-445'
* Howard Rasmussen reports static level of 245'; * 190' measured by Mr. John Drake in 1934 who recorded measurement.

Temperature: Air 77 °F.; Water 52½ °F., at 2:30 (A.M.) (P.M.) August 30 1937
after well had pumped 60 gpm for 1 hr.

Record obtained from * Minutes of town Council Recorded by H. G. Hershey
[illegible] 17, 1930 (H. Rasmussen's Rep[illegible]

Incorporated Town of Sutherland, Iowa

MEMBER OF LEAGUE OF IOWA MUNICIPALITIES

Office of the Clerk

W-0110 before deepening

Sutherland, Iowa May, 1, 1935.

Mr. Allen C. Tester.
Iowa City, Iowa.

Dear Sir-: In reply to yours of April 13" I935 addressed to our Mayor will send you the Log of our 445 foot well which is as follows-:

0----32 feet--yellow clay.
32--175- " -blue " .
I75 -185 "- fine sand .
185--194 " coarse sand and gravel.
194--197 " fine sand .
I97--200 " coarse gravel mixed with clay .
200--204 " fine sand .
204--220 "blue clay .
220--235 " brown sticky clay.
235--304 " brown clay mixed with sand.
304--326 " white clay.
325--395 " fine yellow sand.
395--401 " black sticky clay.
401--410 " yellow sand like sandstone.
410--420 "yellow sand will stand up to drill.
420--430 " white sandstone. " " " "
430--440 " " "
440--445 " " "

The well was completed in June I930. The casing is I0", being the Byers drive type and to date seems to be in good shape. However, 24½ feet of 8" perforated casing was put in the bottom of the well which takes the place of a screen. The water rises 200 feet and we seem to have plenty of it. The water is very high in mineral content and we have just installed an iron removal plant which has improved the quality very much.
Trusting this give you the desired information,

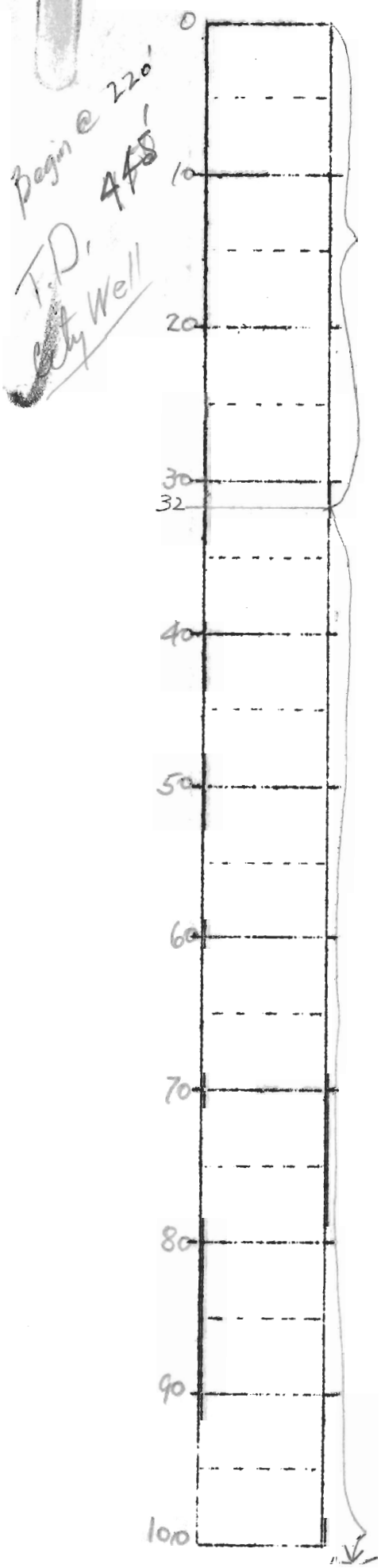
I remain, Very truly yours,

Troy W. Hughes.
City Clerk

Analysis of two wells 2-42' 445'

Name of Well Sutherland W-0110 Sheet No. 1

Depth Range 0-100 Scale: 1 inch=10 feet.



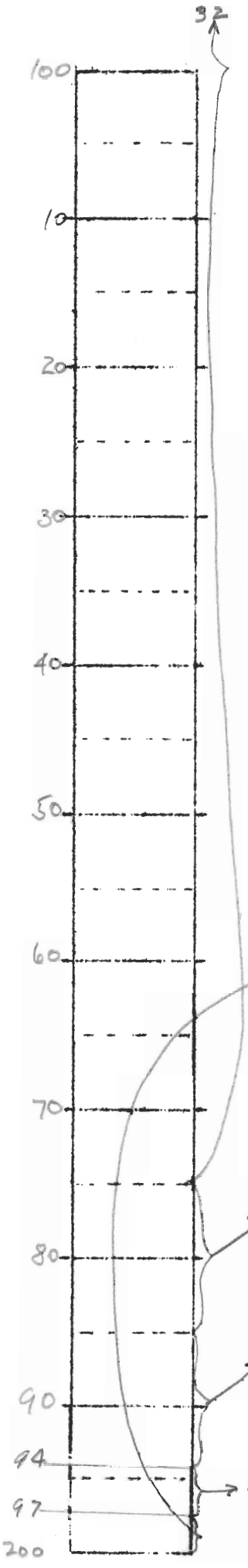
Begin @ 220'
T.D. 448'
City Well

Drift

Shale: 95-100% lt. to dk. yellow, quite hard, dense shale; included in shale 0-5% xstline calcite, biotite, chert fine (⅛-¼ m.m.) clear, A, Qtz. Sand. Dolo, pyrite and other opaque minerals present with fine fragments of igneous + meta rox.

Name of Well Sutherland W-01a Sheet No. 2

Depth Range 100 - 200 Scale: 1 inch=10 feet.



Shale: 95-100% dk gray, dense calcareous shale; the calcareous content comes from the included calcite, dolo, + ls about 1-2% of sample; 2-3% lt. gray, A. clear, large, 1-½ m.m. qtz grains, chert, iron oxide and other opaques present, with igneous + meta rox.

Drift

Sand + gravel: Similar to sample at 194 feet.

Drift.

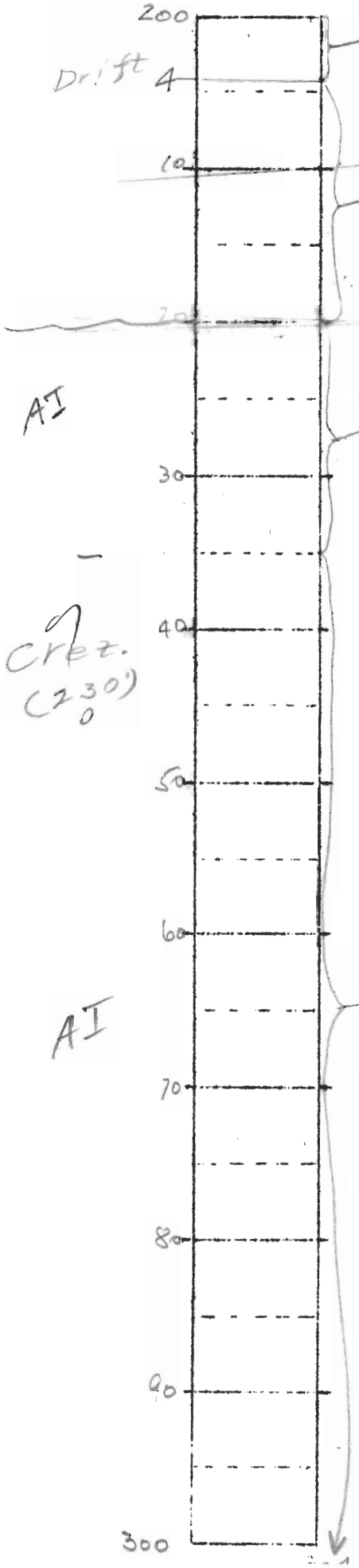
Sand + gravel: 60-70% lt gray, A to r, unassorted qtz sand. Size varies from ⅛ to 1mm; 30-40% gravel varying in size up to 4 m.m. dolo, ls, chert, fragments of igneous + meta. rox.

Sand, Gravel, cobble: Similar to sample at 175 feet but with large cobbles of igneous + meta rox.

Sand + gravel: 70-80% lt gray, A to C, clear unsorted qtz sand; major grade ½-2; 20-30% fragments up to gravel size fragments of sed, igneous, meta, rox + minerals.

Name of Well Sutherland W-0110 Sheet No. 3

Depth Range 200 - 300 Scale: 1 inch=10 feet.



Sand + Gravel: 50-60% fragments up to 4 m.m. of igneous meta + sed rock + minerals; diken rock pieces more common; 40-50% unsorted, A to r, qtz sand. Drift

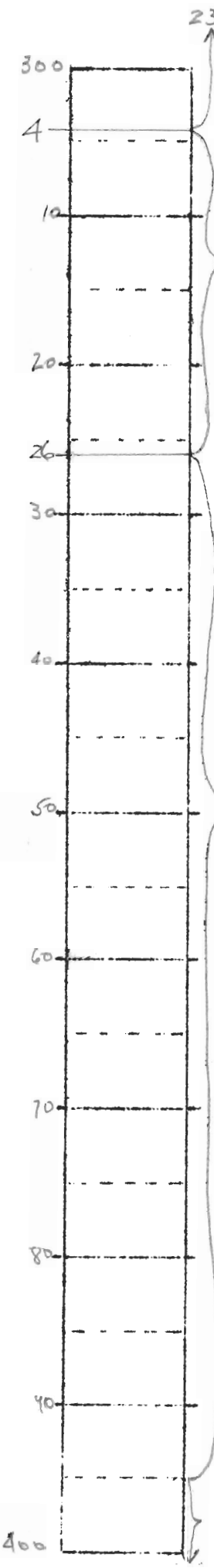
Shale: 60-70% dk gray, brown to black, non calcareous shale; 10-20% lt. gray clear, A to r, qtz sand; 5-10% gray to brown, xstline, ls, dolomite; 5-10% chert, granite, qtzite, calcite + opaques.

Shale: 60-70% dk gray to dk brown, shale; 10-20% lt. gray to dk gray, ls. Some may be bentonitic but swelling is not present; 10-20% dolomitic qtz, xstline qtz + opaque minerals also included in the shale. The lt. gray fragments above called ls under the petrographic mic. appear to be very fine qtz grains cemented by calcite. Some is present.

Shale: 80-90% dk gray to brown, dense shale; 10-20% gray ls, gray to reddish dolo, fine detrit. qtz, xstline qtz, fragments of drift + opaque material.

Name of Well Sutherland W-0110 Sheet No. 4

Depth Range 300 - 400' Scale: 1 inch=10 feet.



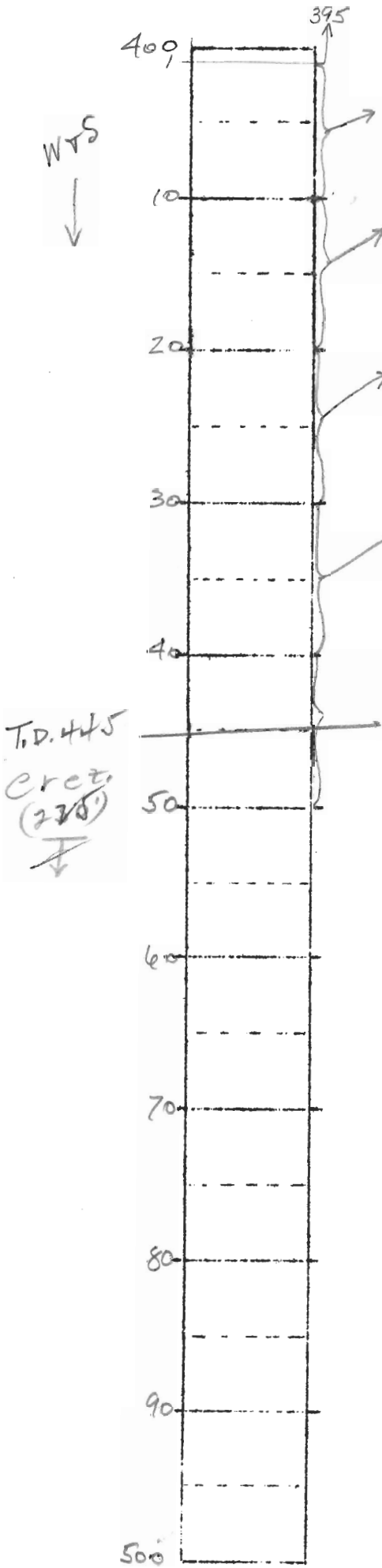
Silt: 98-100% A-a, lt gray, qtz silt with occassional larger fragments of rsltlme qtz; 0-2% lime, limestone, calcite, white mica, opaque minerals.

SS; 99-100% M, gray to yellow, a to r, clear + frosted qtz sand, major grade ¼-⅛, subs-grade ⅛-1/16; 0-1% white mica, rsltlme qtz, casing scale, cinders, shale, calcite + opaque minerals.

Silt; 100% M gray A to r qtz silt, subs. grade ⅛-1/16", white mica, rsltline qtz, opaque minerals present.

Name of Well Sutherland W-0110 Sheet No. 5

Depth Range 400 - 500 Scale: 1 inch=10 feet.



SS; 99-100% lt. gray to yellow, A to C, qtz sand. Major gde. ¼-⅛. Subs. grade ⅛-1/16, 0-1% white mica, xsline qtz, drift fragments + opaque minerals.

SS; 99-100% lt gray to slty. yellow, A to C clear, Some frosted qtz sand. Major grade ¼-⅛. Subs. grade ⅛-1/16; 0-1% xsline qtz, ls, shale, iron scale, opaque minerals.

SS; 99-100% lt gray, slightly yellow, A to C, clear qtz sand; Major grade ¼-⅛, Subs. grade ⅛-1/16; 0-1% white mica xsline qtz, ls, shale, iron oxides + opaque minerals

SS: Similar to sample at 420 feet.

SS: 99-100% lt gray slightly yellow, A to C, clear qtz sand Major grade ¼-⅛ Subs. grade ⅛-1/16; 0-1% shale, xsline qtz, white mica & opaque minerals.

Deep Wells Vic. of Sutherland

Obrien Co

CE 1552

Section C. M. & St. P. RR Well at Sanborn

	Thick	Depth	
Clay yellow	75'	75'	
Clay blue	125	200	
Shale Blue	160	360	
Shale Blue & Green with strata of Ls	200	560	
SS, soft, wh, with some sh	155	715	creta
Sh, gray, streaks of rock	50	765	?
SS, white	45	810	
Sh, blue & green, mixed with SS	200	1010	
Sh, green & white	246	1256	

Water from 494, 503, 633, & 857', cap ac. 100 gpm
Head 350' below curt.
No spls. - Log from memory of driller

Clay Co - No data

Buena Vista Co

11 water anal. composite sheet shows a 1465' Well at Alta drawing from Dakota, St Pet, calc. Hard. 595 - No other information in file no data sheet or Water Anal. sheet.

Cherokee Co

1 State Hospital Well 1070' - see Folder
2 Marcus - St. Pet & Jordan 1300' from W. Anal. Folder

	Curb Elev.	Total Depth	Depth To SS (St. Pet.?)	Sea Lev. Elev. St. Pet.
Sanborn R.R. Well O'brien Co.	1552'	1256	765'	+ 787'
Alta Buena Vista Co.	1519	1465'	?(1415 4 st. Pet. 50' Thick)	
Cherokee Cherokee Co	1338	10	1015	+ 323'
Marcus Well Cherokee Co.		1380'	?	
Sutherland O'brian				

Sutherland, OBrien Co. May 4, 1938

Telephone conversation with Mayor Reiste of Sutherland & "Red" Carson drilling for Rasmussen Well Co., re deepening 444' well at Sutherland

Log:

See old log

From Mr. Carson

Yellow sandstone		444 - 470
Blue sh with traces of ss.	30	470 - 500
Very coarse yellow ss.	30	500 - 530
White shale	1	530 - 531
White ss		531 - 560 not thru

Casing to 506

Note: At request of Mayor Reiste I visited Sutherland Mar. 19, 1938 and discussed their problem. Water at that time was very hard & town wanted to know what could be done. Believing production at 444' to be from U. Dakota ss I suggested drilling deeper to L. Dakota ss.

Today, suggested that drilling be carried to bottom of white ss beginning at 531. That casing be carried to 531' & that annular space between 10" & 8" casing be grouted with neat cement to above level of upper SWL. ie. 70'

H.G.H.

Mineral Analysis Chart For Sutherland Well W-0110

O'Brien Co. Talley

	Kind of Rock	Interval	Fluorite	Apatite	Chitin	Barite	Anhydrite	Celestite	Pyrite	Sphalerite	Zoned Zircon	Unzoned Zircon	Tourmaline: Green	Tourmaline: Brown	Tourmaline: Blue	Garnet	Leucoxene	Anatase	Titanite	Rutile	Ilmenite	Magnetite	Hematite	Limonite	Glauconite	Hornblende	Amphibole	Epidote	Andalusite	Staurolite	Muscovite	Allanite	Anhydrite	Chert	Clay Aggregate	Feldspar	Glauconite	Gypsum	Muscovite	Quartz
Cretaceous	Shale	220-235				C	C					C	R			C	R					C	R		R	C	C							F					C
	Sls.	235-326							R		R	C	R	X		R	C		R	X	A					C	C	X	X					A	C			R	A
	Ss.	326-395							X			C	R			X	C	X		X	R	F						X		X					X				F
	Sls.	395-401										C	C			R	A			X	A	R						R							F				A
	Ss.	401-450		X					X		R	C	R	R		R	A			R	C	A						X		R	X	X				C			R	E

Sheet No. .... Name of Well Sutherland .... Survey No. W-0110

Location .... Date Drilled .... Analyst Schuldt

Depth	Sample	Description
400		
10		
20		
30		
40		
	445'	ss, buff, med. gr. (Maj Gr. ½-¼ mm, PS ¼-⅛ mm), Ang to subang., clear to frosted & 50% slightly iron coated on surface, Well sorted; 5% lg. frag. blk. Mn oxide; sand) 90% Qz.; rare flakes of mica.
50	450'	ss, buff, sim to ss. sple. 455-450' in color, grain size, sorting, & approx. comp.
	455'	ss, buff,
60	460'	ss, buff,
	465'	ss, buff, med. (M.G. ½-¼ mm, PS ¼-⅛, 2nd Subs ⅛-1/16 & 1-½ mm), ang. to subang., clear to frosted; 80% of gr. slightly coated with iron oxide., sorting poor, some silt present.; 10% br. drab, fine xline dol, non efferv.
70	470'	sh, medgray, soft (as well mud), silty & micaceous, non calc., structureless
	475'	sh (" " " & frag.
80	480'	sh
	485'	sh 40% ss, lt. gray, v. fine gr. (M.G. ⅛-1/16 mm, PS. 1/16-1/32 & ¼-⅛ mm) well sorted, ang., micac., silty. 60%
90	490'	ss, pale buff, v fine gr. (MG ⅛-1/16 mm, PSs 1/16-1/32 & ¼-⅛ mm) well sorted, ang., micac., v. slightly iron stained, 75%; 25% lt. gray sh. (cave); 3 frag. abraded & pale buff sh. with ½-1 mm shell drk. br. Fe. oxide, hard, which peels off.
	495'	ss, pale buff, v. fine & med., (M.G. ⅛-1/16 mm, PS. ½-¼ mm), ang to subang., clear to frosted, poorly sorted, v. slightly iron stained. 5% caved gray sh.
500	500'	

Sheet No.................... Name of Well.. Survey No....................

Location .... Date Drilled.................. Analyst..........................

Depth	Description
500 (500′)	ss, V. pale buff, crse (Maj. Gr. 1-½ mm, Prin Sub ¼-⅛ mm), max. gr. size 2 mm. Ang. to subang., clear to slightly frosted, V. poorly sorted; 1 lg. frag. of pyrite; sev. lg. frag. coalifying. wood.
505′	ss, sim. to sple 500-505 but with prin sub. gr. ½-¼ mm, & with v. much dissem. pyrite & 5% gray sh; 10% med. gr., v. ang., well sorted, cemented gray ss.; occas. granules lg. mat.
10 (510′)	ss, crse (M.G. 1-½, P.S. ½-¼ mm) Ang to subang, clear to slightly frosted, granules up to 3 mm common, sorting V. poor.
515′	ss, pale buff, med. gr. (M.G. ½-¼ mm, P.S. 1-½ mm) Ang. to subang., slightly frosted, fair sorting
20 (520′)	ss, V. crse. to fine, M.g. 1-½, P.S. 2-1 & ½-¼ mm, subang., V. poorly sorted, sev. frag. pyritized wood; 5% V. pale buff silt to sh. cem. v. poorly sorted ss., crse.
525′	ss, V. pale buff, fine gr (MG. ¼-⅛, P.S. ½-¼), Ang., Well sorted, clear; 7% caved crse gr. & granules.
30 (530′)	~~sh, lt. gray, silty, sandy, micac, structureless, non calc.~~ ss, fine gr. (M.G. ¼-⅛ mm, P.S. ½-¼ mm), clear, Ang., Well sorted, micac.
35	ss (") occas granules
40	ss) micac.
45	ss rare qz granules
50	ss, P.S. ⅛-1/16 mm)
55	
60	
65	
70	
75	
80	
85	
90	
95	
00	

Sheet No. 5a Name of Well. Sutherland City Well No 2 Survey No. W-0110

Location NW NE SW, Sec. 7, T94N, R39W, Waterman Twp Date Drilled Deepened 1938 (1930) Analyst Hershey (May 6, 1938)

Curb elev = ~~1467~~ See G.O.C Elev.

00

10

Note: This well, drilled in 1930, was deepened below 445' in April & May 1938.

20

30

40

See Sheet No. 5

445 Sandstone - light yellow; angular to curvilinear quartz; clear & stained yellow, with some few pink grains; maj. gr. 1/2 - 1/4 mm, prin. subs. 1/4 - 1/8, 1 - 1/2 mm. 1% white & gray chert with trace of buff ls. & igneous material. Much casing scale.

50

450 Sandstone - light yellow; angular to curvilinear quartz chiefly; clear & stained; maj. gr. 1/2 - 1/4 mm.; prin. subs 1/4 - 1/8. 1% white & gray chert etc Much casing scale. Similar to 445 - 450.

Out → Sandstone - light gray, angular to curv., clear qtz: 99%; maj. gr 1/8 - 1/16 mm., prin subs. 1/16 - 1/32 1/4 - 1/8 mm., some cave. White mica & fresh pyrite & other extr. material

455 Sandstone - light yellow, angular to curvilinear clear stained qtz. chiefly; maj. gr. 1/2 - 1/4 mm.; prin. subs 1/4 - 1/8 mm. 1% white & gray chert, ls. etc Much casing scale.

60

460 Sandstone - light yellow, angular to curvilinear clear & stained qtz. 99%; maj gr. 1/2 - 1/4 mm., prin subs 1/4 - 1/8 mm.; 1% ± White & gray chert, ls etc. Much casing scale. Similar to 445' - 460'

465 Sandstone 85-90% - light yellow, angular to curvilinear clear to stained quartz maj. gr. 1/2 - 1/4 mm., prin. subs 1/4 - 1/8 mm. Similar to 445 - 465

Dolomite 10-15% - light brown, very fine grained, carrying rounded qtz grains in part & dark material(?), cherty(?). Much casing scale

70

470 Siltstone - light gray, clayey, sandy, high in white mica, non-calcareous. No structure seen. Some casing scale. No dolomite seen.

475 Siltstone & Shale - light gray, non-calcareous, micaceous, faint trace of structure in one fragment.

80

480 Shale - light gray, non-calcareous, silty, micaceous.

485 Shale - light gray, non-calcareous, silty, micaceous 60%

? 40% Sandstone - light gray, angular to curvilinear qtz. chiefly; maj gr 1/8 - 1/16 mm., prin subs. 1/16 - 1/32 + 1/4 - 1/8 mm. Few larger fragments.

90

490 Sandstone - light gray, angular to curvelinear clear qtz. chiefly, maj gr 1/8 - 1/16 prin. subs. 1/16 - 1/32, 1/4 - 1/8 mm., micaceous. Iron shell concretion filled with gray, unctuous, non-calc. bentonite?; several fragments of medium gray, soft plastic, unctuous, material

495 Sandstone - light gray, angular to curvilinear clear qtz. chiefly; maj. gr 1/2 - 1/16 prin subs 1/16 - 1/32; 1/4 - 1/8 mm, micaceous. 50%

Sandstone - light yellow, ang. to curv., maj. gr. 1/2 - 1/4 chiefly qtz.

Shale - gray, micaceous, silty

00

500

Sheet No. 6 Name of Well Sutherland City Well No. 2 Survey No. W-0110

Location ..... Date Drilled ..... Analyst Hershey (May 6, 1958)

Curb elev. = ~~1467~~

00	500	Sandstone - light gray to buff, angular to curvilinear clear & stained qtz., maj. gr 1-½ mm., prin subs. ½-¼, 2-1 mm. ∠1% soft highly carbonaceous material. Large fragment of pyrite cementing ss.; some pyrite cubes. Some white & light gray chert, ls., igneous material, feldspar?
	505	Sandstone - gray-buff, angular to curvilinear clear & stained qtz. chiefly; maj gr. 1-½ mm prin subs ½-¼, 2-1, ¼-⅛ mm. 1%± White & gray chert, ls., igneous material, some cave material, trace of pyrite. Trace of fossil.
10	510	
	515	
20	520	
	525	
30	530	
	535	
40	540	
	545	
50	550	
	555	
60	560	
70		
80		
90		
00		