U N I V E R S I T Y O F T E X A S
BUREAU OF ECONOMIC GEOLOGY
Austin 12, Texas

Mimeograph Circular No. 23
May 1929

The mimeograph circulars issued from the Bureau of Economic Geology contain the record of cores and cuttings from wells received and described in the Bureau. In some instances drillers logs and other data are given, although it is usually impracticable to include logs of all wells, the logs given being selected as representative of the county or area to which the circular relates. The elevations given are for the most part those reported with the drillers log. In some instances the elevation given, as indicated, is that obtained from the location of the well on the topographic map. In all cases the elevation is to be regarded as approximate only.

E. H. Sellards

SOME WELL RECORDS IN NOLAN COUNTY

Buckner 1, Nolan Oil and Gas Co.

Located in center of the NW ¼ of Section 34, Blk. 21, T. & P. R.R. Reservation, on Bitter Creek, 9 miles SE of Sweetwater, elevation 2155 feet.

Drillers Log

red rock	560	red rock	1190
sand, water	570	blue lime	1211
red rock	620	shale, gray	1230
sand, water	635	blue lime	1245
red rock	660	blue shale	1295
sand, water	686	lime	1300
shale, blue	690	gray slate	1305
red rock and blue shale	885	lime	1308
shell lime	888	red rock	1355
red rock	895	lime	1363
shell lime	897	slate	1367
red rock	920	lime	1375
lime	925	blue shale	1405
red rock	953	shell	1407
lime	954	blue shale	1420
red rock	967	gray lime	1430
red rock and shells	980	dark shale	1435
shell and gravel	1006	red rock	1460
red rock	1010	red sand	1468
sandy shale	1012	red rock	1573
red rock	1052	blue shale	1600
shell lime	1057	lime	1603
gray shale	1062	blue shale	1610
red rock	1108	brown shale	1632
shell lime	1110	blue shale	1642
lime	1650	slate, shells, black water	3310
blue shale	1654	gray lime	3328
lime	1666	blue shale	3333
blue shale	1667	lime, white, water	3354
shell	1668	blue shale	3356
blue shale	1706	blue lime	3358
lime	1708	brown shale	3360

	Depth in Ft. to:		Depth in Ft. to:
blue shale	1722	blue lime	3370
lime	1733	black shale	3371
blue shale	1740	lime and shale	3385
lime	1742	lime, gray, turning black	3412
blue shale	1810	lime, black	3415
shale, lime shells	1825	gray shale	3420
lime	1840	lime, streaked with black slate	3434
slate, dark brown	1860	black lime	3454
gray lime	1887	black slate	3468
shale and lime	1935	hard, blue lime	3474
slate, black	1955	soft, blue lime	3479
lime	1980	dark lime	3485
slate and lime shell	2316	lime, gray, broken slate	3510
sand (Canyon)	2450	blue slate	3515
lime, black, some slate	2612	gray lime	3530
gray lime	2618	black slate	3534
black lime	2655	gray lime	3555
gray lime	2700	lime turning to near black	3571
lime, sandy, water	2736	lime turning sandy	
gray lime	2800		
sandy lime	2840	Remainder of log furnished by	
sand, water	2908	Earl Vandale as follows:	
gray lime	2915	boulders	3570
blue shale	2926	gray lime	3615
gray lime, water	3041	gray lime, water	3625
blue shale	3042	black lime	3634
lime	3050	gray lime, water	3673
blue shale	3066	blue shale	3675
blue lime	3100	brown lime	3693
lime, dark (water 3225-36)	3236	T.D.	3693
slate	3260		
black lime	3272		

NOTE: This well also entered as Montgomery No. 1

Description of samples by M. T. Kniker and E. B. Stiles; submitted by C. W. Clark, 1920.

	Depth in Ft.
Red quartz sand and some red clay or silt.	675-680
Small lump of white gypsum with some reddish and greenish gray clay or shale.	980-985
Bluish and brownish gray shale.	985-990
Gray and red shale and gray fibrous gypsum.	1007-1010
Clear fibrous and white anhydrite with some red and bluish gray shale.	1052-1057
A few fragments of gray shale and of light blue very fine textured shale. No fossils seen.	1108-1110

	Depth in Ft.
Red slightly calcareous shale and white and brownish gray anhydrite of very fine texture.	1185-1205
Gray and dark gray anhydrite with some gray slightly calcareous shale.	1205-1211
Light gray dolomite and bluish gray shale.	1403-1410
Bluish gray slightly dolomitic shale, gray dolomitic and gray and white anhydrite.	1420-25
Mostly red shale with some gray shale and some dove colored limestone. Ostracods noted.	1480
Greenish gray non-calcareous fine textured shale with a small amount of gray limestone.	1665-1670
Greenish gray clay of fine texture and some impure gray limestone. In fine washed material two tests of a textularia and a small coiled globose test resembling a very small anomalina (?).	1869
Gray organic limestone with some shale.	2060
Mainly organic fragments with some small pieces of gray limestone. Many fragments of brachiopod spines and shells and some gray limestone. In thin matrix with imbedded curving tubular bodies about $\frac{1}{4}$ mm. in diameter, and some thin valves, probably of ostracods. The cavities of the tubes are frequently filled with clear crystalline calcite. Fossils contained were determined by Dr. Beede as follows: Rhombopora lepidodendroides, fragments of shell, brachial valve and spine, large Productus, fragments relatively small sea urchin spine, fragment large, very finely striated sea urchin spine, shell of Euomphalus cotilloides.	2100
Gray organic limestone.	2105-14
Gray organic limestone which is slightly dolomitic (?) in some fragments.	2120
Gray clay, gray limestone, and a few grains of pyrite. Several crinoid fragments, a few sponge spicules, a bryozoan fragment, and a smooth ostracod shell were found in washed material. H.T.K.	2173
Gray organic limestone like that from sample at 2120.	2216

(Remaining descriptions by H. T. Kniker unless otherwise indicated.)

Fine gray calcareous shale, gray shaly limestone, and anhydrite.	2320
Fine gray calcareous shale, anhydrite, and gray limestone containing anhydrite.	2328
Anhydrite, hard fine gray shale, and some gray limestone. No fossils.	2340

	Depth in Ft.
Gray limestone, some fine gray shale, and a few fragments of anhydrite.	2433-65
Light gray and gray limestone, anhydrite, and some gray shale. A few fragments of crinoid joints were found in washed material.	2465-77
Greenish gray and gray slightly calcareous shale, the latter containing a few minute mica scales, and coaly shreds; and very light gray limestone.	2524-28
Light gray and darker gray fossiliferous limestone, some clay, and a few grains of anhydrite.	2538-50
Light gray and darker gray fossiliferous limestone. In thin section there were seen a few Productus spines, crinoid stems, and other organic remains.	2635-55
Light gray and darker gray fossiliferous limestone. Fossils: fragments of crinoid stems (abundant), Productus spines, and a few ostracods.	2655-2665
Light gray and dark gray fossiliferous limestone, and a few angular sand grains and pyrite fragments.	2665-2675
Very light gray and dark gray limestone, some hard, dark gray slightly calcareous shale, and a few grains of white chert.	2675-2685
Light gray and dark gray limestone, some white and gray chert, and a few grains of dark gray calcareous shale.	2685-2695
Fragments of chert or siliceous rock in which are cases of crinoid stone (?) in white chert. In one thin section of this material many minute rhombic crystals are seen. There are also fragments of a gray limestone. Fossils determined by Dr. Beede are: Spirifer or Spiriferina, long solid axis Fusulina, large round spine (smooth) sea urchin, ... , fragments of Rhynchonelliform brachiopod, fragments large sea urchin plate or crinoid plate. E.B.S.	2700
Light gray and dark gray limestone, gray chert, and a few quartz grains and fragments of dark gray shale and gypsum.	2700-2706
Gray and some light gray limestone, gray chert, and a few grains of gypsum.	2706-2718
Gray and light gray limestone, a few fragments of gray shale, white chert and gypsum, and a few sand grains. A number of crinoid fragments and a few Palechinid spines noted.	2720-2730
Gray and white limestone, gray chert, a few fragments of dark gray shale, and a few quartz crystals. Crinoid joints, fragments of a few Ostracod tests and Palechinid spines were noted in washed mat.	2730-2742
Dark gray and light gray limestone, gray shale, and a few fragments of white chert and gypsum.	2760

	Depth in Ft.
Light gray and gray limestone, gray shale, and a few fragments of gypsum.	2800
Light gray limestone and a few fragments of light gray chert.	2835-2840
Light gray limestone, white and gray chert, and a few quartz grains. A few crinoid fragments and bryozoan fragments are present.	2840-2850
Very light gray limestone, white chert, and a few quartz grains.	2860-2870
Bluish gray marl containing organic fragments. In finest washed material many rhombic crystals were noted. No foraminifera were seen. Fossils determined by Dr. Beede were: Round, rather thick-jointed crinoid stem, very slender smooth sea urchin spine (?), very slender Rhombopora with very coarse pattern, hexagonal sea urchin plate, perfect, Fenestella (?) sp., Rhynechelliform brachiopod. E.B.S.	2900
Gray limestone, gray shale, white chert, and a few fragments of pyrite. Fossils: crinoid fragments, Rhombopora lepidodendroides, Rhombopora sp., and a Fusulina shell.	2912-2913
Light gray limestone and white and gray chert. The chert contains big white siliceous sponge spicules.	2984-2990
Like sample from 2984-2990.	2990-3000
Gray shale, and white and gray limestone. Crinoid fragments and a few smooth ostracod shells present.	3000-3006
Gray shale, white limestone, white chert, and a few grains of pyrite. No fossils were noted.	3050-3055
Gray clay, some white sandy limestone, and a few grains of pyrite and angular quartz sand. Several crinoid fragments and a smooth ostracod shell.	3055-3060
White limestone, and a few grains of pyrite, and a few fragments of gray clay and gray chert.	3060-3065
White and light gray limestone, and a few fragments of gray clay, and a few grains of pyrite.	3065-3070
White and light gray limestone, some gray and black shale, and some quartz sand. Fossils: a few crinoid fragments and sponge spicules and two smooth ostracod shells.	3075-3085
White and light gray limestone, and some gray clay, quartz sand, pyrite, and white chert. Fossils: crinoid fragments and a few smooth ostracod shells and Fusulinas.	3090-3095
White and light gray limestone, gray clay, and some white chert. Several crinoid fragments and a few smooth ostracod shells.	3095-3100
Very light gray and darker gray limestone and some gray shale and white chert.	3100-3105

	Depth in Ft.
Very light gray to darker gray limestone containing pyrite, gray shale, and a few fragments of white chert and grains of round sand. Crinoid joints and Fusulina fragments are present.	3110-3120
Gray shale, very light gray limestone containing pyrite, and white chert. Crinoid fragments and a few Palechinid spines are present.	3120-3125
White to light gray limestone, gray shale, and white chert. A few fragments of crinoid joints and several Fusulinas were noted.	3140-3145
Gray limestone, white and light gray chert, and a few fragments of coal. Several crinoid fragments.	3150-3155
Gray limestone and a few fragments of white chert. A sponge spicule was noted in fine washed material.	3170-3172
Gray limestone, gray clay, and a few grains of pyrite. Several sponge spicules and a smooth ostracod shell were seen.	3172-3173
Gray shale, light gray limestone, white chert, and a few grains of round sand. A few fragments of crinoid joints were noted.	3175-3181
Gray slightly calcareous shale containing a few scattered minute mica scales and coaly shreds; some gray limestone; and a few fragments of white chert.	3181-3187
Dark gray limestone. In thin section this limestone is seen to be granular and finely crystalline in texture and shows straight light streaks reminding of sponge spicules. Some organic fragments were seen none of which could be identified. A single sponge spicule was noted in washed material. E.B.S.	3187-3190
Gray limestone, gray shale, and a few grains of worn sand.	3235-3245
Gray calcareous silt or silty limestone containing some poorly preserved organic fragments. No fossils could be identified. E.B.S.	3237
Light gray marl containing some silt. A reticulate bryozoan noted. E.B.S.	3263
Gray limestone, containing pyrite, gray shale, and a few fragments of white limestone. A few fragments of partly silicified calcite in comb structure were noted. Among fossils noted were Fusulina, Nodosaria, Textularia, cf. gibbosa D'Orb., bryozoan fragments, crinoid tissue, Valvulina bulloides and Endothyra. Very strong fumes of ammonia and a faint odor of sulphur were obtained.	3285-3300
Gray calcareous shale, and some gray and white limestone. One large sponge spicule was the only fossil noted.	3296-3300
Very light gray and gray limestone, and dark gray shale. The limestone contains a few minute pyrite concretions.	3300-3305
Light gray limestone of granular texture. E.B.S.	3300-3305

Depth in Ft.

Dark shale with some limestone. Fragments of a bryozoan, a Productus spine, and of a crinoid stem noted in washed material. Bryozoan, ill-defined foraminifera and an ostracod (?) were noted. Considerable pyrite present. E.B.S. 3305-3315

Yellowish white limestone with a small amount of dark shale. In thin section fragments of the limestone show organic outlines in a finely crystalline matrix. E.B.S. 3315-3320

N.B. In nearly all of the described samples above 2315 feet the quantity of material submitted was insufficient to allow fume tests to be made. E.B.S.

Dark gray shale and white calcite. Considerable pyrite present. Some of the calcite seems to be from casts in organic bodies. Fossil fragments present but not identified. One resembles a hydre-coral in texture. E.B.S. 3315-3335

Gray shale, and gray limestone containing pyrite. A few crinoid fragments were seen. 3355

Gray shale, dark maroon colored shale and gray limestone containing pyrite, and white limestone. In thin section the white limestone is seen to be for the most part organic oolitic fragmental in texture. 3385-3390

Two fossils: a Rhipidomella and a fragment of a crinoid stem. 3400-3600

Gray limestone, a few fragments of shale, and a few sand grains. No fossils were seen. 3400-3600

Very light gray limestone containing some pyrite, a few fragments of gray shale and light gray chert, and a few grains of rounded polished sand. 3401-3406

Gray shale and light gray limestone. Fossils: crinoid fragments (abundant), Rhombopora lepidodendroides, Rhombopora (?) cf. tenuiramа, a few other bryozoan fragments, several sponge spicules, two shells of Valvulina decurrens, and an ostracod shell. Strong fumes of ammonia were obtained. 3402-3407

Gray limestone, gray shale and some very light gray limestone. Fossils are abundant. 3430-3437

Gray fossiliferous limestone and a few fragments of gray shale. The shale breaks into thin slender rectangular fragments. 3457-3463

Fragments of crinoid stems. A few pieces of light gray limestone and gray shale are present. In thin section the limestone is seen to be fine-grained and contains organic fragments. 3468-3474

Light gray limestone containing numerous crinoid fragments. A Lingula in shale is present. 3474-3479

Depth in Ft.

Gray slightly calcareous shale and a few fragments of light gray limestone. Crinoid fragments and several pieces of Productus shells and spines, a Rhombopora, and a few smooth ostracods were noted. 3479-3481

Gray slightly calcareous shale and a few fragments of very light gray limestone. A few crinoid fragments and several Productus spines were noted. Very strong ammonia fumes in closed tube. 3493-3498

Mostly fossils in gray limestone. A few fragments of gray shale are present. 3537-3542

Gray and dark gray limestone and some dark gray shale. Crinoid fragments are abundant in sample. Some bryozoan fragments, such as found in 3551-3557 feet and a fragment of a cylindrical zoarium, and a Fusulina were also seen. Strong ammonia fumes in closed tube. 3545-3550

Gray fossiliferous limestone containing a few crystals of pyrite. In thin section were noted crinoid tissue two Textularias cf. gibbosa D'Orb., a few ostracod valves, a few broyozoan fragments, and a Nodosaria. 3551-3557

Rock like that from 3563-69 feet. A single fragment of a large sponge spicule was noted. 3557-3563

Dark gray shale, somewhat calcareous; green shale of fine texture, and a fragment of greenish gray limestone of compact texture. Thin plates of coal occur in the dark shale. Enough bituminous material to make a slight deposit; enough sulphur to form a deep yellow deposit, and very strong fumes of ammonia in closed tube. 3563-3569

Gray granular limestone about one-third of which consists of Fusulinas. The matrix is dark, while the Fusulinas are clear white. No other fossils were noted in washed material. 3584-3585

Gray limestone and dark almost black shale with a few fragments of clear bituminous coal. 3586-3589

Calcareous black shale containing many fossils, among which were noted crinoid joints; some very large calcareous sponge spicules. 3587

Mainly limestone, of two kinds. Part of the fragments consist of compact grayish white limestone, apparently unfossiliferous. The other limestone is gray. 3606-3612

Mostly iron or steel from the tools or the casing. When these are taken up by the magnet, there remain a few small limestone fragments, a few well-worn and etched sand grains, pieces of sandstone and a few fragments of dark gray shale. 3630

Kuteman 1, Wichita Nolan Oil Co.

Located on Section 79, Blk. 4, T. & P. Survey, about 18 miles S. and W. of Sweetwater. Elevation 2662 B by Frost from Sweetwater.

Drillers Log

	Depth in Ft.		Depth in Ft.
Comanchean Cretaceous (cuttings not reported		red rock	1519
white lime	180	gray lime	1525
yellow sand	190	red rock	1555
white gravel	230	gray lime	1565
red rock	245	red rock	1640
yellow sand	275	white lime	1645
red rock	315	red rock	1665
blue shale	370	lime shells & black slate	1715
red rock	380	red rock	1725
white lime	422	white lime & blue slate	1750
red rock	430	white lime	1790
dark with streaks of blue	564	red rock	1795
white sand	572	black slate	1810
blue shale	579	gray lime	1915
dark sandy shale	582	red rock and shells	1925
limey shale	722	red rock--some shells	1980
gyp and hard white shale	780	gray lime	2010
red sandy shale	800	blue slate and shells	2030
gray flint	810	gray lime	2050
red shale	814	blue slate & light shells	2175
white water sand	840	gray lime	2255
red sandy shale	848	red rock	2350
red shale	865	white slate and shells	2430
hard blue shale	990	gray lime	2750
red clay	993	dead lime and water	3050
blue shale	1000	light gray lime & water	3165
red shale	1002	white lime	3175
blue shale	1042	gray lime	3270
hard dark red shale	1045	black slate	3275
blue shale	1066	white lime & water, 1 blr.	3300
red shale	1070	white lime, water increasing ½ bailer per hour	3490
gray flint shale	1096	white lime & water (hole	
red shelly shale	1106	full of water) at 3520'	
lime shale	1195	"starking" sulphur water	3540
red rock	1200	gray lime	3550
lime shell	1230	white lime and water	3600
red rock	1237	gray lime	3660
shell water	1250	white lime and water	3665
red rock	1355	gray lime	3700
blue slate	1370	(Revised measure increases	
red rock	1400	depth 15'--showing it to	
gray lime	1430	be 3715')	
red rock	1455	brown oil sand (oil & gas)	3735
gray lime	1470		
	1480		

	Depth in Ft.
gray sandy lime (bituminous) water shut off, 350' left in hole	3745
gray sandy lime--lighter	3750
gray sandy lime--crystalline	3756
gray sandy lime--water rising slowly	3780
gray sandy lime--hole full of water	3785
the same--turning darker--some carbon formation 2000' of water	3815
blue slate and shells	3820
gray sandy lime	3862
blue slate, some lime & shells (5-3/16" casing set at 3939')	3965
light brown sand (water filling hole)	4000
dark brown sand (oil & gas)	4017
hard sandy lime (oil & gas) (5-3/16" casing reset at 4031')	4023
Hard sandy lime (oil show)	4038
blue slate and some lime & shells	4049
white sand (water coming in)	4065
dark blue shale--some shells (5-3/16" casing reset at 4089')	4089
very dark gray lime	4105
black shale and shells	4112
black shale and shells--some lime	4120
pure black shale	4135
black shale--some lime streaks	4170
black shale--more lime	4194
very hard gray lime (water leaking in either thru or under casing)	4196
black shale--some lime and sandstone	4248
very hard black or very dark lime. 800' water in hole --caving badly.	4249
gray lime (4-3/16" casing reset at 4258)	4258
gray lime, some shale	4285
black shale and lime shells (water at 4446-7)	4447
dark lime, some shale	4460
gray lime, hard (5-3/16" casing reset at 4467)	4467
dark gray lime	4530
black shale	4537
sandy lime and shale (water at 4544)	4541
sandy lime and shale	4550
no change	4610
(discontinued drilling at	4610

Description of samples by E. B. Stiles; submitted by W. H. Dunning Jr. Some descriptions by E. B. Stiles and H. T. Kniker.

Depth in Ft.

Gray and dark gray organic limestone, partially dolomitic. In thin section the limestone is seen to be organic fragmental with intervening areas of crystalline material. Crinoid tissue and other organic material is shown. In washed material Ostracod valves, Productus spines and Palechinid spines were identified. In closed tube ammonia fumes and bituminous fumes were given off. 2900-3000, 3050-3170, 3170-3180, 3180-3275

Dark gray limestone containing considerable banded chalcedony. 3275-3330, 3330-3360

Gray limestone and bluish gray shale. The limestone is granular and crystalline with fragments of organic material. 3360-3387

Gray limestone, partly crystalline and partly granular. 3387-3397, 3397-3415, 3415-3450

Gray limestone, mostly granular in texture and containing many organic fragments. 3480-3485, 3495-3500, 3530-3540, 3540-3550, 3550-3590, 3590-3620, 3630-3640

Brownish gray limestone partly granular and partly fine crystalline. 3655-3660

Depth in Ft.

Gray mostly granular and fine crystalline limestone. Some chert present, fragments of which, in thin section show organic remains. A fragment thought to be of fish bone (?) was seen in section. In another a Nodosaria was seen. In washed material Ostracod cases, Echinoid spines and Productus spines were seen. In closed tube very faint fumes of ammonia and faint fumes of bitumen were given off. 3660-3670

Gray peculiarly mottled chert; some limestone. 3670-75, 3675-3685, 3720-3730, 3720-3720

Very light gray limestone being very finely ground. 3725

Dark gray cherty limestone. 3728, 3735, 3745

Light gray and white fossiliferous limestone and some gray chert. 3750,3756

Very light gray, practically white, limestone, partly crystalline 3765

Gray organic fragmental limestone which contains some chert. 3775

Light gray granular limestone containing considerable crystalline dolomite. 3790, 3798

Brownish gray granular chert, and some gray limestone. 3804, 3810, 3815

Gray limestone containing chert, some clear calcite, and some pyrite. 3813, 3820

Very light gray fossiliferous limestone, partly granular and partly crystalline in texture, containing chert. A minute Fusulina was noted in washed material. 3830

Very light gray and gray cherty limestone. 3835, 3840, 3850, 3857

Gray and light gray limestone containing some chert and a few crystals of pyrite. 3865

An organic fragmental limestone. 3880

Gray and light gray limestone containing some chert and a few crystals of pyrite. Some gray, very slightly calcareous shale. 3888, 3895

Gray and light gray limestone, mostly fine grained but containing some crystalline areas, and dark gray calcareous shale. 3900, 3905

Gray limestone, gray calcareous shale, and white limestone. 3920

Organic fragmental limestone and gray shale. A fragment of crinoid joint was noted in washed material. In thin section the shale is seen to contain minute crystals, probably of calcite. 3930

Gray and light gray shale and limestone containing pyrite. Note: 5-3/16 inch casing set at 3945' 3945

	Depth in Ft.
Dark gray shale, grayish brown fine grained limestone and some gray granular limestone.	3950
Light gray limestone slightly stained by iron rust.	3955
Organic fragmental limestone. Fusulina and a Nodosaria.	3960
Gray limestone containing considerable crystalline material. 3965, 3975,	3985
Gray, somewhat mottled textured chert.	3998
Gray granular limestone and chert. 4000, 4004, 4008, 4012, 4018, 4023,	4051
No indication of a change in formation was seen in these samples.	
Dark gray organic fragmental limestone.	4038
Gray granular limestone and some dark shale.	4043, 4048
White and light gray fossiliferous limestone containing some slightly bluish white chert.	4053
White limestone and chert.	4065
White limestone with a little dark shale.	4065
Almost white and dark gray fine textured limestone partly oolitic. In thin section the gray limestone shows many organic remains of granular texture in an entirely crystalline matrix. Ostracod, Fusulina (small), Endothyra, Trochammina (?), and many septate and branching tubules about one tenth mm. in diameter, and several outlines of Bryozoa were seen in sections of this rock. In washed material a Palechinid spine was seen in addition to forms mentioned. In closed tube faint ammonia fumes were given off. Pyrite is present in the sample.	4070
Dark non-calcareous shale and white crystalline limestone. 4076, 4082,	4088
Gray organic fragmental limestone and some dark greenish gray shale. There is also some calcedonic chert. 4100,	4132-4136
Dark flaky shale, somewhat calcareous, and some fragments of white finely crystalline calcite.	4310
Light gray, gray and dark fossiliferous limestone. Pyrite was noted.	4317
Gray, slightly bluish gray, calcareous shale of fine texture.	4331
Black shale and a few fragments of dark limestone. The shale appears to contain some minute fragments of coaly material.	4407, 4415
Dark gray and black shale, and some gray limestone.	4422

	Depth in Ft.
Dark gray hard shale and white limestone.	4429
Light gray to white fine grained sandstone; dark silty shale; and black hard sandy shale.	4435
Dark almost black shale and light gray limestone. The shale is non-calcareous.	4441
Dark shale and slightly bluish gray calcareous shale. No fossils were seen in this sample.	4447
Gray and dark gray limestone, slightly impure.	4505
Principally gray organic fragmental chert with some finely crystalline limestone.	4510, 4515
Gray granular limestone and hard black shale.	4525
A piece of impure almost black limestone. It came up on the drill stem, at a depth of 4525 feet, when the casing was set at 4467 feet. The rock is irregularly and obscurely bedded. Flat irregular bodies of more solid calcareous material are cut or surrounded by streaks or seams. It yields small drops of oil when heated in a closed tube. No fumes of ammonia noted. Under the hand lens the fossils noted were: Fusulina, averaging six specimens on a surface one inch square, rare fragment of mollusk valves, a spine of a brachiopod, and a Textularia (?O replaced by pyrite. In the washed material was seen obscure fragments of sponge spicules. In thin section the rock was seen to be in part almost entirely organic-fragmental, in part consisting of a copious matrix in which were imbedded many organic fragments. Among these were noted, beside the Fusulina, bryozoa of small size, fragments of echinoderms, palechinid spines of small size, valves of ostracods, and fragments of brachiopod valves, sponge spicules, a Textularia like gibbosa, Trochammina gordialis, some small Nodosaria. The specimens of Fusulina were sectioned and studied by Dr. Beede who reports: "Specimens of Fusulina ventricosa Mank (?) and one or two other allied species from 4467-4525, large piece of black shale from tools. These fossils are confined to the topmost Cisco horizon and basal Wichita. Latter depth (4525) almost certainly in very top of Cisco." J.W. Beede. (J.A.U.)	4467-4525
Black bituminous shale and gray limestone.	4532, 4537
Gray to dark gray limestone, very finely ground. In thin section two fragments of fusulina were seen. The limestone is mostly granular with small irregularly shaped areas of clear crystalline material. Ill-defined small organic fragments are contained in the rock. Some black shale present.	4545