

SUBSURFACE,

INC®



00202325

RECEIVED

NOV 23 1992

COLO. OIL & GAS CONS. COMM.

GEOLOGICAL WELL REPORT

Pacific Enterprises Oil Company (USA)

PEOC-NVG # 32-26

pilot and directional wellbores

SW/NE SEC.26 T6N,R86W
Routt County, COLORADO

Curtis Area

Kevin McManamen
Geologist

SUBSURFACE,

INC®

Geological Consulting, Gas Detection, Petrophysics

1777 Larimer Street, Suite 1502, Denver, Colorado, 80202, (303) 292-1414
P.O. Box 635, Casper, Wyoming, 82602, (307) 266-6801, Mobile: (307) 265-4032
401 Rock Pile Blvd., Gillette, Wy, 82716, (307) 682-3638, 682-4443, Mobile: 682-7509

ALL

Table of Contents

Location Plat..... page 1.
Well Data Summary..... page 2.
Formation Tops page 3.
Daily Drilling Summary..... page 4.
Bit and Rig Data..... page 6.
Survey Data.....page 7.
Drill Stem Test.....page 8.
Formation Evaluation page 9.
Detailed Lithology..... page 16.

November 1992

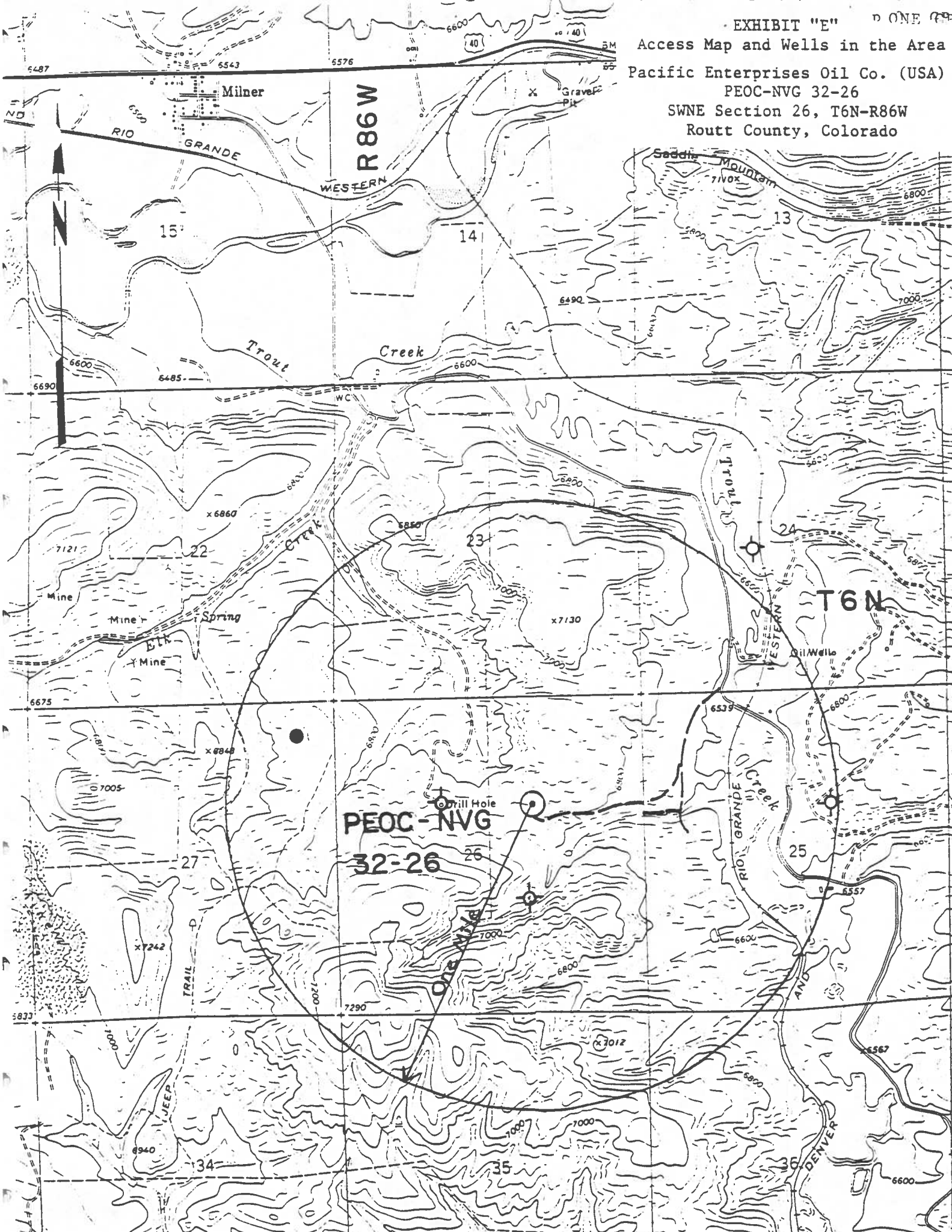
Strip-log and Report by:



Kevin McManamen/ Geologist
assisted by Wm. Eucker III
and D. Redmond

Subsurface, Inc.
1777 Larimer St. Suite 1502
Denver, CO. 80202
(303)292-1414

Access Map and Wells in the Area
 Pacific Enterprises Oil Co. (USA)
 PEOC-NVG 32-26
 SWNE Section 26, T6N-R86W
 Routt County, Colorado



WELL DATA SUMMARY

Well Name:	PEOC-NVG # 32-26
Operator:	Pacific Enterprises Oil Company
Location:	1836 FNL, 1934 FEL SW/NE Sec. 26 T 6 N , R 86 W , (Surf Loc.)
Field/Area:	Curtis Area , San Wash Basin
County/State:	Routt County, CO
Drilling Co.	ADCOR Drlg Co. Rig # 43
Elevations:	6889 G.L. 6907 K.B.
Spud Date:	7/25/92 pilot
TD DATE:	8-17-92
Dates Logged:	7/30 through 8/18/92
Depths Logged:	surf-5000 pilot well;(TD 8/8/92) 3200-4550 sidetrack I
Casing Program:	surf.csg w/ parasite string set @ 2500 ft.
Mud Co.:	Summit Drlg Fluids, Inc.(Don Jackson)
Mud Logging Co.:	Subsurface, Inc.(8x20ft.TRUCKMOUNT FID) (Geologist :Doug Redmond)
Directional Co.	SPERRY SUN
MWD Company:	Drlg Measurements Inc.
DST PROGRAM:	8/16 (4299-4390) Halliburton (see report)
Core Program:	None
E-Log Program:	Schlu.DIL-SFL,FDC FMS
Wellsite Geologists:	Subsurface, Inc. Kevin McManamen
Toolpusher:	Mike Terrel
Drlg Foreman:	Larry Kidd, Don Reese
Well Status:	P&A

FORMATION TOPS

Name	Prognosis	Estimated	E-Log	KB 6907 Datum
Mancos		Surface		
Morapos		755	750	6157
Lower Mancos	1550	1532	1595	5312
Niobrara			3848TVD	+ 3059
Buck Peak	3750	3865	3858MD	
TOW CK BENCH			4230 TVD	+ 2677
	4185	4242	4247 MD	
WOLF MTN BENCH			4468 TVD	+ 2439
	4445	4503	4496 MD	
THIRD BENCH	4735	appears to have been faulted out		
CARLILE SH.			4722 TVD	+ 2185
	4885	4795	4745 MD	
FRONTIER FM	--	4977	4960	1947
TD	5000	5010 DRLR		

SIDETRACK I	est	E-Log MD	Datum
BUCK PEAK BENCH		3809 TVD	+3098
	3850	3852 MD	
TOW CK BENCH	4248 MD	4242 MD	
		4427 TVD	+2765
WOLF MTN BENCH		4285 TVD	+2622
	4409MD	4410 MD	

DAILY DRILLING SUMMARY

1992

DATE	DEPTH	PROG.	HRS.	MUD WT	VIS	F	ACTIVITY
40 ft conductor							
7/24	40	34	1	8.6	30	33.6	Attempt to spud Pump went Down
7/25	74	647	10	8.7	32	30.4	SPUD DRLG SURVEY
7/26	721	560	10.5	9.0	31	20.6	DRLG TFB DRLG
7/27	1281	487	10	9.2	37	16.8	DRLG TFBHA DRLG
7/28	1768	411	11	9.0	36	14	DRLG TFBHA DRLG
7/29	2179	321	11	9.1	38	13.6	DRLG TFBHA DRLG
7/30	2500	--	--	9.1	49	13.2	CIRC SHT TRIP TF E-LOGS
7/31	2500	STNBY 4 am		9.1	47	14	LOG w/ SCHLU CIRC
8/1							STNBY CIRC
8/2							STNBY
8/3		145	3	8.7	29	--	TEST BOP TIH DRLG
8/4	2645	983	15	8.9	33	15.2	DRLG/SURVEY
8/5	3628	599	18	8.9	33	14	DRLG TFBHA
8/6	4227	286	11	9.0	34	15.2	TOOH DRLG
8/7	4515	495	12	9	33	14.8	DRLG/SURVEY TOOH FOR LOGS
8/8	5010	STNBY 4:30 am					LOG PILOT/ PLUG BACK
8/9							STNBY/WOC
8/10	3275			9.0	31	26	TAG CMT/DRLG
8/11	3330	60	3	9.0	33	24.4	DRLG CMT WOC TOOH
8/12	3390	207	7.5	9.0	32	16.8	TIH DRLG TFBHA REAM WO Swivel

DAILY DRILLING SUMMARY (con't)

1991

DATE	DEPTH	PROG.	HRS.	MUD WT	VIS	F	ACTIVITY
8/13	3597	0	0	9.0	31	14.4	CIRC COND WOR
8/14	3597	427	12	9.0	32	13.8	DRLG
8/15	4024	368	11	9.0	32	13.2	DRLG CIRC SHT TRIP CIRC TOOH
8/16	4292	63	2	9.1	33	12	TOOH DST TIH
8/17	4455	93	5	9.0	32	12.6	DRLG LOG RELEASED 5 pm
8/18	4548	--	--	--	--	--	RIG DOWN/SMPLS
8/19	4548	--	-	--	--	--	DRY CUT SPLITS

BIT DATA

BIT #	MFGR	SIZE	TYPE	SERIAL #	DEPTH OUT	FTG	HRS
1	HTC	14-3/4	ATJ15	J91pe	1046	972	21-3/4
2	HTC	14-3/4	ATJ15	H50FE	2072	1026	42.5?
3	STC	14-3/4	MSDT	SAR227	2500	428	15.5
4	HTC	8-3/4	ATJ05	A99PX	5010	2832	80.5
5	HTC	8-3/4	ATJ05	X89HS	3590-4548	951	35

RIG DATA

DRLG COMPANY
 DRAWWORKS
 POWER
 PUMPS:
 DRILL PIPE
 DRILLERS:
 TOOLPUSHER:

ADCOR Rig # 43
 GD 500E-SCR Diesel Elect
 800KW 2 Cat D-398TA 975 hp ea.
 2 GD PZ8 750 hp
 4-1/2 E XH TJt 6-1/2 11K rated
 J.Mecham,Mick Oberhansly,R.Shroyer
 Mike Terrel

DRILLING MEASUREMENTS INC.
Directional Survey Data

Company: PACIFIC
Well: P-32-36
Location: MILNER, COL.
Field: W/C
Operator: FRANK ALFANO
Proposed Azimuth: 263.13

(S83.13W)

Date: 08/17/92
Probe: 429
Units: feet
Declination: 12.00
(West - / East +)

Minimum Curvature						CLOSURE INFORMATION			
DRILLING DIRECTION			D-L/100'	TVD	VS	NORTH		DISP	BRNG
MD	AZ	INC					EAST		
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0
92.0	25.00	0.50	0.5	92.0	-0.1	0.4	0.1	0.4	12.5
158.0	317.00	0.75	1.1	158.0	-0.1	1.1	-0.0	1.1	358.9
222.0	330.00	0.25	0.8	222.0	0.2	1.5	-0.4	1.5	346.9
283.0	87.00	0.75	1.5	283.0	-0.1	1.9	-0.1	1.9	355.8
341.0	87.00	0.75	0.0	341.0	-0.8	1.9	0.6	2.0	17.7
405.0	123.00	0.75	0.7	405.0	-1.5	1.5	1.3	2.0	41.7
510.0	126.00	0.75	0.0	510.0	-2.5	0.7	2.4	2.5	74.5
654.0	47.00	0.75	0.7	654.0	-4.0	2.0	3.8	4.3	62.8
779.0	79.00	1.00	0.4	778.9	-5.8	2.8	5.5	6.2	62.9
904.0	75.00	1.25	0.2	903.9	-8.2	3.4	7.9	8.6	66.9
1027.0	57.00	1.25	0.3	1026.9	-10.6	4.8	10.1	11.2	64.5
1130.0	52.00	2.00	0.7	1129.8	-13.2	6.5	12.5	14.1	62.5
1224.0	50.00	2.50	0.5	1223.8	-16.3	8.8	15.4	17.7	60.1
1317.0	32.00	1.75	1.1	1316.7	-18.9	11.4	17.6	21.0	57.0
1766.0	7.00	2.25	0.2	1765.4	-25.8	26.1	22.8	34.7	41.2
2075.0	347.00	4.00	0.7	2074.0	-26.9	42.8	21.9	48.1	27.1
2187.0	325.00	4.00	1.4	2185.7	-23.2	49.2	17.5	52.2	19.5
2310.0	334.00	3.75	0.5	2308.4	-19.9	56.4	13.2	57.9	13.2
2403.0	327.00	4.00	0.6	2401.2	-17.5	61.8	10.2	62.7	9.3
2582.0	310.00	4.00	0.7	2579.8	-8.9	69.9	0.6	69.9	0.5
3130.0	309.00	5.75	0.3	3125.8	23.2	99.5	-35.3	105.6	340.4
3408.3	289.76	6.86	0.9	3402.4	47.7	114.4	-61.9	130.1	331.6
3412.8	278.00	9.10	61.4	3406.8	48.3	114.6	-62.5	130.5	331.4
3444.0	274.50	11.90	9.2	3437.5	53.8	115.2	-68.1	133.8	329.4
3474.6	267.80	15.50	12.8	3467.2	61.0	115.3	-75.3	137.8	326.8
3505.9	267.00	18.58	9.9	3497.1	70.2	114.9	-84.5	142.6	323.7
3536.5	264.80	21.80	10.8	3525.9	80.7	114.2	-95.0	148.5	320.2
3556.5	265.20	24.42	13.1	3544.3	88.5	113.5	-102.9	153.2	317.8
3604.0	264.40	27.93	7.4	3586.9	109.5	111.6	-123.7	166.6	312.0
3635.0	265.60	27.64	2.0	3614.3	123.9	110.3	-138.1	176.8	308.6
3696.0	266.30	26.94	1.3	3668.5	151.9	108.3	-166.0	198.2	303.1
3791.0	263.00	27.00	1.6	3753.2	194.9	104.3	-208.9	233.5	296.5
3885.0	262.72	27.82	0.9	3836.6	238.2	99.0	-251.8	270.6	291.5
3945.0	263.28	29.67	3.1	3889.2	267.1	95.4	-280.5	296.3	288.8
4038.0	266.32	30.91	2.1	3969.5	313.9	91.2	-327.2	339.7	285.6
4100.0	266.01	32.36	2.4	4022.3	346.4	89.0	-359.6	370.5	283.9
4165.0	265.97	32.65	0.4	4077.1	381.4	86.5	-394.6	404.0	282.4
<u>4226.0</u>	<u>267.44</u>	<u>31.50</u>	<u>2.3</u>	<u>4128.7</u>	<u>413.8</u>	<u>84.7</u>	<u>-426.9</u>	<u>435.3</u>	<u>281.2</u>
4330.0	268.13	30.63	0.9	4217.8	467.2	82.6	-480.6	487.6	279.8
<u>4351.0</u>	<u>269.52</u>	<u>30.45</u>	<u>3.5</u>	<u>4235.9</u>	<u>477.9</u>	<u>82.4</u>	<u>-491.2</u>	<u>498.1</u>	<u>279.5</u>
4444.0	274.59	29.39	2.9	4316.5	523.7	84.1	-537.6	544.1	278.9
<u>4506.0</u>	<u>273.84</u>	<u>28.95</u>	<u>0.9</u>	<u>4370.6</u>	<u>553.3</u>	<u>86.3</u>	<u>-567.7</u>	<u>574.2</u>	<u>278.6</u>

DRILL STEM REPORT

TEST NUMBER: One

DATE TESTED: 8/16/92

TESTER: Halliburton

FORMATION TESTED: Niobrara (Tow Ck)
Sidetrack

INTERVAL TESTED: 4299-4390

TEST TIMES: 16-30-60-120

MUD PROPERTIES: Wt 9.1, V 33, F 12

TOOL OPENED: 0751 hrs w/ 1 inch blow
BOB in 1 min, 18 oz 2 min
19 oz 5 min, 17 oz 10 min
14 oz in 15 min

SECOND OPEN: opened 7 oz in 1 min.
5 oz in 5 min. held
throughout

Recovery: slightly gas cut mud

RECOVERY SMPLR: 2100 cc MUD w/ 25 psi
tester recorded 0 psi gas
0 cc oil, 0 water

TEMPERATURE: 124 deg F

CHART DATA: IH 2004 FH 2015
IF 95-95
SIP-1 149
FF 95-95
SIP-2 170

REMARKS: Wellsite Geologist was
placed on standby for the
test, Data was obtained via
a poor quality field copy
Tested interval clearly
subeconomic.

FORMATION EVALUATION

Wellsite geological responsibility in conjunction with Baseline FID mud gas detection was initiated under surface i.e. 40 ft on 7/24/92. A pilot well was drilled and evaluated to a total depth of 5010 ft. The pilot was then plugged back and sidetracked at 3890 MD. The directionally drilled sidetrack reached out to a total measured depth of 4548 ft. with an average angle of 30 degrees in a S83W direction, nearly due west. This well, located approximately 2 mi. southeast of Milner, Colorado, was drilled to evaluate the economic potential of the thick, extensive petroliferous and hopefully fractured Niobrara Mbr. of the Mancos Formation. Surface geological and well control suggests numerous faults exist in this prospect area. The nearly black and calcite rich Niobrara shale is a well known prolific producer of premium grade oil exclusively from open fractures which appear to concentrate among faults and structures e.g anticlines and flexures. The objective was to intersect a major fault zone while in the petroliferous Niobrara target.

Each of the major formations, members and subintervals were summarized as follows:

Mancos Formation

Upper Cretaceous

The Mancos is a thick interbedded sequence of marine shale, siltstone and sandstone which underlies the Mesaverde Fm. Group. The evaluated Mancos section at this wellsite yielded common fair-good bulk cuts in solvent (xylene) but is considered to have limited economic potential.

The R.O.P. (rate of penetration) ranged between .5 to 2 min/ft. throughout the entire Mancos section. The P-Rate was of little use in revealing formation changes in the Mancos at this wellsite. A 14-3/4 inch hole was drilled to 2500 ft whereby surface casing was run. The balance of the project was drilled with 8-3/4 inch bits. The average P-Rate after 2500 ft. was 1 min./ft. which continued to just above the Niobrara Transition Zone (see Strip-Log). The WOB was then reduced to control deviation which slowed the R.O.P. to 2 min/ft.

The deviation held between 1 and 2 degrees to 2000 ft. At 2100 ft the deviation increased to 4 degrees which increased to 9 degrees at 3750 MD. The Niobrara was contacted at 3858 MD ft with a 9-1/4 deg. hole angle in the N76W direction.

The samples revealed an intermittent detectible hydrocarbon presence throughout the upper Mancos section. The sandstone shows were typically described as follows: (see detailed lithology)

SS- trace-occasional lt brn oil stn, tr-occ
dull to bright fluorescence, faint-good milky and bri streamy
blue-yellow cuts (See Strip-Log)

The lower Mancos section revealed decreasing depositional energy with depth. The decreasing sandstone and increasing shale is observed in all normal (non faulted) sections and can be useful for correlation .

The pilot well was drilled with a LSND mud until 2600 ft. MD. At this point, air at 500 psi was injected down a 2" parasite string affixed to the surface casing. This aerated the annulus mud column at the base of the casing and lightened the hydrostatic head on bottom while drilling. Mud gas readings were diluted down to approximately 10% of the non-aerated readings.

The mud gas ranged between 10 and 50u (Total Gas) down to the Marapos whereby a 150u was recorded at 750 ft. The background dropped to 25u. by 800 ft. The background held in the 20-50u. range until the Mancos "B" Mkr at 903 ft. where a 200u increase was noted along with an increase in heavies (see Strip-Log). The subsequent background ranged between 50 and 100u until the air was added which decreased the readings to 5-10u. Connections and down time gas ranged between 10 and 100u. Note 1% CH₄ span gas was equivalent to 100u.

The E-Logs identified the Marapos at 750, the Km"B" marker at 903 , the lower Mancos at 1595, the Km4 marker at 2325 ft and the Niobrara top at 3858 ft MD.

In Conclusion the Mancos section, described above, was evaluated and found to be petroliferous but subeconomic at this location.

Transition Zone

Middle Cretaceous

The Transition zone separates the sandy, silty Mancos from the lower energy Niobrara. It generally is a thick 100-200 ft. gradational interval denoted primarily by detailed sample evaluation. Fractures have been detected while drilling through this interval thus making it a potential zone of interest. Note that the Transition Zone was penetrated twice at this wellsite.

The R.O.P. was 1-2 min/ft. through this interval in both penetrations. Again the P-Rate data was of little correlative value.

Transition Zone Con't

The primary field tool used to denote this subtle zone while drilling is found in the samples. The pertinent changes include:

- increasing effervesence in 10% HCL
- increasing bulk sample cuts in xylene
- decreasing depositional energy increasing shale homogeneity

While drilling the Sidetrack, a primary fracture was encountered in this interval at 3795 MD which resulted in abundant free paraffin flowing over the shaker and coating the samples. The aeration was shut off to hault additional paraffin i.e oil solidification from entring into the wellbore. The balance of the well was drilled without aeration.

The Mud Gas ranged between 3 and 5 u, with 7-20u connection gases in the pilot well. The Sidetrack revealed a 5 to 70u (14 fold) increase with respective heavies at 3795 MD. The paraffin plugged the gas buster and detection lines located at the blooie line. It is assumed that the actual show is considerably better than was recorded due to the plugging.

The E-Logs reveal a subtle change respective to the Transition Zone. The gamma revealed a increase at 3700 in the pilot with additional shoulders at 3750 and 3790 MD. The estimated top while drilling was 3750 in the pilot. The sidetrack revealed a gamma increase at 3725 MD.

In Conclusion: The Transition into the Niobrara can be identified and can be useful. It is important that one not confuse this transition top with the underlying true Niobrara top. Fractures are commonly encountered while drilling this interval. The one primary fracture encountered while drilling the sidetrack should have been tested in lieu of it trying to test itself.

Niobrara Fm.

Middle Cretaceous

The Niobrara Shale is a thick, low energy, marine source bed that contains three distinct calcite rich benches or subintervals. These benches are highly laminated and speckled with small elliptical light tan to dark orange calcspheres known also as coccoliths or foraminifera. Flanking these chalky biozones are concentrations of nearly black elliptical fecal pellets lineated in the smectitic less competent shale. In addition to the well defined sample characteristics, The E-Logs demarcate these benches with anomalous resistivity. Each of these benches are very petro-liferous and each can be productive with appropriate fracturing. Each of the benches were summarized as follows:

First Bench (Buck Peak Member)

This bench represents the top of the Niobrara and was named after the first high resistivity producing interval at the Buck Peak Field discovered in August 1956 and located in T6N,R90W. Despite the good production at Buck Peak Field (4MMB0), this uppermost member was not considered the primary target at this site.

The R.O.P through both the pilot and sidetrack ranged between 1 and 2 min/ft. and afforded little correlative value.

The Samples revealed the Buck Peak with the following observations:

- Increased bulk sample cuts
- Increase in black, tan and orange inclusions i.e specks
- significant increase in effervesence
- increase in hackly (uneven) texture

This bench was the least developed of the three benches at this site although evidence of fracturing was noted in both the pilot and sidetrack penetrations. Free calcite was observed with both open and tight crystalline habits. The shale along with the free calcite both yielded fair to bright streamy cuts in solvent. (see Strip-Log).

The Mud Gas through this bench ranged between 4 and 8 u(.04-.08%). There was a slight increase of heavies subsequent with contact with the Niobrara top. Connection Gases (CG) and Down Time Gases (DTG) ranged between 6 and 80u total gas in the pilot. The sidetrack yielded unaerated readings of 50-90u. A probable fracture was identified at 3907 MD in the sidetrack. In addition to the two fold 50 to 100u increase, there was an influx of free calcite. Subsequent connection gases jumped up to 800u with a significant influx in butane C4s. i.e from a trace .005% to .1% indicating liquid (oil) wellbore entry.

The E-Logs identified the Buck Peak top at 3858 MD or 3848 TVD in the pilot and 3852 MD or 3815 TVD in the sidetrack. The resistivity was relatively low through this first bench.

In Conclusion: The First bench (Buck Peak) was clearly petroliferous and held some evidence of fracturing. It appears that this isolated bench would be subeconomic, however, may contribute to producible economics when comingled with additional fractured section. This zone was not tested.

Second Bench (Tow Creek / Wolf Mtn Mbrs)

This thickest member of the Niobrara is actually made up of two subintervals namely the upper Tow Creek and the lower Wolf Mtn benches. Both benches represent highly speckled "biozones" consisting of very small elliptical light tan-orange calcospheres also known as coccoliths or foraminifera. These benches are notably more calcareous, petroliferous and resistive.

The R.O.P. through the Tow Creek ranged between 1-3 min/ft. in the pilot and 1 min/ft in the sidetrack. The slow p-rate in the pilot was due to a decrease in the WOB (weight on bit). At 4330 MD in the sidetrack there was an increase in R.O.P. to 1/2 min/ft. which was associated with a slight gas increase and some free crystalline calcite i.e. indicative of a fracture.

The samples revealed bench-type lithology in both penetrations (see lithology for details). Significant calcite and sample cuts were also noted on the Strip-Log.

The Mud Gas in the pilot ranged between 3 and 8u (total) in both the Tow Ck and Wolf Mtn Benches. Connection Gases ranged between 5 and 35u (total). The background revealed a five-fold, short lived, increase at 4485 and again at 4485. A three fold increase was noted at 4655 which was associated with heavies and appeared to have some duration. (see Strip-Log Mud Gas Column) The Sidetrack gas readings ranged between 80 and 150u (total) Connection Gases ranged from 100 to 750u (total). Downtime Gases (DTG) recorded a peak of 1240u or 12.4% at 4268 MD indicating significant formation gas entering the wellbore when the pumps were down. The maximum formation gas was 1560 units (15.6%) at 4330 MD which was associated with liquid phase heavies.

The E-Logs identified the Tow Creek at 4247 MD in the pilot and 4242 MD or 4140 TVD in the sidetrack. The Wolf Mtn top was identified at 4496 MD in the pilot and 4410 MD or 4283 TVD in the sidetrack.

A Drill Stem Test (DST) was run through the 4290-4390 MD interval in the sidetrack wellbore. The recovery was only slightly gas cut drilling mud. (see DST Report)

In Conclusion the Second Bench was petroliferous and held some evidences of fracturing. The primary project objective of crossing a fault while in a well developed, less sensitive and more competent (brittle) bench was effected. The DST tested only 100 ft of interval. The limited test yielded limited results. Keep in mind that this was an obligation well which somewhat hampered a zealous comprehensive evaluation which included a limited operations budget.

Third Bench

This highly petroliferous and very calcite rich basal Niobrara member was not considered a primary target at this wellsite. It has potential and appears to be the least sensitive and most brittle of all the benches. The Third Bench was faulted out of the pilot and partially penetrated in the sidetrack. The samples revealed an briefly sustained influx of type limestone described as follows:

LS- 1t-m gry cryptoxln tan chlky v frm-mhd
chlky dnse arg (see 4740-60 in lithology
section)

The subsequent connection gas increased after penetration which suggests that this thin interval was petroliferous and/or fractured. Shows of live oil and mud gas are not uncommon while drilling this Fort Hayes equivalent.

In Conclusion: The Third bench was only partially present and penetrated. The limited evaluation suggests a subeconomic zone, however, Its has potential and may someday be a lateral target.

Carlile Fm.

Middle Cretaceous

The Carlile is generally less competent and less calcareous than the overlying Niobrara. Both are considered stable disoxic marine shales. It is petroliferous but seldom considered a zone of interest except for the silty Codell Mbr found in the DJ Basin.

The R.O.P. averaged 1 min/ft in the pilot through the top interval then slowed to 2 min/ft with depth and increase in siltstone.

The Samples denoted the top with nearly black silty shale which increased depositional energy with depth. (see lithos) This formation can be a difficult sample pick to the untrained eye.

The Mud gas was low i.e. 2-4u (total) with 5-8u connection peaks. No shows were recorded with the sensitive Flame Ionization Detection (FID) equipment.

The E-Logs denoted the Carlile at 4745 MD (4722 TVD).

In Conclusion: The Carlile appeared non economic at this location and holds little potential in this basin.

Frontier Fm

Middle Cretaceous

This regressive marine sandstone commonly yields shows, however, no good producers have been established to date in this basin. Under the right reservoir and trapping conditions, the Frontier can be a prolific oil and gas bearing interval.

The P-Rate ranged between 1 and 2 min/ft. and held no significant changes.

The Samples did reveal an influx of sandstone described as follows:

SS- 1t-m grybrn occ wh, vf-fgr tr glauc slty
comm wh pore fill tr rr stn w/
fnt slow mlky cut

The Mud Gas identified a slight 2 to 4 unit increase in total gas with a respective increase in heavies.

The E-Logs denoted the top at 4960 Md in the pilot with no apparent log shows.

In Conclusion: The Frontier appeared to be consistent with the area i.e tight with a weak live hydrocarbon presence. It is a potential zone, good subsurface marker and useful mapping datum.

Detailed Lithology

Note: All samples were caught lagged and sieved by the respective drilling crews under the supervision of the wellsite geological personnel. Samples were started out of the 40 ft. conductor pipe. All samples were optically evaluated using a 7x30X B&L Corvascope.

40-60	TR% SH-	m gry v slty bent
	40% SH-	lt- med gry v sdy sft-sl frm bent carb sl calc grds into ss
	60% SS-	lt-m gry occ tan/crm,vfgr fri wl srted tt tr 6% tr m-crse(v frm subang trnsl) sl-mod calc tr columnar calc no shows
60-90	TR% SH-	v slty sft-frm bent sl calc
	60% SLTST-	lt-m grys grybrns sft-sl frm sdy tr carb sl calc
	40% SS-	lt-m gry tan slty drty fri vfgr wl srted sl-mod calc barren w/ incr SS-m-crse gr clr mhd subang- subrnd unconsol
90-120	TR% Calcite-	clr,trnsl,lt tan amorph,subang massive frags
	40% SLTST-	lt-m grys grybrns sdy sl frm tr carb grds into ss v sl calc
	60% SS-	lt-m grys off wh s&P vf-fgr wl srted v fri drty slty sl-mod calc tr-v frm brit fgr mod calc
120-150		Noted influx vfgr consol dolo cmted ss
	10% SH-	m-dk gry brns slty tr dk brn nrly blk non calc tr carb frm tr vfrm subrnd-subblky
	50% SLTST-	lt-m grybrns sdy sl frm-frm arg sl calc grds to vfgr ss tr carb
	40% SS-	lt grys m gry vf-fgr wl srted sl calc dolo v frm- mhd brit consol slty tr carb slty tr pyr tr sm opt por tr xln calcite
150-180		Noted: Trace cln m gr ss w/ sm opt por
	TR% DOL-	lt gry v frm cryptoxln
	10% SH-	lt-m gry grybrns slty tr carb tr pyr sl frm v sl calc
	60% SLTST-	lt-m grys m brngrys sdy arg lam w/ ss ip tr carb tr pyr sl frm sl calc

Lithology/ PEOC-NVG 32-26 Pilot

- 180-210 10% SH- m-dk grybrns slty bent tr hckly sl frm tr carb tr pyr
50% SLTST-m grybrns brngrys sdy arg lam w/ ss tr carb tr pyr mic sl frm-frm sl calc
40% SS- lt-m gry off wh vf-fgr dolo cmt sl-mod calc s&p slty tr carb tr pyr drty wl srtd subang-subrnd drty tr calc clr trnsl no shows
- 210-40 TR% DOLO- rr lt gry tan v frm cryptoxln
10% SH- m brngry grybrn vfrm-frm non-sl calc subblky
50% SLTST-m brngry ooc tan sdy arg sl-vfrm sl calc tr carb dolo mod calc
40% SS- lt-m gry grybrn slty drty sl-mod calc dolo s&p v frm-mhd brit fri vf-fgr wl srtd poor opt por grds into sltstn rr tr tan incls rr tr wk mlky cut pred barren tr f-mgr w/ por
- 240-70 TR% SH- aa
40% SLTST-lt-m grybrn sdy arg sft-sl frm tr carb mic sl calc
60% SS- lt-m gry grybrns ooc off wh tr clr trnsl sl frm fri frm brit s&p vf-fgr ooc clr m-crse unconsol wl srtd tt no shows
- 270-300 20% SH- m-dk brngrys sl frm non-sl calc tr pyr tr carb
40% SLTST-m-dk brngrys sl frm tr carb tr pyr sdy sl calc mod calc
40% SS- lt-m grybrns drty v slty s&p tr carb tr pyr sl-v frm lt gry off wh sl-mod calc tr m-crse gr rr tr free calc poss shl barren
- 300-30 30% SH- m-dk grybrns m gry sl frm-frm slty subblky v sl calc micromic tr carb tr pyr bent tr free columnar xln calc
40% SLTST-m-dk gry brngry sdy arg sl frm-frm sl calc tr carb tr pyr subblky
30% SS- lt-m gry ooc tan of wh vfgr drty slty s&p tr carb wl srtd tt frm-v frm fri brit sl-mod calc sl dolo no sig stn or fluor
- 330-60 30% SH- lt grys bent v carb tr pyr
40% SLTST-lt-m grys m-dk brngry sdy arg aa
30% SS- lt-m gry slty drty fri sl-mod calc barren aa
- 360-90 50% SH- m brngry lt-m grybrns bent subrnd-subblky tr carb frm sl calc slty lam w/ carb tr pyr
30% SLTST-m brngrys sl frm sdy lt gry(v sdy) mic tr carb tr pyr
20% SS- lt-m gry off wh drty slty vfgr wl srtd tt s&p tr pyr tr varic grs frm-v frm mod calc fri dolo tr wk mlky cut

Lithology/ PEOC-NVG 32-26 Pilot

390-420 10% SH- m grybrns sl frm-frm v sl calc slty aa
tr free calc poss shl frag
30% SLTST-m brngrys sdy arg tr pyr tr carb
60% SS- lt-m grys off wh vf-fgr tr mgr s&p tr varic tr
glauc tr pyr slty incr cln off wh fgr w/ 6-8%
opt por pred wl srted mod wl srted subrnd-subang
sl calc rr tr crse yel/clr grs v wk cut
pred barren

420-50 TR% SH- aa
20% SLTST-m brngrys sl frm sl calc tr carb sdy pyr
80% SS- lt-m gry off wh trns1 tan fgr occ vfgr occ mgr
subang s&p tr glauc rr tr varic slty tr carb frm-v
frm occ mhd brit fri 6-8% por tt tr pyr sl calc
dolo cmt ip fnt mlky cut pred barren

450-80 TR% SH- incr m grybrns slty sl frm v sl calc
30% SLTST-m brngrys sdy v sdy tr carb tr pyr sl frm sl calc
grds into ss
70% SS- lt-m gry off wh tr trns1 slty (incr) lt
gry brns vf-fgr mod wl srted tr carb tr pyr
frm-v frm brit, fri s&p glauc occ mgr mod wl srted
subang-subrnd tt v sl-sl calc comm dolo cmt(lt gry)
no stn or fluor fnt-fair mlky instnt yel/grn
cut

480-510 10% SH- m brngrys v bent slty carb mic sft-frm v sl calc
brit tr pyr
30% SLTST-lt grys lt-m grybrns sdy arg v frm sl calc dolo ip
tr carb tr pyr
60% SS- lt-m grys vf-fgr wl srted slty frm fri tr pyr
subang sl calc dolo cmt lt-m gry tr carb wl srted
tr trns1 v slow mlky cut rr tr fluor
no sig stn

510-40 TR% SH- aa m brngrys
rrTR% LS- tan dnse v frm
30% SLTST-lt grys lt-m grybrns sdy aa
70% SS- lt-m gry vf-fgr sl calc dolo no stn or fluor
fnt slow mlky cut

540-70 TR% LS- lt tan dnse cryptoxln
10% SH- m brngrys grybrns occ dk brngry sl calc slty tr
carb
40% SLTST-lt-m grys brngry sdy arg pyr tr carb
50% SS- lt-m gry grybrns drty incr slty vf-fgr wl srted tr
opt por frm fri rr tr glauc tr carb tr pyr
pred barren

570-600 NO RECOVERY

Lithology/ PEOC-NVG 32-26 Pilot

- 600-30 Noted color change incr brns from grys
 TR% LS- aa
 10% SH- m brngrys bent sl frm-frm slty v sl calc tr carb
 tr pyr plty subblky slty
 50% SLTST-m brngrys brns sdy sl frm sl calc tr carb tr pyr
 arg
 40% SS- lt-m grys brngrys occ trnsl incr slty fgr mgr ip
 vfgr fri frm-v frm no sig cut
- 630-70 Poor smpl quality
 nearly 100% CVGS LCM sweeps tight hole conditions
- 670-700 TR% BENT- wh sft wxy w/ tr Ls
 10% SH- m grybrns slty frm
 60% SLTST-brngrys sdy pyr calc mic frm
 30% SS- wh lt brn grys vf-fgr slty pyr tt frm fri no sig
 shows
- 700-30 TR% BENT-aa
 10% SH- pyr grybrns aa
 50% SLTST-m brngry sdy frm brit pyr abdt carb
 40% SS- m brngrys occ wh vf-fgr v slty v sl-non calc pyr
 tt frm no shows
- 730-60 NO RECOVERY
- 760-90 Noted influx in clean Sandstone
 TR% Free Calcite
 TR% DOLO- lt tan/brns dnse v frm arg
 20% SLTST-m brngrys non calc v sdy frm brit
 80% SS- wh clr lt-m gry brngry fgr w/ sm vfgr wh cly fil pyr
 occ glauc mica s&p ang-subang pred tt frm fri
 tr vis por tr bri fluor v fnt slow strmy yel/blu
cut mod-v calc abdt calc cmt
- 790-830 30% SLTST-m grybrns sl calc sdy mic pyr frm brit
 70% SS- m grybrns wh-lt gry vf-fgr sl calc slty pyr sl
 arkosic mic tt frm tr bri fluor w/ slow fnt
strmy cut incr vfgr mod-v calc
- 830-60 Noted ss bcmg v slty
 10% SH- aa
 40% SLTST-m gry grybrns sl calc arg sdy ip mic frm blkyp ip
 50% SS- aa w/ v fnt mlky slow cut
- 860-90 Noted influx in Shale
 TR% BENT-rr wh crm sft
 30% SH- m-dk brngrys bent v frm brit sl calc subblky plty
 slty tr carb
 40% SLTST-m brngrys lt grys rthy sdy arg tr carb tr pyr frm
 v sl calc
 30% SS- lt-m grys off wh trnsl drty slty s&p tr glauc tr
 varic vf-fgr wl srtd comm tan chiky pore fill
 mod-v calc no cut

Lithology/ PEOC-NVG 32-26 Pilot

- 890-920 50% SH- m-dk grybrns bent mtrx v frm brit subblky non calc slty
30% SLTST-m-dk grys grybrns carb sl frm v sl calc sdy arg
20% SS- lt-m grys drty slty vfgr carb tr glauc rr tr stn
tr sptty flour v fnt cut
- 920-50 Show zone w/ influx in sandstone
- TR% LS- tan brns dnse v frm
20% SH- dk gry grybrns bent frm-v frm brit tr carb slty
subblky tr plty
30% SLTST-m-dk grys grybrns sdy arg v sl calc frm
50% SS- off wh lt-m gry influx cln clr trns sl ss
drty ip s&p tr glauc tr varic f-m gr occ fgr
subrnd-subang m gr w/ gd opt por v sl calc mod ip
v frm fri occ lt brn live oil stn bri
yel/grn fluor gd bri instnt strmy blu yel cut
- 950-80 10% SH- aa bent mtrx
20% SLTST-m-dk grybrns lt-m grys incr tans sdy arg tr carb
sl frm-frm v sl calc;c grds into ss
70% SS- lt-m grys off wh clr trns sl incr drty & slty
f-m gr frm-v frm fri mgr tr opt por comm chlky
pore fill mod calc comm brn oil stn bri yel
grn fluor gd strmy blu/yel cut
- 980-1010 TR% LS- brn tan dnse sdy
TR% SH- aa
30% SLTST-brns & tans aa m gry brntan
70% SS- lt-m grys incr slty off wh vf-fgr occ mgr v frm
fri brit tr glauc tr varic sl-mod calc
v calc ip derng opt por occ stn fluor w/
fair-gd instnt strmy blu/yel cut
- 1010-46 10% SH- m-dk brngrys bent tr pyr tr carb subblky tab ip
40% SLTST-m brngrys sdy arg sl frm-frm sl calc tr carb tr
pyr
50% SS- lt-m gry m grybrns v slty drty frm fri brit
sl-mod calc occ off wh trns sl (mgr) pred vf-fgr
tr stn derng bri fluor w/ fair strmy instnt cut
- 1046-70 Post Trip Poor quality
10% SH- m grybrns sl calc slty blk
50% SLTST-m grybrns sl calc pyr v fine mica frm brit
40% SS- lt-m grys sm grybrns vfgr drty slty tt frm tr
yel grn fluor strmy cut
- 1070-1100 80% SLTST-m grybrns sl calc v sdy(v fine) micromic tr bent
subblky frm arg
20% SS- m grys m grybrns vfgr slty sl calc prly srtd tt
frm no sig shows tt

Lithology/ PEOC-NVG 32-26 Pilot

- 1100-30 20% SH- m grybrns slty sl calc frm-mhd
 70% SLTST-m grybrns sl calc sl sdy subblky frm-mhd
 10% SS- m-lt grys vfgr sl calc s&p mic tr pyr tt hd
- 1130-60 TR% DOLO- tan brn hd dnse microxln
 10% SH- m grybrns calc slty brit mhd
 80% SLTST-m grybrns v calc ip grds into marly Ls sdy
 mic brit hmd
- 1160-1190 10% SH- m grys grybrns sl calc slty frm
 70% SLTST-m brngry sl calc sdy mic frm mhd
 20% SS- lt-m grys clr vfgr slty wh pore fil
 tr arkosic mic tt frm
- 1190-1220 10% SH- m grybrns slty sl calc subblky frm bentic mtrx
 90% SLTST-m grybrns sl calc sdy ip pyr frm blk-subblky
- 1220-50 10% SH- aa brngrys slty frm
 60% SLTST-m gry brngrys calc ip sdy frm
 30% SS- lt gry wh clr m gry vf-fgr calc mic glauc tr
 feldspar grs tr(dolo/calc frac fill) slty frm
 mhd NS
- 1250-80 20% SH- m grybrns sl calc slty v bent pyr sft-frm blk ip
 80% SLTST-brn m grybrns sl calc sdy carb sft frm blk
- 1280-1310 60% SH- m brn grybrns sl calc sl slty pyr tab-blky
 frm brit v bentic mtrx
 40% SLTST-aa
- 1310-40 Noted influx Sandstone
- TR% LS-
 10% SH- m grybrns calc slty mic sft-frm bentic
 60% SLTST-m grybrns calc sdy mic marly frm mhd brit
 30% SS- m gry lt grys mott vfgr slty calc & dolo mic thnly
 lam w/ sltstn tt frm v calc ip NS
- 1340-70 10% SH-aa, 50% SLTST-aa, 40% SS-aa
- 1370-1400 10% SH- m brn calc slty sft-frm v bent hckly ip
 30% SLTST-m grybrns calc sdy intbd w/ ss tr frac fill frm
 brit
 60% SS- wh clr lt gry vf-fgr s&p glauc mic sl calc subrnd-
 subang pred tt frm unconsol even bri yel/grn
fluor w/ strmy yel cut
- 1400-30 TR BENT- aa
 10% SH- aa
 30% SLTST-lt-m gry brngrys sdy mhd calc
 60% SS- wh clr lt-m grys vf-fgr s&p unconsol glauc
 calc cmt w/ sm wh pore fill slty tr fldspr
 subang-subrnd pred tt, tr dk oil stn even bri yel
fluor w/ strmy cut v sl-non calc ip

Lithology/ PEOC-NVG 32-26 Pilot

- 1430-60 TR% SH- dk brn brngrys, rthy slty sl frm bentic mtrx
 30% SLTST-m brns brngrys sdy arg frm grds into ss non calc
 tr carb micromic
 70% SS- lt-m grys comm wh pore fill s&p slty frm-v frm
 fri tr varic vf-fgr tr glauc non-v sl calc/dolo tr
 fgr unconsol tr even bri yel grn fluor
- 1460-90 10% SH- brn brngry slty v frm brit tr carb mic non calc
 bentic mtrx
 40% SLTST-m brn brngrys, rthy sdy arg grds into ss non-sl
 calc frm tr carb
 50% SS- lt-m grys grybrns slty(incr) drty s&p vf-fgr wl
 srted tt comm wh pore fill v sla calc dolo rr tr
 fluor no sig stn
- 1490-1520 20% SH- m-dk brn brngrys rthy slty bent frm-v frm brit
 subblky-pty tr pyr tr carb v sl calc
 50% SLTST-m brn brngrys sdy lam
 30% SS- lt-m grys grybrns vf-fgr occ mgr tr glauc s&p drty
 slty tr carb v frm-mhd sl calc dolo rr
 tr fluor no stn
- 1520-50 Noted: influx non slty shale
- 40% SH- m-dk brn brngrys rthy frm bent subblky-pty non
 calc brit slty
 40% SLTST-m brngrys arg sdy frm-v frm v sl calc brit
 micromic tr carb
 20% SS- lt-m grys grybrns slty(incr) vf-fgr tt wl srted
 comm wh fill v sl calc no sig stn or fluor
- 1550-80 70% SH- m-dk gry v sl calc slty blk sl fis frm mhd ip
 20% SLTST-aa lt-m grys sdy mhd lam brit
 10% SS- wh lt grys vfgr mott ang sl calc s&p slty
 drty well cmted tt barren
- 1580-1610 90% SH- dk grys mgry smooth occ slty bent sl calc-non ip
 fis frm mhd ip brit
 10% SS- lt-m grys vfgr sl calc glauc ang slty tt mhd
- 1610-70 100% SH- dk gry smooth sl-non calc thnly lam w/ m gry
 sltstn sl bentic mica frm-mhd brit tr ss
- 1670-1700 80% SH- dk gry smooth text non calc sl sdy frm brit sft sl
 bent
 20% SLTST-m-dk brngrys non calc sl sdy frm brit sft ip bent
- 1700-30 90% SH- aa, 10% SLTST-aa
- 1730-60 80% SH- dk grys smooth sl bent non calc frm-mhd brit
 20% SLTST-dk grys grds into shale sl bent non calc frm
 brit

Lithology/ PEOC-NVG 32-26 Pilot

- 1760-1820 80-90% SH- dk gry s dk grybrns bent (sl incr)
calc ip mhd frm brit
10-20% SLTST- bent pyr sdy
- 1820-50 Post Trip/sweep abdt LCM
- 1850-80 80% SH- dk gry s smooth text slty ip sl bent sl-non calc
fis blk y frm mhd
20% SLTST- m grybrns sl calc sl sdy mic frm-mhd brit
TR% SS- described next smpl No sig cut
- 1880-1910 30% SH- dk gry smooth non calc slty blk y frm occ mhd
50% SLTST-m-dk gry sdy sl calc-dolo mic frm mhd brit
20% SS- m grybrns lt gry tan vfgr calc cmt slty & drty tr
calc incl s tt sl fri frm-mhd 10% w/ grn fluor mod
yel strmy cut (fnt-fair)
- 1910-40 20% SH- m brngrys grybrns slty sl bentic mtrx frm-v frm
brit tr carb non calc
60% SLTST-m-dk brngrys rthy sdy arg frm occ lt brn tan v sl
calc tr carb
20% SS- m grybrns brngry rthy slty drty v frm-mhd sl calc
dolo vfgr tt wl srtd tr glauc s&p occ lt gry-clr
vf-fgr tr yel grn fluor, v fnt mlky blu cut
no sig stn
- 1940-2000 40% SH- m-dk brngrys frm sl bent tr carb subblky-subrnd
non-sl calc slty ip
50% SLTST-m brngrys grybrns sdy arg sl frm-frm v sl calc tr
carb rr tr pyr occ lam w/ ss mic
10% SS- m brn brngrys m gry slty drty s&p glauc sl calc
vf-fgr tr fluor no stn or sug cut
- 2000-30 rr tr free Calcite-columnar tr druse
50% SH- dk brngrys v frm brit non calc sl calc subblky
slty, tr carb tr blk spkls
40% SLTST-m-dk brngrys, frm sdy lam arg sl calc tr carb
10% SS- m brngrys lt-m gry s vfgr slty drty frm-mhd fri s&p
tr varic occ unconsol clr tan-trnsl vf-fgr rr
tr dk-lt brn stn rr tr fluor v fnt mlky
blu cut
- 2030-60 TR FREE CALC-wh off wh trnsl massive amorph
60% SH- m-dk brngrys rthy incr bent mtrx frm slty lam w/
carb subblky-splntry v sl calc sl incr
40% SLTST-m brn brngrys tan sl frm sdy carb sl calc lam tr lt
-m orng calc incl s (mod-v calc)
ss- aa fnt mlky cut fair w/ time
- 2060-90 30% SLTST-m grybrns sl calc w/ sm calc tan incl s sdy ip
frm mhd ip
70% SH- dk gry s mgrys non calc sl calc sl slty frm mhd fis
ip brit

Lithology/ PEOC-NVG 32-26 Pilot

2090-2150 80% SH- dk gry smooth text slty ip non calc mic fis blk
frm-mhd brit
20% SLTST-m grybrns dk gry sdy carb specks mic sft-frm
brit ip

2150-2180 30% SLTST-m gry-dk grybrns sdy calc spks (incls) carb
specks sft-frm brit
70% SH- dk gry smooth non-sl calc slty frm-mhd fis brit

2180-2210 90% SH- dk grys smooth sl-non calc slty mic sl calc blk
fis mhd frm
10% SLTST-m grybrns vf sdy tr carb mic fos deb calc mic bent
frm-sft grds into shale lam w/ ss barren

2210-2240 80% SH- dk gry slty calc spkls carb specks blk-fis frm
mhd
20% SLTST- m grybrns dk grys calc lam w/ ss mic
frm mhd sft ip

2240-70 70% SH- dk grys m gry sl-non calc occ calc spks
fos deb slty blk brit frm-mhd
30% SLTST-m gry m grybrns calc blk spks v sdy ip
sl bent sft-frm. tr ss tr free bent

2270-2300 50% SH- dk gry sl-non calc mic calc (incls)spkls
frm-mhd brit fis-blky
50% SLTST-m brngrys calc thnly lam w/ lt gry vfgr
ss tr free calc columnar xln habit tr
qtz fil frm-sft

2300-30 60% SH- m grybrns dk gry calc & dolo mic slty
tr calc spkls (incls) frm-mhd brit no cut
40% SLTST-m grybrns calc-dolo carb spkls grds to
shale mic sl bent sft-frm

2330-60 60% SH- dk grys m grybrns smooth mic calc & dolo
brit frm-mhd
40% SLTST-m grybrns thnly laminated w/ lt gry
vfgr ss calc & dolo tr hairline fracs carb
spkls sft-frm tr free calc

2360-90 TR% CALCITE-rr columnar habit lt tan brn
50% SH- m grybrns vfrm-frm slty tr carb mic non-
sl calc sl bent subblky-blky
50% SLTST-m-dk brngrys grybrns rthy arg tr carb sl
frm-frm sl calc micromic ip

Lithology/ PEOC-NVG 32-26 Pilot

- 2390-2420 TR% BENT- wh of wh sft wxy w/ yel fluor
 TR% LS- brn tan dense cryptoxln.
 60% SH- m-dk grybrns subblky-blky fis plty v frm
 brit bent mtrx slty tr carb non-sl calc
 40% SLTST-m-dk brngrys rthy arg sl frm-frm v sl-sl
 calc tr carb sdy ip
 TR% SS- lt-m grys vfgr slty drty wh chlky fill
 s&p nfsc
- 2420-50 Noted influx in sandstone w/ show
- 40% SH- m-dk grybrns brngrys slty(incr) subblky
 v sl calc frm-v frm sl frm & slty tr carb fis ip
- 50% SLTST-m-dk brngrys sdy arg occ calc incls sl
 frm mod calc sl ip tr carb occ lam w/ ss
- 10% SS- lt grys off wh trns1 comm wh pore
 fill fgr vf & m gr ip v frm fri brit
occ lt brn stn w/ bri yel/grn fluor fnt mlky
blu/yel cut
- 2450-80 40% SH- m gry grybrns bent mtrx frm-v frm brit
 tr carb subblky subrnd fis slty non-sl calc
- 50% SLTST-m brngrys grybrns tans sdy arg lt-m orng
 calcsphr incls v calc ip sl-mod calc sl
 frm lam w/ ss,
- 10% SS- lt-m grys off wh comm wh-gry cly pore
 fill sl calc drty slty tr glauc s&p vf-fgr
 wl srted frm-v frm fri tr lt-m brn oil stn
bri yel/grn fluor fair mlky blu/yel cut in
xylene
- 2480-95 TR% CALC-columnar xln habit,tan
- 20% SH- m-dk brngrys subblky-subrnd slty frm
 brit tr carb v sl calc bent
- 60% SLTST-m brngry rthy sdy frm sl calc, tr carb
 micromic aa
- 20% SS- off wh lt-m gry wh pore fill vf-fgr frm-
 v frm brit fri slty s&p tr glauc tr m gr
 trns1 clr tt non-sl calc tr brn stn
bri yel/grn fluor fair-gd instnt cut
- 2495-2500 Bottoms up @ casing point (fast feet 95-98
- 30% SH- aa w/ tr Bent-lt gry off wh
- 60% SLTST-lam w/ ss aa
- 10% SS- slty drty vf-fgr tt comm wh-lt gry pore
 fill fair-gd instnt mlky cut tr halo
over time aa

PEOC-NVG 32-26/Pilot Lithology Con't

- 2500-30 TR% SH- dk brngrys slty frm
 10% SLTST-m-dk brngrys sdy sl frm mic tr carb
 TR% SS- wh of wh lt-m gry s fgr trns l tr fluor
 no sig cut
 90% CMT- cement
- 2530-60 70% CMT-
 TR% SH- dk brngrys slty frm brit pred non calc
 30% SLTST-m-dk grybrns sl frm-frm sl calc sdy tr
 carb
 TR% SS- lt-m gry s off wh trns l vf-fgr wl srt d
 s&p comm wh pore fill tr yel grn fluor
v fnt cut no sig stn
- 2560-90 poor smpl quality
 40% CMT-
 10% SH- dk grybrns slty tr carb frm v sl calc
 subblky
 50% SLTST-m-dk brngrys sl frm-frm sdy arg sl calc
 tr carb tr pyr
 TR% SS- lt-m gry occ m gr clr trns l pred vf-fgr
 grds into sltstn no stn rr tr fluor
- 2590-2620 poor smpl
 60% CMT-
 40% SLTST-m gry dk gry brngry sdy carb spks sl
 calc mhd brit
 TR% SS- lse clr qtz clr vfgr ang tt w/ lt grn
 fluor no sig cut
- 2620-50 20% SH- m gry slty v sl calc frm sft rthy
 subblky
 60% SLTST-lt-m gry s brngry non calc sdy brit mhd-frm
 20% SS- lt gry clr vf-mgr non calc tr s&p ang prly srt d tt
 mhd tr grn fluor
- 2650-80 70% SLTST-m gry sdy non calc mhd brit grds into vfgr ss
 30% SS- lt gry m gry clr vfgr occ fgr non calc
 subang, glauc tt mhd
- 2680-2710 TR% SH- m gry rthy wxy sft
 TR% wh, orng amorph brit material probable mud additive
 50% SLTST-m gry non calc sdy mic mhd brit
 50% SS- lt-m gry s clr wh vf-fgr non calc glauc ang
 slty lam tt wl cmt d barren mhd
- 2710-40 TR% SH- nearly 10% m gry slty non calc frm
 50% SLTST-aa tr carb spks non calc mic brit mhd
 50% SS- wh lt gry vf-fgr slty mic wh cly fill glauc ang-
 subang tt mhd tr pale fluor

PEOC-NVG 32-26/Pilot Lithology Con't

- 2740-70 Noted: abdt LCM cedar fiber
 TR% SH- m gry rthy slty frm-mhd
 70% SLTST-m grys non-sl calc sdy brit mhd frm
 30% SS- lt-m grys occ wh vfgr slty s&p blk carb spks
 ang wl consol tt mhd
- 2770-2800 20% SH- m gry slty non calc sl calc ip brit mhd frm
 60% SLTST-m gry lt gry ip non-sl calc sdy mic brit frm-mhd
 20% SS- m gry wh-lt grys vfgr slty sl calc subang-ang wl
 cmt tt mhd NS
- 2800-30 10% SH- mgry smooth text slty sl calc brit mhd ip
 70% SLTST-m gry sl calc sdy mhd aa
 20% SS- lt-m grys w/sm wh vfgr s&p v sl calc sm wh pore
 fill tt mhd tr fluor no cut
- 2830-60 20% SH- m grys slty sl calc subblky brit mhd
 70% SLTST-m-lt grys grds into vfgr ss sl calc brit
 10% SS- lt gry vfgr sl calc ang-subang tt mhd tr pale blu
 fluor no cut
- 2860-90 20% SH- aa, 60% SLTST-aa, 20% SS- aa barren
 TR blk carb frags
- 2890-2920 30% SH- m grys smooth sl calc blk brit mhd
 60% SLTST-m gry lt grys sl calc sdy brit mhd
 10% SS- m gry lt grys vfgr slty sl-non calc blk carb spks
 mic tt mhd barren
- 2920-50 30% SH- m gry smooth text slty sl calc blk brit mhd
 70% SLTST-m gry lt gry sdy sl calc sm mica brit mhd
 TR% SS- aa
- 2950-80 20% SH- m gry dk gry v slty incr effervesence brit mhd
 80% SLTST-m gry sdy mic tr blk spkls brit mhd
 TR% SS- aa w/ fnt strmy blu/yel cut
- 2980-3010 50% SH- m-dk gry smooth text tr calcsphrs calc blk
 fis ip frm-mhd
 50% SLTST-m gry dk gry dcrng sdy v sl-non calc brit mhd frm
 tr-5% SS- lt gry m gry vfgr slty tt mhd barren
- 3010-3040 60% SH- dk gry m gry smooth text sl calc rr tr orng spkld
 blk sl fis mhd frm
 40% SLTST-m-dk gry sl calc w/ sm blk spkls
 no shows
- 3040-70 20% SS- lt grys mgry vf-fgr glauc s&p sl calc slty ang wl
 cmtd tt mhd fnt mlky cut strmy ip
 50% SLTST-m gry dk gry sdy calc blk carb spkls(incls)
 tr orng calcspheres brit mhd
 30% SH- dk gry mgry slty calc blk brit mhd-frm

PEOC-NVG 32-26/Pilot Lithology Con't

- 3070-3100 20% SH- sm mica brit blk
 50% SLTST-aa
 30% SS- m gry lt grys vfgr grds to sltstn calc blk spkls
 subrnd-ang tt wl cmted mhd barren
- 3100-30 20% SH- m grys slty mic tr carb tr blk spks subblky-subrnd
 non-sl calc vfrm-mhd brit bent mtrx rr tr columnar
 calcite w/ onesided druse habit
 70% SLTST-m gry grybrns sdy arg tr carb rr tr calc incl sl
 calc grds into ss frm
 10% SS- lt-m grys vf-fgr slty s&p comm wh chlky fill frm-v
 frm tt wl srted sl-mod calc cmt fnt mlky cut w/
 time
- 3130-60 TR% LS- tan brn dnse rr
 50% SH- m-dk gry grybrns v frm mhd slty bent, tr blk spkls
 rr tr pyr non-sl calc subblky-blky rr tr orng
 calcsphrs sl frm.
 50% SLTST-m-dk grybrns sdy arg tr blk spks tr orng calcsphrs
 grds to ss ip sl acle frm-v frm
 TR% SS- aa v fnt mlky cut w/ time
- 3160-90 NO REC
- 3190-3220 TR% CALC- wh amorph trns l
 80% SH- m-dk gry grybrns influx brns brngry
 subblky-blky bent(inc)non-sl calc tr m brngry
 (mod calc) tr blk spkld rr tr calcsphrs
 frm-mhd brit slty
 20% SLTST-m grybrn brngry tr blk spkls tr tan
 spkls sl calc frm tr pyr sdy ip NFSC
- 3220-50 Noted sl incr in effervesence
 TR CALC-wh trns l blk mas
 70% SH- m-dk grybrns brngry slty tr hckly v frm-
 mhd bent subblky-blky plty sl calc (sl incr)
 30% SLTST-m-dk brngry grybrns blk spkld lam grds
 ip to vfgr ss arg micromic
 TR% SS- m gry vfgr slty s&p carb tr glauc mhd tt
 wl srted sl calc
- 3250-80 70% SH- m-dk grybrns brngry slty tr blk spkls v
 frm-mhd subblky blky plty ip hckly ip bentic
 mtrx sl calc
 30% SLTST-m-dk grybrn tr tan lt gry sdy brngrys sl frm-frm
 arg vfrm mic tr blk spks sl calc
 TR% SS- rr w/ fnt cut
- 3280-3310 TR% LS- brn dnse vfrn cryptoxln tr pyr
 TR% CALC- columnar habit tt frac w/ shale contacts
 70% SH- m-dk brngrys vfrm-mhd frm & slty ip comm blk spkls
 sl calc bentic tr pyr subblky-blky rr tr hckly text
 30% SLTST-m brn brngrys tr tan sl frm-v frm sl calc tr blk
 spkls mic arg tr sdy w/ fnt cut

PEOC-NVG 32-26/Pilot Lithology Con't

- 3310-40 TR% LS- incr m brn dnse tan
 50% SH- m brngrys grybrns slty bentic tr frm v frm-mhd
 brit subblky sl calc mod calc
 50% SLTST-m brngrys grybrn arg sdy frm sl calc occ mod calc
 micromic tr blk spkls
 TR% SS- lt-m grys off wh wh pore fill slty drty s&p tr
 varic vf-fgr tr mgr trns l tt wl srt d
 no sig F or S tr fnt cut
- 3340-70 Noted influx in ss (abdt sweep material)
 TR% CALC- tan brn columnar tr druse w/ shale contact (F)
 10% SH- m grybrns slty comm blk spkls frm-v frm bentic
 mtrx sl calc subrnd-sunblky plty comm rk flour
 tr slickensides
 40% SLTST-m grybrns sdy arg frm sl calc mic comm blk spkls
 tr pyr
 50% SS- lt-m grys off wh trns l drty vf-fgr v fri slty s&p
 subang comm wk chlky fill mod calc sl odor
in HCl(10%) tr lt brn stn bri yel fluor
gd strmy blu/yel cut in solvent (xylene)
- 3370-3400 30% SH- m-dk grybrns slty bent frm-mhd bentic comm blk
 spkls v sl calc subblky
 30% SLTST-lt-m grybrns sdy arg sl frm-frm sl calc comm blk
 spkls micromic
 40% SS- lt-m grys off wh trns l incr drty vf-fgr tr
 unconsol mgr comm wh pore fill tt wl srt d
tr lt-dk brn stn bri yel grn fluor w/
gd instnt strmy cut
- 3400-60 30% SH- m-dk brngrys grybrns slty v slty tr pyr v frm-mhd
 subblky bentic mtrx comm blk spkls
 40% SLTST-m-dk brngrys sdy arg frm brit micromic tr blk
 spkls rr tr orng calcspheres sl calc
 30% SS- lt-m grys slty sm dk grybrns v drty s&p vf-fgr tt
 wl srt d comm cly fill sl-mod calc no stn tr
fluor fnt-fair mlky cut
- 3460-90 TR% LS- dk brn dnse cryptoxln
 TR% CALC- columnar hairline frac tt w/ shale contacts
 30% SH- dk grybrns slty tr pyr blk spkls v sl calc v frm-
 mhd brit subblky comm plty
 60% SLTST-m-dk brngrys sdy arg mic pyr tr blk spkls aa
 10% SS- v drty slty vf-fgr v fri tr fluor tr stn
v fnt cut
- 3490-3520 20% SH- m gry smooth text slty ip sl calc blk ip frm
 70% SLTST-m gry sl calc pyr rthy sdy brit frm mhd
 10% SS- wh lt grys clr vfgr slty glauc cly fill tt tr
fluor
- 3520-50 20% SH- m grys brngrys smooth text slty sl-non calc
 blk brit frm
 80% SLTST-m gry brngrys carb spkls pyr sl carb vf sdy
 brit mhd frm no cut tr SS- w/ pyr

PEOC-NVG 32-26/Pilot Lithology Con't

- 3550-3580 TR% SS- aa no sig cut or show
 30% SH- m grybrns slty sl-mod calc smooth frm
 70% SLTST-m grybrns calc sdy blk spkls tr pyr frm
- 3580-3610 30% SH- m grybrns sl-mod calc slty blkly frm
 70% SLTST-m grybrns calc tr calc spkls pyr sdy frm
 tr w/ cut
- 3610-40 20% SH- m grybrns sl;ty mod calc rthy wxy ip
 frm-sft
 80% SLTST-m brngrys calc tr orng calcspheres sdy
 mic frm brit tr w/ cut
- 3640-70 80% SLTST-aa 20% SLTST-aa w/ fnt cut
- 3670-3700 TR% FREE CALC- yel columnar habit tr slickensided
 60% SLTST-m-dk gry brngrys bcmg smooth shaley
 frm brit dcrng energy of deposition
 40% SH- incr dk gry dkgbrngrys slty calc blkly
 brit frm (gd-fnt cut)
- 3700-3730 40% SLTST-dk grybrns calc mic tr blk spkls brit
 frm mhd fnt cut
 60% SH- dk gry m grybrns slty calc brit frm
 blkly
- 3730-60 *incr eff (high case Kn Transition)
 TR% BENT- gry blu gry sft w/ dull fluor
 60% SH- m-dk grybrns slty subblky-subrnd sl-mod
 calc (incr) tr orng calcspheres v frm-mhd
 bent tr hckly
 40% SLTST-m brngrys grybrns sl-mod calc tr tan
 calcspheres fnt blu/yel mlky cut
- 3760-90 incr eff & tan specks top Kn Transition
 TR% BENT- lt gry s sl frm dull fluor slty wxy ip
 70% SH- incr m-dk brngrys slty frm-v frm mhd ip[
 comm bent mtrx subblky subrnd tr fis tr hckly
 text comm blk spkls tr tan calphres (incr)
 fnt-fair cut
- 3790-3820 TR Orng calcspheres incr effervesence
 TR CALC- columnar w/ shale contacts
 80% SH- dk brngrys grybrns vfrm-mhd tr frm v
 bent occ lt tan calcspheres tr lt-m orng
 calcspheres subblky fis tr hckly tr plty
 blk spkls sl-mod calc (incr)
 note the spkld shale is v calc fair
 cut
 20% SLTST-m-dk grybrns sl frm-frm blk spkld sl-mod
 calc arg mic

PEOC-NVG 32-26/Pilot Lithology Con't

3820-50 incr effervesence w/ depth

TR% BENT- lt-m grysgrybrns sft-sl frm dul fluor
80% SH- m-dk brngrys frm-v frm v bent subblky
plty subrnd tr hckly slty blk spkld tr
tan-m orng calcspheres mod calc incr
fair cut
20% SLTST-m brngrys grybrns rthy arg sl frm-frm
mic sl mod calc tr sdy tr calcspheres

3850-80 Note; BUCK PEAK MBR bench type lithos noted
influx calc and hyl spkld shale (approaching
marlstone)

TR% CALC- wh trnsl amorph tab ang xln w/ shale
contacts
90% SH- m-dk brngrys subblky fis ip hckly v frm-
mhd slty brit influx tan-lt orng calcsphrs
chlky comm blk spkls bent mtrx v calc
(incr) gd cut
10% SLTST- m brngrys sl frm-frm sdy mic blk spkld
orng calcspheres

3880-3900 Rt type lithos

TR% CALCITE- wh lt brn trnsl xln amorph tr
prismatic poss Inoc aragonite
TR BENT- lt gry wh wxy
100% SH- m-dk brngrys clky subblky hckly abdt lt
orng tan calcspheres v calc rapid fiz incr
w/ sl odor in HCl & residue lineated comm blk
spkls bri strmy blu/yel cuts
TR SLTST-aa

3900-20 TR CALC-clr trnsl wh xln tr prismatic habit(dcrng)
TR BENT- lt-m grysg tan wh tr pyr dul fluor
100% SH- m-dk brngrys chlky abdt calcspheres(sl
dcrng) subblky hckly lineated w/ sm blk spkls
frm-v frm brit v calc rapid fiz sl
odor & res bri strmy blu/yel cut

3920-40 TR% CALCITE-
100% SH- m-dk brngrys rthy chlky dcrng
calcspheres slty hckly w/ sm brn/blk spklsd
(fecal?) v calc rapid fiz bent tr pyr
gd cut(sl dcrng)
TR% SLTST-m brn tan arg calc sl frm-frm sdy

3940-60 Noted dcrng calcspheres w/ depth
TR% BENT- gry grygrn wh wxy
100% SH- m-dk gry brngrys subblky hckly fis ip
lam abdt m orng calcspheres v calc
frm-mhd brit slty comm blk spkls chlky
bentic mtrx gd cut sl dcrng

PEOC-NVG 32-26/Pilot Lithology Con't

- 3960-4000 TR CALCITE-tan brn w/ shale contacts tt columnar habit
 100% SH- dk brngrys grybrns frm-mhd brit slty bentic subblky hckly(derng ooc plty comm orng calcspheres(derng), comm blk spks(derng) mod-v calc(derng)
fair-gd mlky blu/yel cut
- 4000-40 TR% CALC- wh trnsl tan amorph xln mass habit
 100% SH- m-dk grybrns brngrys sl;ty chlky benmt v frm m hd brit w/ sm tan-m orng calcspheres derng ooc blk spkls subblky hckly(derng) mod calc (derng) more slty
- 4040-60 100% SH- m-dk grybrns brngry subblky hckly chlky bent frm-v frm brit ooc tan m orng calcsphertes (derng) mod calc slty (incr) non bench type lithos
- 4060-4100 90% SH- dk grybrns, slty frm-v frm brit bentic mtrx subblky-blky tr orng tan calcspheres tr blk spkls mod calc fnt cut
 10% SLTST-m-dk brngrys sl frm-frm tr sdy mod calc arg comm blk spkls subblky-subrnd
 sl incr in depo energy
- 4100-20 TR% BENT- wh gry sft wxy w/ fluor
 70% SH- m-dk brngrys grybrns slty v frm brit bent mod calc(sl derng) tr tan spkls comm blk spkls subblky chlky aa fnt cut
 30% SLTST-m-dk brngryus arg rthy micromic comm blk spkls sl frm-frm chlky ip
- 4120-60 TR% CALC- wh trnsl amorph xln
 TR% BENT- wh blu/gry wxy w/ fluor
 70% SH- m-dk brngrys grybrns slty bentic subblky frm-v frm brit rr tr tan calcspheres tr blk spkls mod calc fnt-fair cut
 30% SLTST-aa brngrys sdy tr blk spkls frm mic grds into ss
 TR% SS- lt-m brngrys drty slty vf- fgr tt wl srted v frm
- 4160-80 TR% BENT- blu grys pyr
 TR% CALC- wh clr trnsl
 80% SH- dk grys m brngrys calc slty tr orng calcspheres pyr bent blkly frm sft
 20% SLTST-dk gryrbns grds into sh mod calc ooc orng calcspheres pyr bent blkly frm-sft. slow mlky cut fnt-fair

- 4180-4200 TR% BENT- gry blu wxy sft w/ yel/blu fluor
 80% SS- dk grybrns mod calc pyr slty plty-blky
 frm
 20% SLTST-dk grybrns m grybrns mod calc thnly lam w/ vfgr s
 tr blk spkls frm-mhd brit tr ss
slow mlky yel shale cut (fnt-fair)
- 4200-20 TR CALCITE-wh tr druse w/ strmy cut
 30% SLTST-m grybrns dk grybrns mod calc w/ sm orng
 calcsphrs sl sdy tr blk fecal spkls brit frm
 70% SH- dk grybrns mod calc slty mic bent brit frm
fnt-fair cut strmy ip
 TR SS TR BENT aa
- 4220-40 TR% CALCITE-tan brn trns l w/ shale contact (frac)
 TR% BENT-incr blu gry tr pyr
 30% SLTST-dk grybrns dk gry blk spkls w/ sm calcsphrs
 sl sdy brit frm
 70% SH- sl incr brngrys dk grybrn mod calc slty w/ sm
 orng calcsphrs tr blk spkls frm brit fair
cut slow sl incr
- 4240-60 Noted: incr calcspheres prob Tow Ck Top
 TR% CALC- wh clr trans amorph xln columnar habit ip
 20% SLTST-dk grybrns brngrys rthy incr calc w/ sm orng
 calcspheres tr blk spkls frm sl brit blkyl chly
 80% SH- dk grybrns incr effervesence slty mic bent
 calcsphrs blkyl brit frm
bri strmy blu/yel mlky cut w/ halo
significant incr in cut
- 4260-80 Noted: Rt top Tow Creek Bench (incr calcspheres)
 10% SLTST-m-dk grybrns v calc tan-orng calcsphrs (incr)
 brit frm
 90% SH- m-dkgry slty v calc mott w/ tan-lt orng calcs,
 (incr) tr blk spkls brit hckly(bench type)
 frm bri yel cut w/ halo
- 4280-4300 100% SH- m-dk brngrys rthy chly (high Rt Type)
 abdt lt tan calcsphrs comm blk spkls subblky-
 hckly frm v calc w/ rapid fiz w/ res and
 sl sulfur odor tr fos deb tr free calc w/
 druse terminations i.e. rhomb habit or dogtooth
bri strmy cut
- 4300-20 TR% CALC- wh tan crm pyr
 100% SH- m-dk brngrys slty chly mott subblky-plty
 hckly text lam abdt m orng-tan calcsphrs
 comm blk spkls frm-v frm brit bent v calc
 sl dcrng fair-gd cut dcrng

- 4320-40 100% SH- incr m brn m-dk brngrys incr slty chky
bent hckly subblky sl frm-frm vf rm ip
mod-v calc (sl dcrng) abdt calcsphrs(dcrng)
comm blk spkls fair-gd cut
TR% SLTST-lt-m brn brngrys sl frm-frm mod calc arg w/ sm
blk spkls
- 4340-60 Noted: less spkld incr sltstn
90% SH- m-dk brngrys rthy v slty subblky-pty
hckly lt tan calcsphrs (dcrng) frm-v frm
bent comm blk spkls mod-v calc fair-gd cut
10% SLTST-m brngrys rthy sl frm arg blk spkls tr lt brn
tan calcsphrs
- 4360-80 TR% CALC- crm m-dk brn fos shl frags
90% SH- m-dk brngrys incr dk grybrns subblky-pty :
frm-vfrm brit dcrng lt tan calcsphrs comm
blk blk mod-v calc chky hly spkld dcrng
10% SLTST-m brngrys rthy sl frm frm arg mod calc blk spkls
lineated ip fair-gd cut
- 4380-4400 TR% CALC-aa
100% SH- m-dk grybrns slty subblky pty tr hckly abdt blk
spkls tr tan orng spkls frm-v frm brit bent
calc fair-gd cut
TR% SLTST-aa blk spkld
- 4400-20 TR CALC- wh trns l brn tan columnar(shl) and rhomb habit
100% SH- incr brngrys rthy grybrns chky slty v slty abdt
spkls incr lt tan calcspheres subblky hckly mod-v
calc gd mlky cut
TR% SLTST-aa
- 4420-30 Note: incr effervesence
100% SH- m-dk brngrys rthy mott grybrns incr hly spkld w/t
orng calcsphrs hckly v slty slty subblky
pred non spkld comm blk spkls v calc rapid fis
bent frm-v frm tr mhd brit good cut in solvent
TR% SLTST-m brngrys rthy sl frm-frm blk spkls
mod calc
- 4430-40 100% SH- m-dk brn gry slty v slty subblky pty comm blk
spkls tr tan calcsphrs sl frm-frm vfrm bent
v calc tr calc- tan crm wh clr columnar massive
xln habit gd bri yel cut
- 4440-60 CALCITE-wh clr crm columnar rhomb habit (frac) incr amt
100% SH- m-dk brngrys slty sl dcrng calcsphrs
subblky comm blk spkls hckly v calc sl frm
-v frm brit v slty bent gd cut dcrng
TR% SLTST-m brngrys sl frm calc sl frm

4460-80 100% SH- dk grybrns incr hckly text subblky plty bent sl
v frm brit slty v slty ip chlky v calc comm
spkls tr tan calcsphrs gd cut
TR% CALC- dcrng lt brn off wh trns^T rhomb columnar mass
(three types)

4480-4500 100% SH- m-dk brngrys grybrns chlky incr lt tan-m org
calcsphrs comm blk(fecal) spks,bent frm-v frm
v slty subblky hckly plty ip incr v calc w/
fizz sl sulfur odor gd cut

4500-20 Noted: est Wolf Mtn Bench Top

100% SH- m-dk brngry incr spkld w/ tan orng calcsphrs
comm blk spkls incr hckly chlky subblky
frm-v frm brit v calc rapid fizz w/ res & odor
incr free calc-lt tan-brn off wh trns^T columnar
rhomb habit tr fos frags gd cut

4520-30 100% SH- dk grybrns mott w/ tan calc spkls marly v calc
effervesence v slty hckly fiss sm plty
frm sl brit tr Calc- tan off wh
columnar mass w/ gd cut

4530-40 100% SH- dk grybrns mott m grybrns v calc tan calcsphrs
occ blk spkls tr pyr hckly brit sl brit frm
gd cut
TR CALC- tan off wh mass columnar aragonitic(Shl)

4540-60 100% SH- dk grybrns slty v calc tan-lt orng calcsphrs
pyr marly hckly frm-mhd brit gd shale cut
TR CALC- off wh tan trns^T columnar/ mass pyr

4560-80 100% SH- dk grybrns m gry brn slty tr pyr v calc w/
tan,off wh calcsphrsre marly ip hckly
blky frm brit dcrng chlky text gd cut
TR% CALC- incr wh tan pyr columnar mass tr shale contact
tt hairline frac

4580-4600 100% SH- dk grybrns slty mod-v calc (dcrng)
sm hckly plty sm blky frm brit
TR CALC- dcrng aa

4600-20 TR CALC- tan wh pyr columnar
TR BENT- blu gry sft pyr
100% SH- dk grys grybrns slty mod calc smooth ip blky frm
sl brit

4620-40 TR CALC- tan wh trns^T tr pyr coulmnar mass
TR BENT- tan mic
100% SH- dk grybrns mod calc smooth slty blky plty

4640-60 TR BENT-aa
 TR% CALC- wh yel/tan pyr w/ blu mnrl fluor incr from above
 to 4670
 100% SH- dk grybrns sl slty mod calc plty frm brit

4660-80 TR% CALC- dcrng from aa
 100% SH- dk grybrns mod calc smooth plty fis sl brit frm

4680-4700 TR% CALC- tan wh clr trnsl pyr
 100% SH- dk gry smooth mod calc blkly-fis frm-sft brit

4700-40 100% SH- dk gry dk grybrns smooth mod calc tr blk spkls
 blkly frm-sft brit ip gd cut
 TR% CALC- tan wh columnar
 TR% BENT- blu gry sft

4740-60 30% LS- m gry lt gry cryptoxln arg chlky sl dolo mhd
 dnse
 70% SH- dk gry m gry smooth calc frm sft blkly sl brit
gd cut

4750-70 TR BENT- rr lt gry blu/gry v dul fluor
 TR CALC- wh trnsl rhomb tr stn mass columnar tan (shl)
 10% LS- tan lt brngrys v frm-mhd cryptoxln arg chlky aa
 90% SH- m-dk grybrns tr v dk nearly blk mod calc tr v
 (dk) sm hly spkld shale pred non spkld slty-v
 hckly sl frm-v frm tr mhd brit occ blk spkld
gd cut

4770-90 TR CALC- dcrng wh off wh trnsl rhomb and mass habit
 TR LS- aa
 100% SH- m-dk brngrys v slty sl-v frm occ mhd mod calc
 (tr SH-v dk sl calc) subblky tr spkld dcrng tr
gd cut
 TR SLTST- m brngrys rthy sl frm mod calc tr blk spkld

4790-4800 TR% CALC- aa
 TR% LS- aa
 TR BENT-
 90% SH- m-dk grybrns dk gry frm-v frm slty-v slty mod
 pred non spkld subblky occ v sl calc dk gry
 10% SLTST- m brn brngrys rthy sl frm-frm arg comm
 blk spkld mod calc subrnd gd gd bulk shale cut

4800-20 Noted: dcrng effervesence sl dcrng cut Carlile Top
 TR LS- aa
 TR BENT-
 TR CALC- clr trnsl tan wh columnar/rhomb/mass
 90% SH- dk gry dk grybrns slty frm-v frm
 brit occ m brngrys tr hckly subblky
 sl-mod calc (dcrng tr blk spkls v slty
fair-gd cut
 10% SLTST- m brn gry rthy sl frm arg tr sft chlky tr pyr

4820-40 90% SH- dk gry grybrn choc brn non spkld subblky tr plty
frm-v frm sl more competent sl calc non calc tr
calc slty (incr) fnt-fair cut
10% SLTST-m-dk brn gry rthy brn arg sl frm mod calc tr
tr sdy bent

4840-60 TR% LS- tan m brngrys dnse v frm cryptoxln sl dolo
TR% CALC- wh trns sl crm rhomb columnar (shl)
90% SH- pred dk gry charcoal gry grybrns nrly blk
subblky plty tr fis frm-v frm tr mhd bent pred sl
calc occ mod calc fnt bulk cut
10% SLTST-m-dk brn brngrys rthy arg tr sdy sl frm
tr blk spkls subblky-subrnd

4860-80 TR% CALC-
TR BENT- gry off wh sft-sl frm w/ dul fluor
100% SH- m-dk grybrns chargry v dk sl calc tr non calc
tr mod calc subblky-subrnd frm brit tr mhd
slty tr pyr fnt pyr tr sltstn-aa

4880-4900 TR CALC- aa
90% SH- dk gry grybrns char gry slty subblky
tr blk sybrnd bent fis ip frm-v frm
brit tr mhd non-sl calc occ mod calc
fnt-fair cut
10% SLTST-m brngry rthy sft-sl frm tr sdy arg
pyr

4900-40 TR% BENT- wh sft w/ dul fluor
80% SH- dk gry chargry grybrns slty v slty frm-v frm
subblky fis ip plty sl calc bent occ sl frm
20% SLTST-m brn brngrys rthy sl frm sl-mod calc occ
spkls tr pyr tr sdy
fnt bulk cut

4940-60 80% SH- m-dk grybrns v dk char gry v frm brit
sl calc slty subblky-fis p0red non spkld
NO CUT
20% SLTST-m-dk grybrns arg sl frm-frm tr pyr tr sdy sl calc

4960-80 noted tr sandstone
80% SH- m-dk grybrns slty frm-vfrm, brit subblky-blky
fis bent sl calc NO CUT
20% SLTST-m grys grybrns tr lt brn/tan sl frm-frm
arg grds into ss sl calc tr pyr
TR% SS- lt grybrn v slty frm vfgr tt tr lt grybrn sl calc
pore fill barren

4980-5010 20% SH- aa v slty sl calc no cut
40% SLTST-lt-m grys sdy grds into ss frm sl calc tr pyr
tr carb lam w/ ss tr calc-columnar (shl)
40% SS- lt-m gry brn brngrys trns off wh ip vf-fgr tr m
wl srted comm wh-gry chlky pore fill frm fri
subang-subrnd no fluor tr lt-m brn stn,
fnt mlky slow blu/yel cut in solvent (xylene)

PEOC-NVG 32-26 SIDETRACK LITHOLOGY

Note KOP 3390 ft.

- 3390-3400 90% CMT
10% SLTST-m-dk gry sl calc sdy blk mhd
- 3400-10 30% CMT
10% SH- m-dk gry slty sl calc blk mhd
60% SLTST-dk gry m gry vf sdy sl calc brit mhd
- 3410-20 20% CMT
80% SLTST-aa occ blk spkls (fecal)
- 3420-30 Smpl quality improving
TR% CMT
TR% SS
30% SH- dk gry smooth text sl calc fis frm mhd ip
70% SLTST-m-dkgry sl sdy non-sl calc frm mhd brit
- 3430-60 70% SLTST-dk gry m gry mott vf ss sl-non calc w/ sm blk
spkls frm-mhd brit
30% SH- dk gry smooth slty sl calc blk brit mhd
- 3460-90 90% SLTST-m gry dk grybrns sl calc vf ss occ glauc
tr blk spkls blk mhd brit
10% SH- grds into sltstn
- 3490-3520 100% SLTST-mgry dk gry grds into vfgr ss sl calc
carb spks tr bent brit mhd
TR% SH- aa
- 3520-3550 20% SH- m gry grybrns slty-v slty bent frm occ vfrm
brit subblky plty v sl calc tr pyr tr carb
80% SLTST-lt-m grys grybrns tan arg sdy grds to vfgr ss
sl-v frm v sl calc tr pyr tr carb bent
- 3550-80 30% SH- m gry grybrns bent slty sl-v frm brit
v sl calc subblky tr pyr tr carb
70% SLTST-lt-m gry grybrns arg v sl sl calc sdy sl frm
frm v frm tr carb tr pyr
- 3580-3597 TR% BENT- m gry sl frm v dul fluor
20% SH- m gry grybrns frm-v frm brit slty tr pyr tr carb
v sl calc bent subblky
80% SLTST-m gry grybrns sl-v frm arg sdy sl calc
TR SS- rr m gry lt gry v slty vfgr v frm brit tt
abdt wh/gry cmt sl calc dolo barren
- 3597-3630 TR% CMT
TR% BENT- blu gry sft
30% SH- m brngrys non-sl calc slty smooth text plty
frm-sft
70% SLTST-m gry brn sl-non calc v sdy(vfgr)mic frm blk
TR% SS- m brngrys vfgr frm barren

PEOC-NVG 32-26 SIDETRACK LITHOLOGY

3630-60 10% SH- dk gry m-dk brngry sl-non calc v slty blk
frm sm brit
90% SLTST-m grybrn v sdy mioc sl calc blk carb spkls
blk fr brit tr ss

3660-90 10% SH- aa
90% SLTST-m brngrys grds into vfgr ss tr blk carb splkls
brit frm
TR SS- wh tan lt grys vfgr sl calc pyr mhd tt
TR BENT- wh lt blu gry pyr

3690-3720 TR% BENT- wh lt grys sft wxy dul fluor
TR CALC- wh trns l lt brn rhomb habit mass (frac)
30% SH- m gry grybrns v frm brit sl bent mtrx
slty occ blk spkls v sl calc
70% SLTST-lt-m brngrys arg tr sdy micromic rr tr org
calcsphrs sl frm-frm sl-mod calc tr blk spkls

3720-40 Noted sl incr in effervesence Top Kn Transition

TR% BENT- lt gry grygrn sft-sl frm tr pyr tr vol glas
shards
50 SH- m grybrns v frm-mhd slty bent occ blk spkls tr py
subblky plty sl-mod calc brit
50% SLTST-m brngrys frm-v frm arg tr sdy sl-mod calc
tr carb tr blk spkls rr tr orng calcsphrs rr tr
hackly text

3740-60 type transition lithology
60% SH- m-dk brngrys v frm-mhd brit bent slty(dcrng)
comm blk fecal spkls tr carb subblky-plty
occ blk v sl-sl calc mod ip
40% SLTST-m brngrys arg sl-vfrm sl-mod calc
tr blk spkls tr tan-orng calcsphrs mod calc ip

3760-80 Noted sl incr in effervesence

TR BENT- lt grys lt grygrn sft-frm dul fluor
80% SH- m-dk brngrys grybrn v frm-mhd brit bcmg
more firm bent subblky-plty incr fis comm
spkls sl-mod calc (incr) slty tr hckly
20% SLTST-m-dk brngrys sl-frm mod calc tr carb comm spkls
tr orng lt tan calcsphrs arg micromic

3780-95 Note: Abdt paraffin mixed w/ smpl w/ bri cut
acted like a sweep poor quality

Fracture TR CALC
TR BENT
50% SH- lt-dk brngrys grybrns sft-mhd non-mod calc
slty, brit tr pyr tr carb fnt-bri cut
40% SLTST-lt-dk brngrys rthy arg sdy sft-v frm sl-mod calc
10% SS- vf-fgr tan lt-m gry wh-gry pore fill sl-mod cal
tr stn tt

PEOC-NVG 32-26 SIDETRACK LITHOLOGY

- 3795-3820 sl incr effervesence
 TR% BENT- lt gry grygrn wh tr glass shard inclc dull f
 TR CALC- tan wh clr trnsl rhomb mass w/ shale contacts
 tr dogtooth spar frac evidence
 80% SH- m-dk gry grybrns subblky plty frm v frm slty
 micro filled frac w/ calc (tt hairline frac)
 sl-mod calc comm blk spkls bent fair
shale cut
 20% SLTST-m brngrys rthy occ lt brngrys occ dk brngrys
 tr sdy comm blk spkls micromic mod calc
- 3820-40 sl incr eff sl incr calcsphrs
 TR% BENT- lt gry grygrn glass shards tr pyr dul fluor
 TR% CALC- clr trnsl tan mass rhomb
 90% SH- m-dk grybrns frm-v frm brit slty comm-abdt
 blk (fecal) spkls tr tan-orng calcsphrs
 bentic mtrx fair-gd mlky cut
 10% SLTST-m-dk grybrns brngrys sdy arg sl-frm mod calc
 comm blk spkls tr vfgr ss
- 3840-60 Noted Kn Top 3845
 TR CALC-aa
 90% SH- m brngrys m-dk grybrns incr lt orng tan calcsphr
 chlky subblky tr hckly (sl incr) bent abdt
 spkls occ hly spkld bent mod calc
 occ v calc gd mlky blu yel cut
 10% SLTST-aa
- 3860-70 Noted: bench type lithology
 influx calcite incr effervesence incr calcsphrs
 TR CALC- incr wh off wh tan crm trnsl clr rhomb mass w/
 contacts
 100% SH- m grybrns brngrys sm dk incr lt tan calcsphrs
 comm blk spkls hly spkls ip v calc incr
 subblky-plty fis occ hckly (incr) slty frm-v
 brit lam ip gd bri mlky-strmy blu/yel cut
 TR SLTST-m brngrys arg sl frm- frm blk spkls
- 3870-80 Noted; high Rt type lithology
 TR CALC-
 100% SH- m grybrn chlky subblky plty fis hckly
 hly spkld w/ lt orng tan calcsphrs v frm brit
 calc rapid fiss slty occ blk spkls
bri instn strmy blu/yel cut
- 3880-90 TR CALC-
 TR BENT-
 100% SH- m brngrys chlky subblky plty fis ip incr hckly
 text abdt hly spkld w/ lt tan-orng calcsphrs frm
 frm brit v calc rapid fizz gd mlky cut
 sl dcrng cut tr sltstn

PEOC-NVG 32-26 Sidetrack Lithology

- 3860-70 Bench type Lithos: influx calcite, incr eff incr calcsphrs
 TR% BENT- m gry grybrns
 TR% CALC- incr wh off wh tan crm trns l cl rhomb mass w/
 shale contacts (fracture evidence)
 100% SH- m grybrns brngry dk ip incr lt tan-orng calcsphrs
 comm blk spkls incr hly spkld frags v calc (incr)
 subblky-plty fis (inc) slty frm-v frm brit lam
 TR% SLTST-m brngrys sl-v frm blk spkls
not ad incr bri gd strmy blu/yel bulk cut in solvent
- 3870-80 High Rt type
 TR CALC- aa
 100% SH- m grybrns chlky subblky-plty fis hckly hly spkld
 w/ tan calcsphrs v frm brit v calc w/ rapid fizz
 slty occ blk spkls bri instnt strmy blu/yel cut
- 3880-90 TR% CALC- aa TR BENT- aa
 100% SH- m brngrys grybrns chlky subblky plty fis incr
 hckly abdt hly spkld w/ tan-orng calcsphres
 frm-v frm brit v calc w/ rapid fiz gd cut sl derng,
 TR% SLTST-aa
- 3890-3910 100% SH- m gry brn brngry chlky occ lt brns hckly
 subblky fis abdt hly spkld (sl derng)incr
 blk spkls frm-v frm v calc w/ rapid fiz
bri instnt cut tr sltstn
- 3910-30 10% BENT- lt gry wh grngry w/ bri grn fluor
 90-100% SH- m brngrys chlky rthy incr slty abdt m orng tan
 calcsphrs tr calc laminations hckly fis plty -
 subblky v calc w/ rapid fiz bri instnt
blu/yel mlky-strmy cut
- 3930-50 TR% BENT- blu-gry pyr
 TR% CALC- wh tan mass striated
 100% SH- dk gry m-dk brngry smooth slty mod calc
 w/ sm orng tan calcsphrs blkly fis-plty hckly
 text frm w/ blu-yel mlky cut
- 3950-80 100% SH- dk gry smooth slty mod-v calc occ tan spkls tr
 tt hairline frac w/ calc fill blkly frm
 TR% CALC-tan wh
 TR BENT-blu-gry pyr
- 3980-4000 100% SH- dk gry smooth mod-v calc sl slty hckly fis frm tr
 calc gd cut
- 4000-20 100% SH- dk gry smooth mod calc occ calc spkls fis-plty
 frm tr xln calc tan mass rr tr bent-aa
- 4020-4040 TR% CALC- wh tan
 100% SH- dk gry mgrybrns smooth slty tr blk spkls mod-v
 calc blkly subplty brit frm-mhd gd cut

PEOC-NVG 32-26 Sidetrack Lithology

- 4020-40 TR% CALC- wh tan
100% SH- dk gry m grybrns smooth slty blk carb spkls
mod-v calc blk subplty brit frm-mhd
- 4040-60 90% SH- m-dk grybrns,dk grys smooth ip slty mod-v calc
blk brit frm-mhd
10% SLTST-m-dk gry brngry mod-v calc tr vf gr ss tr blk
spkls occ calcsphrs brit frm-mhd
- 4060-80 100% SH- dk gry m-dk grybrns mod-v calc slty brit-mhd
blk
- 4080-4100 10% SLTST-m-dk grybrns mod-v calc tr calcsphrs tr blk spkls
frm-mhd brit
90% SH- dk gry m-dk grybrns smooth slty blk brit sl less
calc-mod ip
- 4100-20 20% SLTST-m-dk grybrns mod-v calc tr blk spkls occ orng
calcsphrs frm-brit
80% SH- dk gry m brngrys slty mod calc smooth brit blk
frm-mhd rr tr calc frags
- 4120-40 30% SLTST-m brngrys mod-v calc grds into shale occ tan-wh
calcsphrs frm-mhd brit
70% SH- m grybrns dk gry smooth mod-v calc sl less calc
than above slty blk frm-mhd brit
- 4140-60 20% SLTST- m grybrns mod-v calc blk spkls grds into slty
shale blk brit mhd
80% SH- dk grybrns dk gry mod-v calc pred slty w/ sm
orng calcsphrs brit blk-subplty frm-mhd
- 4160-80 30% SLTST-m grybrns incr effervesence incr calcsphrs
occ blk spkls blk-mhd fnt cut
70% SH- m gry brns dk gry smooth slty blk brit
frm-mhd fnt shale cut
- 4180-4200 TR% CALC- tan columnar(shl) w/ sm wh mass i.e. no habit
20% SLTST-m grybrns v calc tr blk spkls brit mhd frm
80% SH- dk gry m grybrns slty mod-v calc brit mhd blk
fnt cut in solvent
- 4200-20 20% SLTST- m-dk gry grybrn mod-v calc spkld ip w/ calcsphrs
tr blk brit mhd
80% SH- dk gry dk brngrys mod calc slty tr smooth text
blk-plty frm-mhd tr dk orng calcsphrs fnt-
fair cut
TR% CALC- wh tan mass tr stn w/ bri lt blu fluor
strmy yel/blu cut
fracture evidence

PEOC-NVG 32-26 Sidetrack Lithology

4220-40

TR CALC- tan off wh mass xln habit columnar ip (shl)
 80% SH- dk grybrns slty w/ sm blk spkls frm-v frm
 brit hckly subblky plty,sl bent rr tr calcsphrs
 mod calc-sl incr
 20% SLTST-m-dk brngrys brns rthy sl frm-frm arg tr pyr occ
 blk (fecal) spkls fnt-fair cut

4240-50

Note: high cse TOW CREEK BENCH
 incr effervesence, incr chlky incr blk spkls

TR% BENT- m gry grygrn frm w/ dul fluor
 TR% CALC- aa
 80% SH- m-dk grybrns chlky rthy incr blk spkls subblky
 plty hckly incr dk orng calcsphrs incr lt tan
 calcsphrs slty frm-v frm brit mod-v calc (incr)
 gd cut
 20% SLTST-aa

4250-70

Noted incr blk spkls incr effervesence
 TR% CAL- tan crm tr rhomb pred mass habit
 90% SH- m-dk brngry rthy chlky abdt blk spkls subblky
 hckly(incr) incr lt orng-dk orng calcsphrs
 hly spkld slty tr lam w/ carb frm-v frm v calc gd
shale cut
 10% SLTST-m brngrys rthy sl-v frm comm blk spkls mod calc

4270-90

Note: high Rt Type lithology

100% SH- m-dk brngrys chlky rthy hly spkld w/ orng-tan
 calcsphres abdt blk spkls pred spkld slty frm-v
 frm brit subblky-v hckly v calc-w/ rapid fizz
bri strmy cut in xylene

4290-4300 Con't high Rt type Lithos

TR CALC- wh tan crm tr pyr columnar mass habits
 100% SH- m-dk brngrys rthy chlky pred hly spkld v calc
 w/ rapid fizz subblky-plty hckly frm-v frm tr
 SH/Calcite contacts (frac evidence) bri
shale cuts

4300-20

Noted sl dcrng calcsphrs, incr blk spkls sl dcrng
 effervesnce i.e tracking out of Rt

TR% BENT- gry grybrns off wh w/ dull fluor
 100% SH- m-dk brngrys rthy chlky (incr non spkld frags)
 subblky-fis plty hckly frm-v frm v calc w/ rapid
 eff sl dcrng abdt blk spkls bri cut

4320-25

Noted: Encountered a Mud Gas Increase and caught a spot
 smpl,noted incr non spkld shale dcrng effervesence
 Noted fracture evidence

PEOC-NVG 32-26 Sidetrack Lithology

4320-25

TR% CALC- wh tan crm trnsl clr bladed open frac
type tr columnar (shl) mass ip tr
lt brn-dk stn strmy cut w/ yel fluor
100% SH- m-dk brngry grybrn chlky rthy incr non
spkld shale comm spkld shale (blk) mod calc-v ip
bent bri mlky blu/yel cut sl derng
effervesence

4325-30

Calcite- clr trnsl tan crm wh bladed ip (open frac
type) columnar rhom and mass habit tr stn
fast-slow strmy cut w/ fluor
80% SH- dk grybrns brngry rthy influx non spkld
shale v slty mod calc(derng) sl calc ip frm-
v frm brit bent occ spkld (derng) subblky-subrnd
hckly comm blk spkls gd shale cut
20% SLTST-m-dk brngry rthy sl-v frm tr pyr comm
blk spkls bent arg

4330-50

TR% CALCITE- tan crm off wh trnsl columnar bladed
tr stn slow strmy cut frac evidence
80% SH- dk brngrys chlky ip plty hckly bent comm
blk spkls occ tan spkls v slty frm v frm ip v
calc gd shale cut
20% SLTST-m-dk brngrys rthy sft-sl frm occ frm
mod-v calc blk spkld arg micromic occ tan-orng
spkls i.e calcsphrs

4350-70

TR% CALC-aa
70% SH- m-dk brngrys rthy slty v dk brngrys v
frm-frm incr competence bentic ip subblky fis ip
hckly v slty ip occ tan calcsphrs v calc
30% SLTST-m brngrys rthy sl-v frm occ blk spkls
occ tan spkls mod-v calc arg ip

4370-92

TR CALC- wh tan crm trnsl rhomb columnar and
mass xln habit (derng) evidence of
fractures
90% SH- m grybrns chlky subblky plty sl incr m
orng calcsphrs v calc comm blk spkls vfrm-
frm incr competence brit slty v slty (derng)
10% SLTST-aa

4392-4410 60% SH- m grybrns v calc v slty subblky plty frm

brit sft gd instn shale cut
TR CALC- abdt wh tan clr trnsl w/ yel blu fluor

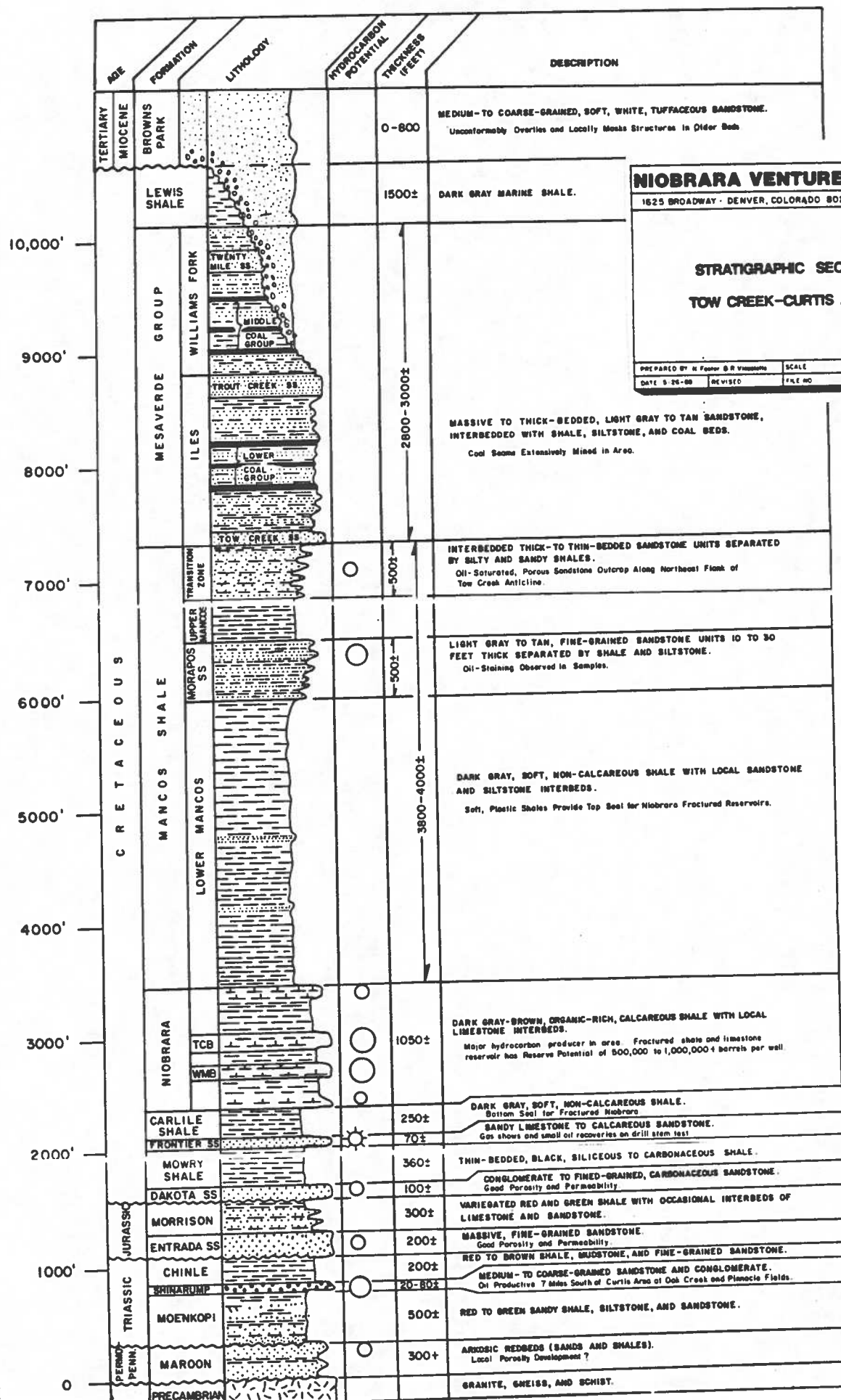
40% SLTST-m grybrns v calc chlky(marly) occ
calcsphrs sm blk spkls frm-brit

PEOC-NVG 32-26 Sidetrack Lithology

- 4410-30 TR CALC- wh clr mass yel/blu fluor
 30% SH- m grybrns m brns slty v calc marly calc
 spkls (common) hckly ip frm sft brit gd
strmy cut
 70% SLTST-m grybrns tr blk spkls w/ sm tan
 calcsphrs wh ip, grds into slty shale frm blkly sft
- 4430-50 20% SLTST-m-dk grybrns shaley v calc, marly w/ sm
 tan calcsphrs frm-sft blkly
 80% SH- m-dk grybrns brngry smooth text ip slty ip
 v calc sm calcsphrs tr blk spkls marly hckly
 ip blkly frm gd shale cut
 TR% CALC- tan wh yel-blur fluor bri strmy cut ip
- 4450-70 100% SH- m-dk grybrns smooth ip v calc calcsphrs
 incr slty hckly frm brit plty w/ gd cut
 TR CALC-abdt wh clr tan columnar mas habit w/ yel
blu fluor
- 4470-85 Rt Type
- 100% SH- m-dk brngry tan v calc abdt calcsphrs
 slty v marly arg hckly blkly frm brit bri
strmy shale cut
 CALC- abdt wh tan columnar mass tr pyr
 yel/blu fluor strmy cut ip
- 4485-4500 100% SH- m-dk brngry v slty arg marly frm wxy
 sft ip v bri strmy cut
 abdt calc-tan wh clr mass occ columnar w/ strmy
cut
- 4500-15 100% SH- m-dk grybrns dk brngry smooth v calc marly
 sm calcsphrs hckly frm plty ip gd bri
cut
 CALC- abdt tan wh pyr w/ fluor & cut
- 4515-30 100% SH- dk gry m brngry smooth text occ
 calcsphrs v calc less arg fis frm brit gd cut
 TR Pyr, Tr Bent
 CALC- abdt tan wh mass & columnar habit pyr w/
yel blu fluor
- 4530-4548 100% SH- dk gry brngry smooth ip v calc mod calc
 ip fis plty frm brit gd shale cut bri
strmy ip
 CALC- abdt wh tan pyr mass columnar w/ fluor

TOTAL DEPTH DRLR 4548

STRATIGRAPHIC SECTION TOW CREEK-CURTIS AREA



NIOBRARA VENTURE GROUP

1625 BROADWAY - DENVER, COLORADO 80202-SUITE 530

STRATIGRAPHIC SECTION TOW CREEK-CURTIS AREA

PREPARED BY H. Foster B.R. Voss
DATE 5-25-88 REVISED FILE NO. MAP NO.

SCALE 1" = 100'