

# GEOLOGIST'S REPORT

DRILLING TIME & SAMPLE LOG

COMPANY BEREXCO LLC NO. L-21  
 LEASE LACEY LOCATION 2310 FSL & 990 FEL  
 SEC. 21 TWP. 26S RNG. 33W  
 COUNTY FINNEY STATE KANSAS  
 FIELD WILDCAT

CONTRACTOR BEREDCO DRLG. RIG NO. 2  
 COMM. 11-4-2011 COMP. 11-21-2011  
 RTD 5390 LTD 5396

No. of DST'S 2 No. of CORES NONE  
 SAMPLES SAVED FROM 3800 TO TD  
 DRILLING TIME KEPT FROM 3800 TO TD  
 SAMPLES EXAMINED FROM 3800 TO TD  
 GEOLOGICAL SUPERVISION FROM 3800 TO TD  
 GEOLOGIST ON WELL EDWIN H. GRIEVES

FORMATION TOPS  
 BASE HEEBNER SAMPLE 3970 LOG 3975 SUBSEA -1041  
 TORONTO 3982 3986 -1052  
 LANSING FM. 4015 4019 -1085  
 MARMATON 4504 4584 -1650  
 CHEROKEE FM. 4722 4719 -1785  
 MORROW FM. 4997 5000 -1066  
 CHESTER FM. 5047 5054 -2120  
 ST. GENEVIEVE 609E ? ?  
 ST. LOUIS 5122 5130 -2196  
 TD 5390 5396 ?

ELEVATIONS  
 KB 2934  
 DF 2931  
 GL 2921  
 MEASUREMENTS ARE ALL FROM KB

SCALING RECORD  
 8/8 1752 W/ 9X.  
 W/ 9X.  
 W/ 9X.  
 W/ 9X.  
 W/ 9X.

EL. LOG AR. IND. S. P. GR.  
 DEN. NEUT. GR. CALIPER  
 M. L. SONIC. X. RMI

21

API 15-055-22118

REMARKS Earth-Tech had an unmanned gas detection trailer on this hole from 3800 feet to total depth.

Geologist Log 3 to 6 ft high to E-Log depths

Thank you,  
 Edwin H. Grievess  
 Geologist

**LITHOLOGY**

SANDSTONE  
 LIMESTONE  
 SHALE  
 GYPSUM

SLTSTONE  
 DOLOMITE  
 GRANITE WASH  
 ANHY & GIP

**CHROMATOGRAPH**

HOT WIRE BY TOTAL GAS VOLUME

C1 = METHANE  
 C2 = ETHANE  
 C3 = PROPANE  
 C4 = BUTANE  
 C5 = PENTANE  
 C6 = HEXANE  
 C7 = HEPTANE  
 C8 = OCTANE  
 C9 = NONANE  
 C10 = DECANE

3800

Interbedded Limestones  
 ① Fastex Drlg. Lms. tan to abu wht. to cam.-chlk. + tan; crypto. to v.v. fine trs. sub-chlk, sub-sucro to sucro; dul. yel. to yel. + dul. lt. yel. to lt. yel. fluor.; No Cut; pr. to PR. micropor. + prob. interx/n. por.

POR. + PROD. INTERXLU. POR.

② Slower Dalg. Lms. H. tan to tan, grayish. IP's; crypto. to v.v. fn. xln.; sub-chlk, sub-sucro + packstn. dul. yel. to yel. fluor.; No Cut No Vis POR.

WOB 34000  
RPM 76  
SPM 60  
PP 800

Lms. v. to extly. abn. wht. to crm. chlk + H. tan to tan; crypto. to v.v. fn. xln. trs. sub-chlk, sub-sucro. to sucro.; dul. yel. to yel. + dul. H. to H. yel. fluor.; No Cut; abn. pr. to trs. pr. + gd. micro-pp. + prob. interxlu. por.

3900

Lms. tan, grayish. IP's; crypto. to v.v. fn. xln.; trs. sub-chlk, sub-sucro + packstn.; dul. yel. to yel. fluor.; No Cut; No Vis Porosity  
Sh. v. drk. gray to black - carb.  
Sh. H. gray, grayish IP's to trs. H. green

BZSCHAEBUER  
3970-1036

BLK. SH. 5U

Toronto  
3982-1048

Lms. abn. wht. to crm. - chlk + tan, crypto. to v.v. fn. xln.; trs. sub-chlk, sub-sucro. to sucro. + packstn.; dul. H. yel. + fluor.; No Cut; abn. pr. to trs. + gd. micro-pp. + prod. interxlu. por.; abn. chert + wht. to gray; opaque; w/trs. foss.

Lms. H. gray, grayish. tan to tan; crypto. to v.v. fn. xln.; trs. sub-chlk, sub-sucro + packstn. dul. yel. fluor. IP's; No Cut; No Vis POR.

4000

Lms. hv. trs. wht. to crm. - chlk. + H. tan crypto. to v.v. fn. xln.; trs. sub-chlk, sub-sucro. to sucro.; phz. to m. oolitic IP's; dul. yel. fluor.; No Cut; hv. trs. pat. to tan. to gd. micro-pp. por. + prob. interxlu. por.

Lansing Fm.  
4015-1081

Interbedded Limestones

① Faster Dalg. similar 4015-4024  
② Slower Dalg. Lms. H. gray. to tan, crypto. to v.v. fn. xln.; oolitic IP's (gray + tan) trs. sub-chlk, sub-sucro. to packstn.; dul. yel. fluor. IP's; No Cut; No Vis POR.

Lms. trs. wht. to crm. - chlk. + tan; crypto. to v.v. fn. xln.; v. to extly. oolitic IP's to v. to extly. oolitic matrix sub-sucro. to sucro. + packstn. dul. yel. to yel. fluor.; No Cut; abn. pr. to gd. to extly. oolitic por.; Quest. Perm.

4100

Interbedded Lmst + scattered Shales

① Slower Dalg. Lms. H. gray. to tan; crypto. to v.v. fn. xln.; trs. sub-chlk, sub-sucro. + packstn.; dul. yel. fluor. IP's; No Cut; No Vis POR.

② Faster Dalg. Lms. tan, grayish. IP's; crypto. to v.v. fn. xln.; trs. sub-chlk, sub-sucro. to sucro.; dul. H. to H. yel. fluor.; No Cut scattered trs.

4089 TRIP FOR HOLE IN DRILL PIPE

TRIP GAS 5U

fluor.; No Cut; scattered trs.  
poor micro-pinpoint porosity  
② scattered shales med. to v. drk.  
gray - calc IP's

Lms. abn. wht. to crm. - chlk + crm. to tan  
grayish. IP's; crypto. to v. f. xln.; w/ trs.  
med. to coarse, wht. calc xls + trs. ags. scattered  
trs. slt. to oolitic, oolitic for slt. trs. slt. to oolitic  
oolitic; sub-chlk., sub-sucro to trs. sucro. +  
pachstn. dul. H. yel. to dul. yel. fluor.; No Cut  
trs. pr. to tr. oolitic por.; Prob No vis Por  
Lms. H. gray. to tan; crypto. to v. u. f. xln.; trs.  
sub-sucro., pachstn. + trs. sub-lithogr.  
dul. yel. fluor. IP's; No Cut; No vis Por

Lms. hvy. trs. wht. to crm. - chlk +  
tan, grayish. IP's; crypto. to v. u. f. xln.;  
slt. to oolitic/or slt. to oolitic; matrix  
trs. sub-chlk., sub-sucro. to sucro. +  
pachstn.; dul. yel. fluor.; No Cut;  
2bn. pr. to tan + trs. oolitic por. +  
trs. pr. to tan. micro-por. IP's  
Questionable permeability

Interbedded Lmsts + scattered Shales  
similar 4104 - 4200

Sh. v. drk. gray to blk. carb-looking  
Interbedded Lmsts + scattered Shales  
similar 4104 - 4200

Lms. similar 4231 - 4252

Interbedded Lmsts + scattered Shales  
similar 4104 - 4200

Lms. extra. abn. wht. to crm. - chlk +  
grayish. tan to tan; crypto. to v. f. xln.;  
xln.; sub-chlk., sub-sucro. to  
sucro.; abn. phantom oolitic to  
abn. oolitic; dul. H. yel. fluor.;  
w/ abn. pr. to slt. trs. tr. micro-por.  
IP's; + poss. inter xln. por. IP's

Lms. H. gray. to tan; crypto. to v. u. f. xln.;  
trs. sub-chlk., sub-sucro. + pachstn.;  
v. dul. yel. fluor. IP's; No Cut; No vis Por.

Sh. v. drk. gray to blk. - slt. to ext. trs.  
calc IP's, grading to shly Lmsts  
Lms. trs. wht. to crm. - chlk + H. gray. to tan  
crypto. to v. u. f. xln.; sub-chlk., sub-sucro.  
to sucro.; phantom oolitic IP's; dul. H.  
yel. fluor.; No Cut; abn. pr. fa. qd. to excel  
micro-por. + inter xln. por.

Lms. lt. gray. to tanish. gray; crypto. to  
v. u. f. xln.; trs. sub-chlk., trs. sub-sucro.,  
pachstn. + sub-lithogr.; v. dul. yel.  
fluor.; No Cut; No vis Por.

4200

4300

4400

WOB 35000  
RPM 78  
SPM 58  
PF 800

TRAP CHECK

S U

C U

'fluor.; No Cut; No Visible Por.

Sh. med. to v. drk. gray calc. to v. drk. gray to black-carb

6 U

Lmsts. similar 4449-4477 becoming Tan IP's

4500

4560-4584 Sh. med. to v. drk. gray. sli. to extraly calc. grading to Shly Lmst

MARMATON  
4584-1650

Lms. hv. trs. wht. to crm-chlk + lt. gray to tan; crypto to fuxlu phantom oolitic to oolitic; matrix subchlk sub-sucro. + packstn; dul. ht. to ht. yellow fluor.; No Cut; No Visible Porosity

7 U

Lmst. lt. gray to tan; crypto. to v.v. fuxlu trs. sub-chlk, sub-sucro + packstn; phantom oolitic IP's; dul. ht. yellow fluor.; No Cut; No Visible Porosity

4600

Lms. similar 4584-4598

Lms. similar 4598-4638

Sh. v. drk. gray to black-carb  
Lms. similar 4598-4638

BLK. SH. 19 U

Lms. abn. wht. to crm-chlk + lt. gray to tan crypto. to v.v. fuxlu; trs. sub-chlk, sub-sucro to sucro; dul. ht. to trs. ht. yellow fluor.; No Cut; abn. por. to trs. tr. micro-p.p. por. + poss. interxly por.

RECYCLE 13 U

Lms. similar 4598-4638

4700

Sh. v. drk. gray. to black-carb  
Lms. tan to lt. gray; crypto. to v.v. fuxlu; sub-chlk, sub-sucro. to sucro + packstn; abn. sli. to extraly. oolitic; dul. ht. yellow fluor. No Cut to v. sli. to extraly. oolitic; v. sli. trs. tr. micro-p.p. por.

BLK. SH. 20 U

RECYCLE 12 U

CON GAS 15

Sh. v. drk. gray to black-carb.  
Lms. tan to lt. gray; crypto. to v.v. fuxlu; sub-chlk sub-sucro + packstn; trs. foss.; trs. oolitic dul. yellow fluor.; No Cut; No Visible Por.

BLK. SH. 12 U

Cherokee  
4722-1788

Interbedded Limestones + Shales

① Lms. tan, grayish. IP's; crypto to v.v. fuxlu; sli. trs. chlk, trs. subchlk sub-sucro, packstn + trs. sub-lithogr. IP's; scattered trs. phantom oolitic to scattered trs. oolitic (tan + lt. gray) dul. yellow to yellow fluor.; No Cut; No Visible Por.

② Lms. lt. to med. gray; crypto. to trs. v.v. fuxlu; sli. to extraly. sli. grad. IP's to calc. shs.; sub-chlk, trs. sub-sucro + packstn with trs.

WOB 40000  
RPM 76  
SPM 58  
DB 250

TKS. sub-sucro. + packstn w/TKS  
sub-lithogr. j. dul. yel. fluor. IP's  
No Cut; No Vis POR

③ Sh. med. to v. drk. gry. calc to  
v. drk. gry. to black-carb

SPM 38  
PP 950

4800

BLK. SH. 7 U

BLK. SH. 12 U

RECYCLE 11 U

4900

CON GAS 10 U

Interbedded Lmst + Shs similar  
4729 - 4902 w/TKS olive green  
Shales

WOB 38000  
RPM 70  
SPM 54  
PP 1000?

Lmst. w/interbeds Shs.  
① Lms. H. to med gry. tanish IP's  
crypto. to v. v. xlu. j. sli to  
extaly. Shly. j. TKS. sub-chlk. for Shly.  
sli. TKS. sub-sucro. packstn. and  
sub-lithogr. j. scattered TKS. dul yellow  
fluor. No Cut; No Vis POR  
② Sh. med to v. drk. gry. calc to  
v. drk. gry. to black-carb

Marrow Fm  
4997-5063

Sh. med to v. drk. gry w/TKS  
olive green j. TKS to hvy TKS  
pyritic w/abn Lmst in samples  
similar 4954 - 4997

5000

WOB 38000  
RPM 78  
SPM 54  
PP 850

Lm. Sdsts. gry. to tan, mottled IP's. Fin. med to  
coarse gr., composed Lmst + poss  
frag. matrix crypto to v. v. xlu. j.  
chlk. sub-chlk. sub-sucro. + TKS to  
hvy. TKS. sucro. + packstn.  
TKS to hvy TKS. sptd. brown oil str. j.  
w/ dul. gl. dr. yel. to yel. fluor. w/ flush  
to excel. stemg cuts in sucro. w/ str.  
poor to TKS. fair micro. p.p. POR. +  
prob. interxlu. por w/ exte. abn.  
of shale in samples similar 4997-5012

SHOW 30 TO 40 U

CON GAS 53 U

SHOWS 40 TO 48 U

CHESTER Fm  
5047-5113

Lms. med. gry. cryptaxlu. j. very Shly.  
grading to extaly calc Shs. j. packstn  
No fluor. j. No Cut; No Vis POR

TRIP GAS 475 U

Qtz Sdst. tan to brn. from even  
oil str. j. good oil odor. j. v. v. xlu. to fin gr.  
poor to good spt. j. ang. to TKS sub-ang. to  
TKS sub-ang. j. hvy. TKS w/ some whit  
clay fill in gl. dr. yel. fluor. w/ flush  
to excel. stemg cuts; abn. p.p. POR. +  
to TKS excel. p.p. micro. p.p. + interxlu.

5100

SHOW 48 U

5091-5101 Shly Lmst similar 5047-5080  
Sh med. to drk. gry. w/ hvy TKS Lmst's  
similar 5047-5080

St. Louis

similar 5047-5080

Lms. trs. wht. to cream - chlk, trs w/chlk oolites and tan, abn. grayish; crypto to v.v. fu. xln.; v. to extly. oolitic (micro sm, med + trs. lg.) matrix chlk, sub-chlk sub-sucro + packstr.; dul. H. to sl. trs. lt. yel. fluor.; No Cut; No Vis Por w/huy trs Chert brt. orange grading to lt. gray tan opque to transl

5157-5170 Lms. tan, wht. to cream - chlk, trs w/ chlk oolites, + trs, pinkish IP's, tanish pink; crypto. to v.v. fu. xln.; v. to extly oolitic (micro, sm, med, + trs lg) matrix trs. chlk, trs, sub-chlk, sub-sucro to trs, sucro; dul. yel. to trs. yel. fluor.; No Cut; No Vis Por. w/trs Chert brt. orange grading to lt. gray tan; opque to transl.

Lms. tan, grayish. IP's; crypto. to v.v. fu. xln trs. sub-chlk, sub-sucro, packstr. + trs sub-lithogr.; IP's sl. to extly. oolitic (sm, med + trs lg) dul. H. yel. fluor.; No Cut; No Vis Por w/scattered trs Chert brt. orange grading to lt. gray tan; op to transl.

Lms. trs. wht. to cream - chlk + cream to lt. tan; crypto to v.v. fu. xln.; v. to extly. oolitic (sm, med + trs. lg) matrix sub-chlk, sub-sucro to sucro; dul. H. to trs. lt. yel. fluor.; No Cut; No Vis Por w/trs chert as above

Lms. tan, grayish. IP's; crypto to v.v. fu. xln trs. sub-chlk, sub-sucro, packstr + trs, sub-lithogr.; IP's sl. to extly. oolitic (sm, med + trs. lg) dul. H. yel. fluor. No Cut; No Vis Por. w/scattered trs. Chert bright orange grading to lt. gray + tan; opque to transl.

Lms. sl. trs. wht. to cream - chlk + tan; crypto to v.v. fu. xln.; extly. oolitic (med to lg) matrix sub-chlk, sub-sucro to sucro; sl. trs. spid. dead blk oil stain; dul. yel. mineral fluor.; dead oil stain has gd milky to gd ring cuts; No Vis Por abn. loose oolites; w/scattered trs Chert brt. orange grading to lt. gray tan opque to transl

5268-5296 Lms. lt. gray to tan; crypto to v.v. fu. xln trs. sub-chlk, sub-sucro, packstr. sub-lithogr. IP's sl. to extly. oolitic (sm, med + trs. lg) dolomitic IP's dul. yel. fluor.; No Cut; No Vis Por w/chert similar to above

5296-5306 Lms. similar 5268-5296 w/huy trs. wht to cream - chlk becoming v. to extly. dolomitic grading to Lmy Dolomites

5306-5390 Lms. tan, grayish. IP's to trs. lt. gray; crypto. to v.v. fu. xln.; abn. sl. to v. dolomitic grading to Lmy. Dolomites; sub-chlk, sub-sucro packstr and trs sub-lithogr. IP's sl. to extly. oolitic (sm, med + trs. lg) dul. H. to sl. trs. lt. yel. fluor. No Cut; No Vis Por; w/scattered trs Chert bright orange grading to lt. gray + tan; opque to transl.

TD 5390

7 1/8 inch Bit Info in out  
1. New Smith F. 27. I 1755 5390 TD

Dev. SURV.  
1. 1757 1 1/2° 4. 5100 3/4°  
2. 3756 1 1/4° 5. 5390 1 1/4° TD  
3. 5060 3/4°  
C. D. O. +

St. Louis  
5122-2188

36 U  
38 U

CON GAS 32 U

5200

WOB 38000  
WOB 42000

SHOW? 28 U

40 U

5300

CON GAS 48 U

40 U

SHOW? 70 U

RECYCLE 52 U

54 U

5400

2. 3126 1/4 5. 5510 1/4 ✓  
 3. 5060 3/4  
 Cir Points  
 1. 4600 9. 5040  
 2. 4660 10. 5060  
 3. 4700 11. 5090  
 4. 4730 12. 5100  
 5. 4940 13. 5180  
 6. 4970 14. 5275  
 7. 5000 15. 5390  
 8. 5020

- Daily Drlg Report  
 1. 3800 11:47 PM 11-11-11  
 2. 3947 7:00 AM 11-12-11  
 3. 4267 7:00 AM 11-13-11  
 4. 4648 7:00 AM 11-14-11  
 5. 4885 7:00 AM 11-15-11  
 6. 5060 7:00 AM 11-16-11  
 7. 5060 7:00 AM 11-17-11  
 8. 5100 7:00 AM 11-18-11  
 9. 5130 7:00 AM 11-19-11  
 10. 5345 7:00 AM 11-20-11  
 11. 5390 7:00 AM 11-21-11

DST #1 MORROW 4994-5060  
 IO Building Blow 1 1/2 inches 30 min  
 FO BOB 11 min  
 Rec: 90 slip/sptd Mud  
 100% Mud w/ thick serum oil  
 Tool Samp. 25% oil 75% Mud looks thick  
 BHT 122°F  
 IHP 2379#  
 TFP 17-44# in 30 min  
 ISIP 171# in 60 min  
 FFP 39-50# in 60 min  
 FSIP 147# in 120 min  
 FHP 2358#

DST #2 Chester Sdst 5074-5100  
 IO Good Blow BOB 8 1/2 min  
 FO Good Blow BOB 4 1/2 min  
 Rec. 2662 feet GI P  
 858 ft total fluid  
 735 ft 42 G-89% oil-23 wtr-53 Mud  
 123 ft 28 G-36% oil-123 wtr-503 Mud  
 Chl 4000 ppm titrated  
 P.T Chl 2500 ppm  
 R<sub>w</sub> 1.6 @ 70°F pH 7.5  
 Tool Sample 22 G; 33% oil-15% wtr  
 + 50% mud BHT 128°F  
 IHP 2393#  
 TFP 18-127# in 30 min  
 ISIP 1367# in 60 min  
 FFP 164-234# in 60 min  
 FSIP 1320# in 120 min  
 FHP 2366#

Mud Info:

Date	11-11	11-12	11-13	11-14	11-15	11-16	11-17	11-18
Date	1:55 PM	11:40 AM	11:16 AM	11:15 AM	11:35 AM	11:55 AM	11:25 AM	11:30 PM
Depth	3599	4040	4344	4671	4935	5060	5060	5100
Wt.	8.6	8.8	9.0	9.3	9.5	9.1	9.1	9.3
Vis	56	51	56	49	57	58	78	50
PV	17	16	17	16	20	17	25	15
YP	21	19	20	18	22	18	26	15
GS	15/40	14/36	15/41	14/35	21/58	17/53	20/64	12/48
WL	7.2	8.0	7.3	8.0	8.0	8.0	7.2	8.0
Cake	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32
pH	11.0	11.0	11.0	10.5	11.0	10.5	10.5	11.0
Chl	1200	1500	1500	1700	1350	900	1450	1500
Ca	40	40	40	40	20	20	20	60
LCM	3	2	3	3	4	4	4	3

IHP 2393 #  
 IFF 18-127 # in 30 min  
 ISIP 1367 # in 60 min  
 FFD 164-234 # in 60 min  
 FSIP 1320 # in 120 min  
 FHP 2366 #

Mud Info:

Date	11-11	11-12	11-13	11-14	11-15	11-16	11-17	11-18
	1:55P	1:40P	1:10P	1:15A	1:35A	1:55A	11:05A	11:30P
Depth	3599	4040	4344	4671	4935	5060	5060	5100
WT.	8.6	8.8	9.0	9.3	9.15	9.1	9.1	9.3
Vis	56	51	56	49	57	58	78	50
PV	17	16	17	16	20	17	25	15
YP	21	19	20	18	22	18	26	15
GS	15/10	14/36	15/4	14/35	21/58	17/53	20/64	13/38
WL	7.2	8.0	7.3	8.0	8.0	8.0	7.3	8.0
Cake	1/32	1/32	1/32	1/32	1/32	1/32	1/32	1/32
pH	11.0	11.0	11.0	10.5	11.0	10.5	10.5	11.0
Chl	1200	1500	1500	1700	1350	900	1450	2500
Ca	40	40	40	40	20	20	20	60
LCM	3	2	3	3	4	4	4	3

Date	11-19	11-20
	12:00P	10:15A
Depth	5180	5382
WT.	9.1	9.3
Vis	48	53
PV	14	16
YP	14	18
GS	11/36	13/48
WL	8.0	8.8
Cake	1/32	1/32
pH	11.0	10.5
Chl	2000	3500
Ca	80	40
LCM	2	2

OPERATOR **BEREXCO LLC** LOCATION **2310'FSL & 990'FEL**  
 LEASE **LACEY** NO. **1-21** SEC. **21** TWP. **26S** Rng. **33W**  
 ELEVATION **2934 KB** RTD **5390** COUNTY **FINNEY** STATE **KANSAS**