

**Mud Properties Summary (legal size)**

**COPRC MIRROR LAKE P-20 65-00 126-45**

API / UWI 200/D-02010L094P1639 Rigs	Surface Legal Location P-20 65-00 126-45		Licence No. EL 470		Well Configuration Type HORIZONTAL		Ground Elevation (m) 284.15		Casing Flange Elevation (m) 283.95		KB-Ground Distance (m) 5.20		KB-Casing Flange Distance (m) 5.40																		
	AEE / RFE 10051812	Job Type DRILLING ORIGINAL	Job SubType Fluid / Mud Checks	Plan TMD (mB)	Plan Form Lower Canal	Contractor Beaver Drilling Ltd.	Rig Name# 2	Rig Type DRILLING-DOUBLE	Rig Accept Date 1/24/2014	RR Date 2/23/2014																					
1/28/2014				Depth (mB) (mKb)	Depth (mD) (mKb)	Type	Dens (kg/m³) (sl)	PV Calc (Pa)	YP Calc (Pa)	Gel (10s) (Pa)	Gel (10m) (Pa)	Pom (mL/30 min)	Relief Solids (%v)	Ca (mg/L)	Chlor (mg/L)	K	LCM	Lime (kg/m³)	CaCO <sub>3</sub> (%)	Mg (mg/L)	MBT (kg/m³)	n	OW Ratio	PI (mL/mL)	Pot (mg/L)	Solids, Corr. (%)	Wellbore Original Hole				
1/29/2014	184.00	184.00	Gel-Chem	1,060.0	46	13.0	4.5	1.0	4.0	13.0	9.0			120	1,500	4			3.7				1	0.100		0.1	3.8	Original Hole			
1/30/2014	301.00	301.00	Gel-Chem	1,050.0	65	23.0	7.0	2.0	4.5	14.0	8.5			120	800	7			2.9				1	0.100		0.1	3.1	Original Hole			
1/31/2014	450.00	449.94		1,080.0	107					9.0																			Original Hole		
2/2/2014	550.00	549.91	Gel-Chem	1,100.0	53	9.0	10.0	20.0		10.5	6.3								66		0								6.3	Original Hole	
2/3/2014	602.00	601.89		1,010.0	30					11.0																				Original Hole	
2/4/2014	602.00	601.89	Gel-Chem	1,035.0	75	25.0	11.0	5.5	15.0			8.5							16		0								0.4	Original Hole	
2/4/2014	602.00	601.89	Gel-Chem	1,085.0	78	27.0	11.0	5.0	11.0		9.0								15										2.7	Original Hole	
2/5/2014	602.00	601.89	Gel-Chem	1,080.0	58	27.0	7.0	2.0	5.0			2.2							16		0									2.4	Original Hole
2/7/2014	780.00	779.53	Megadril D Invert	995.0	62	15.0	3.5	6.0	11.0			5.3							6											2.6	Original Hole
2/8/2014	1,377.00	1,376.44	Megadril D Invert	965.0	50	8.0	2.5	3.0	8.0			3.200	8.5			29	179,958	2		12	8.8		0	80/20					8.8	Original Hole	
2/9/2014	1,756.00	1,755.36	Megadril D Invert	1,020.0	50	16.0	4.0	6.0	14.5			4,000	10.5			27	219,005	13		15	8.1		0	83/17					2.6	Original Hole	
2/10/2014	1,902.00	1,895.58	Megadril D Invert	1,020.0	50	16.0	4.0	6.0	14.5			4,000	10.5			27	219,005	13		15	8.1		0	83/17					2.6	Original Hole	
2/11/2014	1,915.00	1,907.01	Megadril D Invert	1,015.0	50	17.0	4.5	6.5	17.0			4,000	10.5			39	242,335	12		15	8.5		0	84/16					2.6	Original Hole	
2/12/2014	2,055.00	1,996.62	Megadril D Invert	1,010.0	79	20.0	5.0	6.5	22.0			4,100	11.0			41	261,080	15		15	9.2		0	84/16					2.6	Original Hole	
2/13/2014	2,152.00	2,013.56	Megadril D Invert	1,010.0	78	20.0	5.0	7.0	22.0			4,100	11.0			42	270,784	11		15	9.2		0	85/15					2.6	Original Hole	
2/14/2014	2,152.00	2,013.56	Megadril D Invert	1,010.0	78	20.0	5.0	7.0	22.0			4,100	11.0			42	270,784	11		15	9.2		0	85/15					2.6	Original Hole	
2/14/2014	2,152.00	2,013.56	Megadril D Invert	1,023.0	78	19.0	5.0	6.5	22.0			3,900	11.5			42	270,784	13		14	9.3		0	84/16					2.7	Original Hole	
2/16/2014	2,192.00	2,014.79	Megadril D Invert	985.0	61	13.0	4.0	5.0	12.0			3,900	9.0			32	196,931	9		14	7.2		0	84/16					2.7	Original Hole	

Fluid / Mud Checks

Fluid / Mud Checks																													
Date	Depth (mKB)	Depth (TVD) (mKB)	Type	Dens. (kg/m <sup>3</sup> ) (sl)	Pv. Calc (Pa)	YP. Calc (Pa)	Gel (10s) (Pa)	Gel (10m) (Pa)	API Filtrate (mL@30 min)	pH	Pm (mL/ml)	Robot Sands (%)	Ca (mg/L) (ppm)	CaCl (ppm)	Chlor (mg/L)	K	LCM	Lime (kg/m <sup>3</sup> )	LGS (%)	Mg (mg/L)	MBT (kg/m <sup>3</sup> )	n	OW Ratio	Pt (mL/ml)	Pm (mL/ml)	Pt (mL/ml)	Sand (%)	Soilids, Corr. (%)	Wellbore
2/17/2014	2,500.00	2,017.92	Megadrill D Invert	1,050.0	73	19.0	5.0	7.3	14.3			4,900	12.0			32	213,540	20		18	9.5		0	83/17			2.8	10.6	Original Hole
2/18/2014	3,070.00	2,025.23	Megadrill D Invert	1,140.0	68	22.0	4.5	6.0	14.0			3,500	14.0			36	266,597	16		13	7.2		0	86/14			3.2	12.4	Original Hole
2/19/2014	3,142.00	2,025.36	Megadrill D Invert	1,140.0	70	20.0	5.0	7.5	19.0			3,100	16.0			38	277,984	20		11	11.6		0	86/14			2.9	16.0	Original Hole
2/21/2014	3,155.00			1,135.0	130																						Original Hole		

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### IV. Leak Off Test Charts



**LOT & Fit with Graph**  
**COPRC MIRROR LAKE P-20 65-00 126-45**  
 Spud Date: 1/29/2014 00:00  
 RR: 2/23/2014 23:59

**Leak Off and Formation Integrity Tests**

FIT, 2/16/2014 12:15

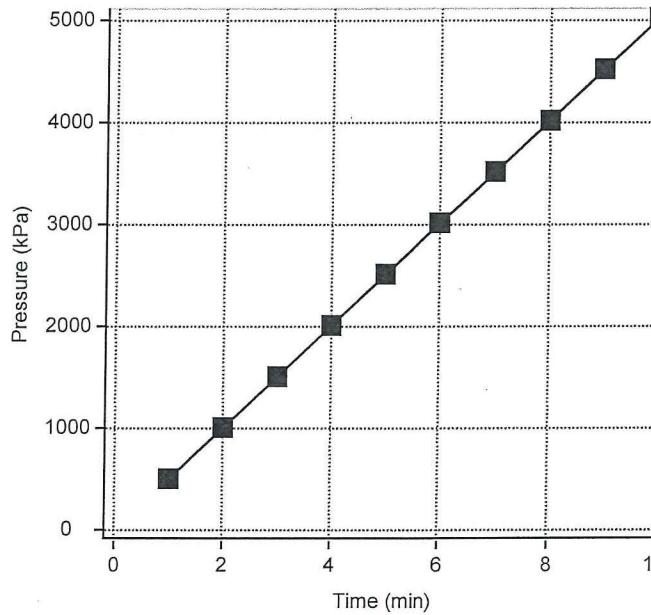
Last Casing String Run Intermediate, 2,152.00mKB	Test Date 2/16/2014	Test Type FIT	Leak off?	Formation Tested Lower Canol	P Surf App... 5,025	Depth (mKB)	TVD (mKB)
Fluid Density (kg/m <sup>3</sup> ) 1,020.0	Fluid Type OBM			LO Eq Fluid Den (k...)	Leak Off Pressure (kPa)	Volume Pumped (m <sup>3</sup> )	0.07

Comment

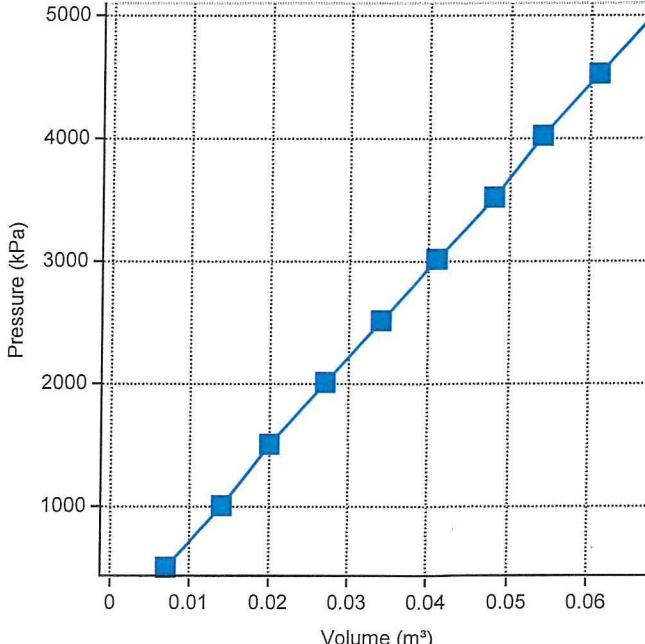
**LOT and FIT Test Data**

Time (min)	P (kPa)	Vol (m <sup>3</sup> )	Note
1.00	503	0.01	
2.00	1,005	0.01	
3.00	1,507	0.02	
4.00	2,010	0.03	
5.00	2,513	0.03	
6.00	3,015	0.04	
7.00	3,518	0.05	
8.00	4,020	0.05	
9.00	4,523	0.06	
10.00	5,025	0.07	

**Pressure vs. Time Graph**



**Pressure vs. Volume Graph**





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## **V. Geological Strip log**

Provided under separate cover



## COPRC Mirror Lake P-20

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### **VI. Mud Gas log**

Provided under separate cover



**VII. Daily Activity and Cost Summary Report**





## Daily Activity and Cost Summary

### Mirror Lake P-20 65-00 126-45

'UWI D-020/L094P1699		Surface Legal Location P-20 65-00 126-45		District NEW VENTURES		Field Name Mirror Lake		License No. EL 470				
Program		Well Type Appraisal		Well Configuration Type HORIZONTAL		Original KB/RT Elevation (m) 289.35		KB-Ground Distance (m) 5.20				
Job Category DRILLING			Primary Job Type DRILLING ORIGINAL			Secondary Job Type						
Actual Start Date 1/24/2014		End Date 2/23/2014		AFE / RFE / Maint.# 10351812			Total Job AFE Amount (Cost) 7,122,600.00					
Summary												
Contractor Beaver Drilling Ltd.				Rig Name/No 2		Rig Type DRILLING-DOUBLE						
Report No.	Start Date	End Date	Start Depth (mKB)	End Depth (mKB)	Daily Cost Total (Cost)	Cum Cost (Cost)	Last 24hr Sum					
1	1/24/2014	1/25/2014	0.00	0.00	265,023.03	265,023.03	No incidents or accidents. 8 - HID, 0 - OBS and 0 - ASA (all closed out)					
							Nipple down BOP, pressure test packoff seal assembly, blow out water and pour 2 pails of diesel, install wellhead, clean mud tanks, tear out rig, laydown torque tube, rig out derrick, laydown derrick, tear out rig for rig move. No pressure on backside.					
2	1/25/2014	1/26/2014	0.00	0.00	81,765.03	346,788.06	No incidents or accidents. 6 - HID, 0 - OBS and 0 - ASA (all closed out)					
							Rig out to move off location E-76. Prepare derrick clean well head and cover with plastic, prepare buildings to move, load buildings, sub, matting and rentals and move off location with CANOL trucking					
3	1/26/2014	1/27/2014	0.00	0.00	83,065.03	429,853.09	No incidents or accidents. 6 - HID, 0 - OBS and 0 - ASA (all closed out)					
							Move rig onto location P-20 location with CANOL trucking, lay matting, spot sub and buildings, pin derrick and rig up					
4	1/27/2014	1/28/2014	0.00	0.00	105,791.03	535,644.12	No incidents or accidents. 6 - HID, 0 - OBS and 0 - ASA (all closed out)					
							Safety meeting prior to raise derrick, inspect derrick, raise and pin derrick, spot cuttings bins, pipe and mud trailers, install torque tube and top drive					
5	1/28/2014	1/29/2014	18.00	20.00	93,395.03	629,039.15	No incidents or accidents. 5 - HID, 0 - OBS and 0 - ASA (all closed out)					
							Rig in Diverter system, Pre-spud inspection, hazard hunt and safety meeting,					
6	1/29/2014	1/30/2014	20.00	263.00	134,832.30	763,871.45	No incidents or accidents. 4 - HID, 2 - OBS and 0 - ASA (all closed out)					
							Spud and drill 311mm surface hole from 0m to 263m with 311mm Mi616 Smith PDC bit with accumulated wireline surveys, rig services, connections and circulation times. Last survey at 300m was 0.2°. Sent pre-spud Beyond Compliance, pre-spud inspection and rig inspection checklists prior to spudding. Spud and drill 311mm surface hole at 00:01hrs on January 29, 2014. Stop pumping at 245m, build volume, vis up mud with gel additions and add LCM, circulate at a reduced rate, displace hole with viscosified mud and LCM, stop pump, viscosify light mud from wellbore with gel additions and add LCM, check muddrop of mud in annulus, pump at reduced rate and check mud volumes, continue with drilling operations.					
7	1/30/2014	1/31/2014	263.00	319.00	152,056.22	915,927.67	No incidents or accidents. 9 - HID, 0 - OBS and 0 - ASA (all closed out)					
							Drill 311mm surface hole from 263m to 301m with accumulated wireline surveys, rig services, connections and circulation times. Last survey at 300m was 0.2°. Pull out of the hole, attempt to backream through tight spot at 110m, lost circulation, build volume, vis up mud with gel additions and add LCM, circulate at a reduced rate, displace hole with viscosified mud and LCM, stop pump, viscosify light mud from wellbore with gel additions and add LCM, backream through tight spots from 98m to 76m. Run in hole to 282m, build volume and vis up to 80+, displace hole to high vis mud, build volume and vis to 80+. Drill 311mm hole from 301m to 319m. Last survey at 357m was 1.3°.					



## Daily Activity and Cost Summary

Mirror Lake P-20 65-00 126-45

API / UWI 200/D-020/L094P1699		Surface Legal Location P-20 65-00 126-45		District NEW VENTURES		Field Name Mirror Lake	License No. EL 470
Program		Well Type Appraisal		Well Configuration Type HORIZONTAL		Original KB/RT Elevation (m)	KB-Ground Distance (m)
Report No.	Start Date	End Date	Start Depth (mKB)	End Depth (mKB)	Daily Cost Total (Cost)	Cum Cost (Cost)	Last 24hr Sum
8	1/31/2014	2/1/2014	319.00	450.00	111,501.54	1,027,429.21	No incidents or accidents. 8 - HID, 0 - OBS and 0 - ASA (all closed out)  Drill 311mm surface hole from 319m to 450m with accumulated wireline surveys, rig services, connections and circulation times. Last survey at 450m was 2.3°. Lost circulation, build volume, vis up mud with gel additions and add LCM. Pull out of the hole, pick up and run in 31 joints of 4" drill pipe, pump and spot heavy high vis pill at 297m, pull and rack back 2 stands and rig up Schlumberger cementers at 256m.  From midnight to 6:00am: Pump 5m3 of water followed by 10m3 of 1740 RFC cement then 0.45m3 of water. Pull and rack back 8 stands, flush any excess cement out of drill pipe and displace to water to drill out cement plug, pull out of the hole, clean out 1 mud tank and fill with water, make up Reed tooth bit, slip and cut drill line.
9	2/1/2014	2/2/2014	450.00	468.00	98,485.03	1,125,914.24	No incidents or accidents. 7 - HID, 1 - OBS and 0 - ASA (all closed out)  After spotting a heavy high vis pill at 297m and racking back 2 stands, we rigged up Schlumberger cementers at 256m, pump 5m3 of water followed by 10m3 of 1740 RFC cement then 0.45m3 of water. Pull and rack back 8 stands, flush any excess cement out of drill pipe and displace to water to drill out cement plug, pull out of the hole, clean out 1 mud tank and fill with water, make up Reed tooth bit, slip and cut drill line, run in the hole, drill cement plug, displace to surface mud, drill 311mm surface hole from 450m to 468m with accumulated wireline surveys, rig services, connections and circulation times.
10	2/2/2014	2/3/2014	468.00	602.00	112,757.28	1,238,671.52	No incidents or accidents. 7 - HID, 2 - OBS and 0 - ASA (all closed out)  Drill 311mm surface hole from 468m to 602m (TD) with accumulated wireline surveys, rig services, connections and circulation times. Circulate hole clean, wiper trip and strap out, backream through tight spots, backream through cement, encountered losses while backreaming, build volume and treat clobbered mud while backreaming.
11	2/3/2014	2/4/2014	602.00	602.00	126,605.03	1,365,276.55	No incidents or accidents. 8 - HID, 0 - OBS and 0 - ASA (all closed out)  Wiper trip and strap out, backream through tight spots, backream through cement, encountered losses while backreaming, build volume and treat clobbered mud while backreaming, work tight hole at 134m, conduct mechanical backoff leaving 88m (7x 6-1/2" and 2x 9" drill collars and tooth bit) worth of fish in the hole and retrieving 46m of 6-1/2" drill collars. Make up screw in sub, bumper sub and jars. Run in hole, screw into fish and jar down, break free, run in the hole to 295m to get circulation back, circulate hole clean, circulate and backream through tight spots to 76m. Midnight to 6:00am= Pull out of the hole and laydown 9" drill collars. Make up tooth bit, 6-1/2" drill collars and jars and run in the hole.
12	2/4/2014	2/5/2014	602.00	602.00	253,295.03	1,618,571.58	No incidents or accidents. 7 - HID, 0 - OBS and 0 - ASA (all closed out)  Circulate and backream through tight spots to 76m, pull out of the hole and laydown 9" drill collars. Make up tooth bit, 6-1/2" drill collars and jars and run in the hole, ream in from 271m to 345m, circulate and attempt to viscosify water, pull out to 251m due to major losses and tight hole. Rotate slowly, build volume, viscosify mud and add LCM, circulate until mud comes around, viscosify mud in the mud tanks and add LCM. Run in the hole and ream through tight spots. Circulate and condition mud at 602m (TD). Pull out of the hole to lay down 12x 6-1/2" drill collars and run 244.5mm surface casing.  NEB and WSCC inspectors conducted an inspection at Beaver #2, inspection was satisfactory.

## Daily Activity and Cost Summary

### Mirror Lake P-20 65-00 126-45

UWI J/D-020/L094P1699		Surface Legal Location P-20 65-00 126-45		District NEW VENTURES		Field Name Mirror Lake	License No. EL 470
Program		Well Type Appraisal		Well Configuration Type HORIZONTAL		Original KB/RT Elevation (m) 289.35	KB-Ground Distance (m) 5.20
Report No.	Start Date	End Date	Start Depth (mKB)	End Depth (mKB)	Daily Cost Total (Cost)	Cum Cost (Cost)	Last 24hr Sum
13	2/5/2014	2/6/2014	602.00	602.00	357,746.50	1,976,318.08	No incidents or accidents. 8 - HID, 2 - OBS and 0 - ASA (all closed out)  Pull out of the hole, lay down 12x 6-1/2" drill collars, rig up power tongs, run 244.5mm surface casing, tag bottom, circulate hole clean and condition mud, rig up cementers and cement 244.5mm surface casing, plug down at 13:57hrs on February 5, 2014 with 10m3 of good cement returns, nipple down diverter, dig out cellar, cut casing,
14	2/6/2014	2/7/2014	602.00	602.00	106,166.13	2,082,484.21	No incidents or accidents. 7 - HID, 1 - OBS and 0 - ASA (all closed out)  Cut casing, weld on casing bowl, clean mud tanks, nipple up BOP, rig up booy and flare lines, nipple up flow nipple and rig up catch can, rig up HCR and kill lines, pressure test BOP components and manifold shack, conduct an accumulator function test, install wear bushing.
15	2/7/2014	2/8/2014	602.00	1,047.00	217,238.53	2,299,722.74	No incidents or accidents. 11 - HID, 0 - OBS and 0 - ASA (all closed out)  Complete rig and pre-drill out inspection. Fill mud tanks with invert. Pick and make up directional BHA, run in the hole, tag cement, displace to invert mud, conduct BOP drill and high angle rescue safety meetings, drill out cement float and shoe. Drill 222mm intermediate directional hole from 602m to 609m, circulate bottoms up, perform FIT to a gradient of 18.1kPa/m (surface applied pressure: 4991kPa for 10 minutes). Drill 222mm intermediate directional hole from 609m to 1047m with accumulated MWD surveys, rig services, connections and circulation times. Last survey at 1121m, Inc: 1.59°, Azm: 29.26°.
16	2/8/2014	2/9/2014	1,047.00	1,522.00	257,034.63	2,556,757.37	No incidents or accidents. 9 - HID, 1 - OBS and 0 - ASA (all closed out)  Drill 222mm intermediate directional hole from 1047m to 1522m with accumulated MWD surveys, rig services, connections and circulation times. WOB: 6-8,000kDaN, RPM - 65-80 (Motor RPM - 131), Differential pressure: 100-3500kPa, Pump rate: 1.6-1.8 m3/min. Torque: 9,000 - 10,000ft/lbs, Rotate: 456m - 96% / Slide: 19m - 4%, ROP: 23.2m/hr. Last survey at 1577mMD, inclination= 0.7°, azimuth= 120.3°, TVD - 1577m.
17	2/9/2014	2/10/2014	1,522.00	1,855.00	125,765.76	2,682,523.13	No incidents or accidents. 9 - HID, 1 - OBS and 0 - ASA (all closed out)  Drill 222mm intermediate directional hole from 1522m to 1855m with accumulated MWD surveys, rig services, connections and circulation times. WOB: 6-8,000kDaN, RPM - 65-80 (Motor RPM - 131), Differential pressure: 100-3500kPa, Pump rate: 1.6-1.8 m3/min. Torque: 9,000 - 10,000ft/lbs, Rotate: 246m - 74% / Slide: 87m - 26%, ROP: 19.59m/hr. Last survey at 1862.5mMD, inclination= 20.0°, azimuth= 286.20°, TVD - 1853.76m. We are 0.56m above and 24.7m right of the line - 1.5° behind in angle - 0.86° behind in azimuth - 24.77m center to center - BURR: 7.4°/30m. KOP: 1731mMD.
18	2/10/2014	2/11/2014	1,855.00	1,921.00	433,279.02	3,115,802.15	No incidents or accidents. 9 - HID, 0 - OBS and 0 - ASA (all closed out)  Drill 222mm intermediate directional hole from 1855m to 1921m with accumulated MWD surveys, rig services, connections and circulation times. WOB: 6-8,000kDaN, RPM - 65-80 (Motor RPM - 131), Differential pressure: 100-3500kPa, Pump rate: 1.6-1.8 m3/min. Torque: 9,000 - 10,000ft/lbs, Rotate: 5m - 8% / Slide: 61m - 92%, ROP: 12m/hr. Last survey at 1901mMD, inclination= 27°, azimuth= 282.34°, TVD - 1895m. We are 0.5m below and 24.4m right of the line - 6° behind in angle - 3° ahead in azimuth - 24.43m center to center - BURR: 7.75°/30m. Pull out to 1710m (vertical section) and replace module in mud pump #1, run in the hole, drill and attempt to build angle, pull out of the hole, dial up mud motor to a 1.93° bend and make up a 222mm Smith 4-3-7 insert bit, attempt to pull the wear bushing due to the fact we couldn't get BHA past wear bushing.