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# Geological Report

on

## McKay Lakes O-80

## Unit O Section 80

Well Reached Total Depth on  
Sep 4, 1999 @ 08:30

for

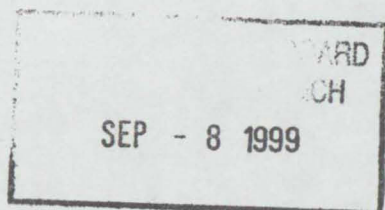
# CHEVRON CANADA RESOURCES

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Chevron Canada Resources

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Lillico Petroleum Consultants

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Brock Lillico



# Well Summary

Storage Units: Metric

## Well Information

Operator: CHEVRON CANADA RESOURCES  
Well Name: McKay Lakes O-80  
Location: Unit O Section 80  
UWI: 300O806020123150  
Pool: WILDCAT  
Field: WILDCAT  
Province / State: NWT  
Country: CANADA  
License Number: EL380

Surface Node	Hole Type:	Fault Indicator:
Co-ordinates	Latitude: 60.3000000	Longitude: 123.2500000
N / S:		
E / W:		

Bottom Hole Node	Latitude:	Longitude:
Co-ordinates		
N / S:		
E / W:		

Elevations	Reference:
Ground Elevation: 292.32	Kelly Bushing to Ground: 7.27
Kelly Bushing Elevation: 299.60	Cut (-):
Casing Flange Elevation:	Fill (+):

Total Depth	Measured Depth	True Vertical Depth
Total Depth Driller (Tally):	1,028.00	1,028.00
Total Depth Driller (Strap or SLM):	1,025.25	1,025.25
Total Depth Logger:	1,028.00	1,028.00

Miscellaneous Depths	Plugback Depth:	Water Depth Reference:
Whipstock or Sidetrack Depth:		Water Depth:

## Well Summary

Drilling Contractor:	AKITA DRILLING RIG 48	Spud Date:	Aug 24, 1999	@ 11:15
Rig Release Date:		Total Depth Date:	Sep 4, 1999	@ 08:30

Cores	#	Formation	Interval	Cut	Recovered	%
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CHEVRON CANADA RESOURCES  
UWI 300O806020123150

McKay Lakes O-80  
Unit O Section 80  
Page 2-1

## Casing Data Summary

Storage Units:

Metric

Casing Type	Casing Size	Casing Landed @	Hole Size
Surface	244.0	359.20	311.0

# Bit Record Table (IADC Grading System)

Storage Units: Metric

**\*\* For more detailed Bit Information refer to Bit Record \*\***

Bit #	Make	Type	IADC		Depth In	Depth Out	Made	Hours	Avg. P.R.	I.A.D.C. Bit Condition									
			S	T						I	O	MDC	Loc	B	G	ODC	RP1	RP2	
1	REED	Y11			0.0	186.0	186.0	18.75	9.9	6	6	WT	A	8	3	NO	TQ		
2	REED	HP43A			186.0	363.0	177.0	15.00	11.8	2	3	NO	A	E	I	NO	TD		
3	REED	EHT11			363.0	421.0	58.0	6.00	9.7	5	6	WT	A	5	1	NO	PR		
4	REED	EHP53A			421.0	657.0	236.0	34.30	6.9	4	8	FC	A	E	2	RG	TQ		
5	REED	HP61			657.0	767.0	110.0	15.50	7.1	2	8	RG	A	E	2	BT	TQ		
6	RBI	C45LRGS			767.0	882.0	115.0	17.50	6.6	3	8	RG	H	F	3	CI	TQ		
7	RBI	C47LRGD			882.0	973.0	91.0	18.50	4.9	2	3	BT	A	E	2	ER	TQ		
8	HW	ATJ-55R			973.0	1,028.0	55.0	10.50	5.2								TD		

Total Rotating Hours: 136.05

# Wireline Logging Summary

Storage Units: Metric

Logging Suite Number: 1  
Wireline Logging Company: Schlumberger  
District: Grande Prairie  
Witness: Brock Lillico

Engineer: Ken Clasper  
Unit Number: 2034

*Was Pressure Control Equipment Utilized:*  
*Was the Logging Job Mechanically Assisted:*

Maximum Deviation: 3.000 °  
Hole Size: 222.0

Total Lost Time: 0.00  
Loggers' Total Down Time: 0.00  
Total Job Time (From Rig up to Rig down): 14.50

	Measured Depth	True Vertical Depth
Casing Depth Driller	363.00	
Casing Depth Logger	359.50	
Total Depth Driller (Tally)	1,028.00	1,028.00
Total Depth Driller (Strap or SLM)	1,025.25	

General Remarks: Hole in good shape, hole volume 29m3 SLB, calculated 26m3, 13% out of gauge.

Logging Run #: 1  
Date: Sep 4, 1999

## Drilling Fluid Data

Drilling Fluid Type: Gel Chem Polymer  
Fluid Density: 1080 Viscosity: 56 pH: 9.5 Fluid Loss: 5.5

Mud Resistivity (Rm): 3.66 @ 24.0 °  
Mud Resistivity (Rm) @ BHT: 2.71 @ 40.0 ° Maximum Temperature: 40.0 °  
Mud Filtrate Resistivity (Rmf): 5.09 @ 21.0 ° Source (Rmf): Filter Pres Flowline  
Mud Cake Resistivity (Rmc): 2.35 @ 18.0 ° Source (Rmc): Filter Pres Flowline

## Logging Run Information

Date on Bottom: Sep 4, 1999  
Total Depth Logger: 1,028.00 (MD) 1,028.00 (TVD)

Logging Tools: Platform Express Compensated Neutron Litho Density Log - Array Induction RXO Log - Microlog - Dipole Shear Sonic Imager, 1028-359m, Ran Gamma Ray Log to Surface.

Remarks: Job went very well, no tight spots, no fill, good calibrations.

Hole Conditions: Hole in good shape.

# Wireline Logging Summary

Storage Units:

Metric

Logging Run #: 2  
Date: Sep 4, 1999

## Drilling Fluid Data

Drilling Fluid Type: Gel Chem Polymer

Fluid Density: 1080      Viscosity: 56      pH: 9.5      Fluid Loss: 5.5

Mud Resistivity (Rm): 3.66 @ 24.0 °

Mud Resistivity (Rm) @ BHT: 2.71 @ 40.0 °

Mud Filtrate Resistivity (Rmf): 5.09 @ 21.0 °

Mud Cake Resistivity (Rmc): 2.35 @ 18.0 °

Maximum Temperature: 40.0 °

Source (Rmf): Filter Pres Flowline

Source (Rmc): Filter Pres Flowline

## Logging Run Information

Date on Bottom: Sep 4, 1999

Total Depth Logger: 1,028.00 (MD)      1,028.00 (TVD)

Logging Tools: CMR; 970-420m

Remarks: Logging went well, slow running tool at 75m/hr; tuning before and after logging overlap fairly well. Permeabilities range into the thousands of millidarcys.

Hole Conditions: Hole in good shape.

# Drill Stem Test Report

Storage Units: Metric

Run #: 1 Date: Sep 5, 1999  
Test #: 1 Misrun:  
Test Company: Baker Closed Chamber Company:  
Representative: Newhook, McNally, Lillico Representative: Sheldon Prysunka  
Unit #: K.B. Elevation: 299.60  
Test Type: Inflate Straddle

Formations Tested From the: MATTSON SANDSTONE  
To the: MATTSON SANDSTONE

Test Interval: From: 594.00 (MD) To: 606.00 (MD) (12.00)  
From: 594.00 (TVD) To: 606.00 (TVD) (12.00)

Total Depth: (MD) (TVD) *(At the time of the Test)*

## String Configuration:

Drilling Fluid Type and Properties: MD 1090, Visc 70, WL 6.0, pH 10.5, mud in good shape.

Cushion Type / Amount: No Cushion

Hole Condition: Hole in good shape.

Bottom Hole Temperature: 40 ° Tool Chased Distance: 0.0 Mud Drop: 0.0

Period	Intital Pressure	Final Pressure	Times	Flow Description	Choke Type	Orifice Diameter	Units
Time / Pressure / Flow Rate Measurements							
Flow 1	891.0	1,415.0	5	Pre-flow: Weak Air Blow increasing to Good Air Blow in 2.5 minutes, steady throughout, No Gas to Surface.			
					IHP 6278 kPa		
					FHP 5930 kPa		
Initial Shut-in		5,435.0	60				
Valve Open	1,339.0	4,305.0	90	Weak Air Blow increasing to Good Air Blow in 3 minutes, steady for 70 minutes, slowly decreasing for duration, No Gas to Surface.			
Final Shut in		5,381.0	120				

Recovery: 400 meters total; 100m muddy fresh water, 300m fresh water.

Analyses: 8 water samples taken by tester to AGAT Grande Prairie

Remarks: Test was operationally successful.

# Directional Survey Points

Storage Units: Metric

Survey Type: drift / single shot

Measured Depth	T.V.D.	Drift Angle (°)	Azimuth (°)	+N / -S Distance	+E / -W Distance	Vertical Section	DogLeg Severity
31.00	31.00	0.250					
50.00	50.00	0.875					
80.00	80.00	0.750					
110.00	110.00	0.500					
146.00	146.00	0.500					
176.00	176.00	0.750					
203.00	203.00	1.500					
217.00	217.00	1.000					
250.00	250.00	0.750					
277.00	277.00	1.000					
305.00	305.00	1.000					
330.00	330.00	1.000					
355.00	355.00	1.125					
414.00	414.00	1.125					
514.00	514.00	2.000					
601.00	601.00	2.250					
686.00	686.00	2.000					
774.00	774.00	2.875					
857.00	857.00	3.125					
943.00	943.00	2.500					
1,019.00	1,019.00	3.000					



# Formation Top Summary

Storage Units:

Metric

Kelly Bushing Elevation: 299.60  
Ground Elevation: 292.32

Casing Flange Elevation:

**\*\* All Depths measured from Kelly Bushing Elevation \*\***

Group Formation Member	Prognosis (TVD)	Sample Top (MD)	Sample Top (TVD)	Log Top (MD)	Log Top (TVD)	Subsea	Thickness
<b>SCATTER</b>	110.00	100.00	100.00	108.00	108.00	191.60	123.00
<b>GARBUTT</b>	260.00	233.00	233.00	231.00	231.00	68.60	185.00
<b>CHINKEH</b>	450.00	415.00	415.00	416.00	416.00	-116.40	16.00
<b>FANTASQUE</b>	460.00	433.00	433.00	432.00	432.00	-132.40	83.00
<b>MATTSON</b>	550.00	515.00	515.00	515.00	515.00	-215.40	442.00
<b>FLETT</b>	1,155.00	960.00	960.00	957.00	957.00	-657.40	71.00
<b>TOTAL DEPTH</b>		1,028.00	1,028.00	1,028.00	1,028.00	-728.40	

## Formation Evaluations

Storage Units:

Metric

Kelly Bushing Elevation: 299.60  
Ground Elevation: 292.32

Casing Flange Elevation:

*All Depths Measured from Kelly Bushing Elevation*

Group:  
Formation: CHINKEH  
Member:  
Boundary Type: conformable  
Fault Type:

Era:  
Series:  
Period: Cretaceous  
Stage:  
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	415.00	415.00	-115.40	18.00
Log Top	416.00	416.00	-116.40	16.00

### Evaluation:

The Chinkeh is SILTSTONE, medium gray to brown gray, quartzose, dolomitic, siliceous, slightly argillaceous, hard, tight, dull orange fluorescence in part, patchy fair yellow orange cut fluorescence, scattered Chert fragments, light gray to light to medium brown, spicules, trace translucent with conchoidal fracture, silty in part grading to very siliceous hard Siltstone, scattered SHALE, medium to dark gray, micromicaceous, blocky, calcareous, silty to very silty in part. Background gas while drilling the Chinkeh was low and uneventful ranging from .0058% to .022%.

### Conclusion:

The Chinkeh has no hydrocarbon potential at this location.

Group:  
Formation: FANTASQUE  
Member:  
Boundary Type: unconformable  
Fault Type:

Era:  
Series:  
Period: Permian  
Stage:  
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	433.00	433.00	-133.40	82.00
Log Top	432.00	432.00	-132.40	83.00

### Evaluation:

The Fantasque is SANDSTONE, light gray to light to medium gray brown, quartzose, very fine grained, subangular, well sorted, siliceous in part, slightly dolomitic in part, glauconite, slightly argillaceous in part, pyritic matrix in part, friable in part, streaks poor to fair porosity, very faint orange cut fluorescence in part, scattered pyrobitumen, scattered Chert, light gray, yellow tan in part, silty and sandy, fossiliferous, trace Crinoids, tight, no shows, interbedded Siltstone, medium gray, quartzose, very argillaceous, micaceous, tight, no shows. At 455-460m the sample had abundant loose disaggregated grains, indicated fair porosity, no shows. After penetrating this sandstone, the mud system (at a density of 1020kg/m<sup>3</sup>) started gaining volume at up to 1.5m<sup>3</sup>/hr. No signs of gas showed up at surface, and the mud chloride content, which was at 150mg/l, never changed. Indications are that this flow was a fresh water flow. Background gas ranged from .0015% to .0071%, with a small peak at 438m .0189%.

### Conclusion:

The Fantasque has poor potential for hydrocarbon production. There appears to be slightly overpressured fresh water at 455-460m.

# Formation Evaluations

Storage Units:

Metric

Kelly Bushing Elevation: 299.60  
Ground Elevation: 292.32

Casing Flange Elevation:

## All Depths Measured from Kelly Bushing Elevation

Group:  
Formation: MATTSON  
Member:  
Boundary Type: unconformable  
Fault Type:

Era:  
Series:  
Period: Mississippian  
Stage:  
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	515.00	515.00	-215.40	445.00
Log Top	515.00	515.00	-215.40	442.00

### Evaluation:

The Mattson is interbedded SANDSTONE and Shale. SANDSTONE, light gray to very light gray, quartzose, mainly very fine to fine grained with fine to medium grained sand down to 570m then predominately fine grained to very fine to fine grained sand to the base of Mattson, subangular to subrounded, generally well sorted, slightly siliceous to very siliceous and hard in part, clean, dolomitic in part, very rarely argillaceous, some dark gray to black Shale laminations, friable in part with scattered loose disaggregated grains, porosities range from tight to streaks of excellent porosity, no live oil staining, no live fluorescence, some dead oil staining at 540-620m with weak orange cut fluorescence in part. There are some streaks of Sandstone cemented tight with calcareous and dolomitic cement and minor thin stringers of sandy Dolomite to 2m thick, and a sandy Limestone unit at 525-532m. Shale, very dark gray to black, dark brown gray in part, medium to dark gray green and waxy in part, sandy, micaceous, silty with scattered Siltstone laminations, minor pyrite, trace carbonaceous at 795m and at 935m (both of these spots show very low density log response, coaly). The best looking Sandstone sections for porosity from samples include: 515-525m; 575-585m; 595-610m; 620-635m; 650-655m; 660-715m; and 855-870m. Sandstone intervals with 15% or greater density porosity include: 515-519m; 535-537m; 577-585m; 594-610m; 623-625m; 654-656m; 689-691m; and 763-768m.

### Conclusion:

The Mattson is very porous, but looks water wet from samples and logs.

Group:  
Formation: FLETT  
Member:  
Boundary Type: conformable  
Fault Type:

Era:  
Series:  
Period: Mississippian  
Stage:  
Age (Approx): Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	960.00	960.00	-660.40	
Log Top	957.00	957.00	-657.40	

### Evaluation:

The Flett is LIMESTONE, light to medium gray to brown gray, fine to very coarse grained Crinoidal fragmental Packstone, slightly argillaceous in part, very fossiliferous, Crinoids, Brachiopods, trace Ostracods, trace Bryozoans, trace pellets, tight, no shows, trace stylolites, scattered Chert, light to medium gray, translucent in part. Background gas ranged from .0058% to .038% with small peaks at 986m .05%, and at 1000m .035%.

### Conclusion:

The Flett has no hydrocarbon production potential at this location due to lack of porosity and shows.

## Formation Evaluations

Storage Units:

Metric

Kelly Bushing Elevation: 299.60  
Ground Elevation: 292.32

Casing Flange Elevation:

*All Depths Measured from Kelly Bushing Elevation*

75.00 to 80.00 (5.00)	<b>SANDSTONE</b> light gray to light brown with various colored quartz grains, very fine to coarse grained angular fragments to rounded grains, poor sorting, siliceous when very fine grained, pitted in some coarse grains, streaks poor porosity, no shows, minor Siltstone, light gray to light yellow gray, quartzose, tight, no shows, trace fragments of granite boulders with very coarse quartz crystal fragments, mica and feldspars, (uphole?)
80.00 to 85.00 (5.00)	<b>SANDSTONE</b> as above, multi colored sand with very fine to fine grained cemented SANDSTONE, fine to very coarse loose quartz grains, subangular to loose rounded grains, poor sorting, siliceous in part, trace poor porosity, no shows, scattered Siltstone, light gray to light brown, yellow in part, siliceous, tight, increasing Claystone, medium to dark gray, very soft, easily washed away while cleaning
85.00 to 90.00 (5.00)	<b>SANDSTONE</b> as above, multi colored, very fine to fine grained in part, with abundant loose medium to very coarse grains, poor porosity in part, no shows, scattered Siltstone, light gray to light gray brown, yellow gray in part, siliceous, tight, no shows, increasing Claystone, medium to dark gray, very soft and washed away while cleaning, very poor samples, mud rings forming while drilling
90.00 to 95.00 (5.00)	<b>Claystone</b> medium to dark gray, soft, poor samples mud rings forming while drilling, scattered loose sand grains, multi colored, fine to very coarse grained, subangular to rounded
95.00 to 100.00 (5.00)	<b>Claystone</b> medium to dark gray as above, sample easily washed away while cleaning, scattered loose fine to very coarse sand grains
100.00 to 105.00 (5.00)	<b>SANDSTONE</b> light yellow to light gray, very fine to fine grained, subangular, fair sorting, siliceous, streaks poor to fair porosity, no shows, abundant loose fine to very coarse quartz grains, minor granitic boulder fragments with coarse quartz crystals, mica and feldspars, (uphole?)
105.00 to 110.00 (5.00)	<b>SAND</b> light gray to light yellow gray quartz grains, minor dark gray Chert grains, medium to coarse grained, subangular to rounded, poor sorting, limonite staining in part, pitted, all loose grains, indicated fair porosity, no shows, trace feldspar grains
110.00 to 115.00 (5.00)	<b>SAND</b> as above, loose fine to coarse grains, indicated fair porosity, no shows, interbedded SANDSTONE, light gray to light yellow gray, very fine to fine grained, subangular, fair sorting, siliceous, slightly argillaceous with limonitic staining, trace poor porosity, no shows, trace granitic boulder fragments
115.00 to 120.00 (5.00)	<b>SANDSTONE</b> wide variety of material in this sample including scattered Sandstone, light gray to yellow gray to orange, very fine to medium grained, mainly tight, no shows, Chert and quartz pebbles, pitted in part, granitic and syenitic fragments with mica, scattered Sandstone, light gray to yellow gray to orange, very fine to medium grained, mainly tight, no shows, minor Dolomite and Limestone, trace Siltstone and Shale, drilling rate slowed through this section (abundant uphole sloughing?)

120.00 to 125.00 (5.00)	<b>SAND</b> light brown to tan brown, red brown in part, quartzose to arkosic, medium to coarse grained, subangular to rounded, fair sorting, no cement, sample looks like unconsolidated sand, indicated fair porosity, no shows, minor Sandstone, light gray, very fine to fine grained, subangular, fair sorting, siliceous, poor porosity, no shows
125.00 to 130.00 (5.00)	<b>SANDSTONE</b> light gray to light yellow gray, red brown in part, quartzose to arkosic, very fine to fine grained, subangular, fair sorting, siliceous, slightly dolomitic in part, trace poor porosity, no shows, abundant loose medium to very coarse sand grains, variety of fragments including granite, syenite, dolomite, chert, and siltstone, (uphole?)
130.00 to 135.00 (5.00)	<b>SANDSTONE</b> light gray to light yellow gray as above, very fine to fine grained, subangular, fair sorting, siliceous, poor to fair porosity, no fluorescence, trace pyrobitumen in rare part, abundant loose medium to very coarse sand grains (uphole?)
135.00 to 140.00 (5.00)	<b>SANDSTONE</b> as above, increasing loose coarse material to 90% of sample, medium to very coarse quartz grains, some feldspar, trace chert, minor granite and syenite fragments, (uphole caving?)
140.00 to 145.00 (5.00)	<b>SANDSTONE</b> as above, light gray to light tan gray, very fine to fine grained, trace poor porosity, no shows, sample predominately loose medium to coarse quartz grains, trace igneous boulder fragments, (uphole?)
145.00 to 150.00 (5.00)	<b>SANDSTONE</b> light gray to light yellow gray, quartzose, very fine to fine grained, subangular, fair sorting, siliceous in part, streaks poor porosity, no shows, abundant loose medium to coarse quartz grains
150.00 to 155.00 (5.00)	<b>SANDSTONE</b> as above, sample mainly medium to coarse quartz grains, trace feldspar grains, trace granitic fragments with mica (uphole cavings)
155.00 to 160.00 (5.00)	<b>SANDSTONE</b> as above, light gray to light yellow gray, quartzose, very fine to fine grained, siliceous in part, streaks poor porosity, no shows, abundant loose unconsolidated medium to coarse quartz grains, poor samples
160.00 to 165.00 (5.00)	<b>SANDSTONE</b> as above, light gray to light yellow gray, siliceous, trace pyritic matrix, mainly tight, no shows, sample is 95% medium to coarse quartz grains (uphole sloughing?)
165.00 to 170.00 (5.00)	<b>SANDSTONE</b> as above, scattered Siltstone, medium gray, quartzose, very argillaceous, tight, no shows, sample mainly loose unconsolidated medium to very coarse quartz grains and minor granitic fragments (uphole cavings)

## Sample Descriptions

Storage Units:

Metric

170.00 to 175.00 (5.00)	<b>SHALE</b> medium to dark gray, silty, micromicaceous, minor Siltstone as above, trace Sandstone, light to medium gray, very fine grained, subangular, fair sorting, argillaceous, siliceous, silty, tight, no shows, sample mainly uphole medium to coarse unconsolidated grains
175.00 to 180.00 (5.00)	<b>SHALE</b> medium to dark gray, micromicaceous, silty, trace carbonaceous, slightly sandy in part, trace Siltstone, medium gray, quartzose, argillaceous, tight, no shows, abundant uphole caving
180.00 to 185.00 (5.00)	<b>SHALE</b> dark gray, micromicaceous, silty, sandy in part, interbedded Siltstone, medium to dark gray, very argillaceous, sandy in part, minor Sandstone, light to medium gray, quartzose, very fine grained, subangular, fair sorting, argillaceous, slightly siliceous, tight, no shows, abundant uphole cavings
185.00 to 190.00 (5.00)	<b>SHALE</b> dark gray, micromicaceous, silty to very silty, trace pyrite, scattered Siltstone, medium to dark gray, very argillaceous, tight, no shows, abundant loose medium to coarse sand grains, poor sample, tripped for drillbit
190.00 to 195.00 (5.00)	<b>SANDSTONE</b> medium gray, silt to very fine grained, subangular, well sorted, argillaceous, trace carbonaceous specks, trace pyritic matrix, tight, no shows, scattered Shale as above, dark gray, silty, slightly carbonaceous in part, trace Siltstone, medium gray, very argillaceous, tight, samples cleaning up, less uphole material
195.00 to 200.00 (5.00)	<b>SANDSTONE</b> medium gray to medium brown gray, quartzose, very fine to fine grained, subangular, fair sorting, micaceous, slightly siliceous, argillaceous, pyritic in part, trace carbonaceous specks, trace poor porosity, no shows
200.00 to 205.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, slightly silty in part, slightly bituminous, trace pyrite, scattered Sandstone as above
205.00 to 210.00 (5.00)	<b>SANDSTONE</b> dark gray to dark brown gray, quartzose, very fine grained, subangular, well sorted, slightly siliceous, argillaceous, glauconitic, mainly tight with trace poor porosity, no shows, minor Shale, dark gray to very dark gray, micromicaceous, silty in part, sandy in part, trace pyrite, trace siderite, trace Siltstone, dark gray, argillaceous to very argillaceous, micromicaceous, trace carbonaceous specks, tight, no shows
210.00 to 215.00 (5.00)	<b>SANDSTONE</b> medium gray to gray brown, very fine grained, subangular, well sorted, slightly siliceous, slightly calcareous to dolomitic in part, micaceous, argillaceous, mainly tight with trace poor porosity, good yellow orange cut fluorescence, trace pyrite
215.00 to 220.00 (5.00)	<b>SANDSTONE</b> as above, medium gray to gray brown, very fine grained, well sorted, friable in part, argillaceous with shaly laminations and streaks, trace poor porosity, good yellow orange cut fluorescence

## Sample Descriptions

Storage Units: Metric

220.00 to 225.00 (5.00)	<b>SANDSTONE</b> mainly medium gray, gray brown in part, very fine grained, subangular, well sorted, slightly siliceous, silty, argillaceous, tight, no shows, minor Shale, dark gray, micromicaceous, sandy to very sandy in part, micromicaceous, trace pyrite
225.00 to 233.00 (8.00)	<b>SANDSTONE</b> medium to dark gray, mainly quartzose, very fine grained, subangular, well sorted, slightly siliceous, argillaceous to very argillaceous, silty, micaceous, tight, no shows, scattered Shale, dark gray to black, micromicaceous, silty and sandy in part, trace pyrite
233.00 to 240.00 (7.00)	<b>SHALE</b> dark gray, micromicaceous, silty to very silty in part, scattered Siltstone, medium to dark gray to brown gray, very argillaceous, sandy grading to very fine grained Sandstone in part, tight
240.00 to 245.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, silty to very silty, trace pyrite, decreasing Siltstone as above
245.00 to 250.00 (5.00)	<b>SHALE</b> dark gray to black as above, silty in part, trace pyrite, trace siderite, minor Siltstone, medium to dark gray, very argillaceous, micromicaceous, tight, no shows, trace SANDSTONE streak, medium gray brown, silt to very fine grained, subangular, fair sorting, argillaceous, slightly siliceous, tight, no shows
250.00 to 255.00 (5.00)	<b>SHALE</b> dark gray, micromicaceous, fissile, fossiliferous with trace shell fragments, silty in part, trace Sandstone streak as above, medium gray, silt to very fine grained, argillaceous, micaceous, tight, no shows
255.00 to 260.00 (5.00)	<b>SHALE</b> as above, trace pyrite, trace siderite, interbedded Siltstone, medium brown gray, salt and pepper, argillaceous, tight, no shows
260.00 to 265.00 (5.00)	<b>SILTSTONE</b> medium gray brown as above, salt and pepper, argillaceous, micromicaceous, tight, no shows, trace pyrite
265.00 to 270.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, silty to very silty, trace pyrite, trace siderite, minor Siltstone as above
270.00 to 275.00 (5.00)	<b>SHALE</b> as above, dark gray to black, micromicaceous, silty, trace Siltstone streaks
275.00 to 280.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, fissile in part, silty to very silty in part, trace pyrite trace Siltstone, medium gray to medium brown gray, argillaceous, sandy in part, tight, no shows, scattered uphole medium to coarse grained unconsolidated sand cavings



280.00 to 285.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, silty in part, trace Siltstone streaks
285.00 to 290.00 (5.00)	<b>SHALE</b> very dark gray to black, micromicaceous, fissile, silty in part, slightly fossiliferous with trace fish scales
290.00 to 295.00 (5.00)	<b>SHALE</b> medium to dark gray, micromicaceous, silty to very silty in part, slightly sideritic and blocky in part, trace Ironstone stringers
295.00 to 300.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, fissile, slightly silty in part with trace Siltstone stringers
300.00 to 305.00 (5.00)	<b>SHALE</b> dark gray as above, micromicaceous, fissile, silty in part, trace siderite
305.00 to 310.00 (5.00)	<b>SHALE</b> as above, micromicaceous, fissile, slightly fossiliferous, trace shell fragments, trace pyrite, trace Siltstone laminations, trace Ironstone
310.00 to 315.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, fissile, slightly silty in part, fossiliferous, trace fish scales, trace pyrite
315.00 to 320.00 (5.00)	<b>SHALE</b> as above, trace siderite
320.00 to 325.00 (5.00)	<b>SHALE</b> dark gray, micromicaceous, fissile, trace pyrite, trace fish scales
325.00 to 330.00 (5.00)	<b>SHALE</b> as above, silty streaks, trace pyrite
330.00 to 335.00 (5.00)	<b>SHALE</b> dark gray to black, micromicaceous, fissile, slightly sideritic in part
335.00 to 340.00 (5.00)	<b>SHALE</b> as above, micromicaceous, fissile, fossiliferous with trace pyritized worm burrows
340.00 to 350.00 (10.00)	<b>SHALE</b> dark gray, micromicaceous, fissile, slightly silty in part, trace pyrite
350.00 to 360.00 (10.00)	<b>SHALE</b> dark gray as above, micromicaceous, fissile, slightly silty in part, trace pyrite, trace siderite
360.00 to 370.00 (10.00)	<b>SHALE</b> dark gray, micromicaceous, fissile, slightly fossiliferous, trace shell fragments

## Sample Descriptions

Storage Units:

Metric

370.00 to 380.00 (10.00)	<b>SHALE</b> dark gray as above, micromicaceous, fissile, slightly fossiliferous, trace fish remnants, trace siderite
380.00 to 390.00 (10.00)	<b>SHALE</b> dark gray, micromicaceous, fissile, trace fish bones and scales, trace siderite
390.00 to 400.00 (10.00)	<b>SHALE</b> dark gray as above, micromicaceous, fissile, slightly fossiliferous, trace pyrite, trace siderite, minor Bentonite streaks, off white, very soft, sandy and micaceous in part
400.00 to 410.00 (10.00)	<b>SHALE</b> dark gray, micromicaceous, fissile, slightly fossiliferous with trace fish remnants, trace pyrite, trace Bentonite stringers, off white to light gray, soft
410.00 to 415.00 (5.00)	<b>SHALE</b> dark gray as above, micromicaceous, fissile, trace pyrite, trace Bentonite streaks, trace Chert fragments, light gray to light brown, translucent
415.00 to 420.00 (5.00)	<b>SILTSTONE</b> medium gray to brown gray, quartzose, dolomitic, siliceous, slightly argillaceous, hard, tight, dull orange fluorescence in part, patchy fair yellow orange cut fluorescence, scattered Chert fragments, light gray to light to medium brown, spicules, trace translucent with conchoidal fracture, silty in part grading to very siliceous Siltstone
420.00 to 425.00 (5.00)	<b>SHALE</b> medium gray, calcareous to dolomitic, fossiliferous, silty to very silty in part, scattered Siltstone, medium gray brown, calcareous, argillaceous, tight, no shows
425.00 to 430.00 (5.00)	<b>SHALE</b> medium to dark gray, micromicaceous, blocky, calcareous, silty to very silty in part, scattered Siltstone as above, medium gray to gray brown, sandy, calcareous to dolomitic, argillaceous, tight, mainly no shows, dull yellow orange cut fluorescence in part
430.00 to 435.00 (5.00)	<b>SANDSTONE</b> light to medium gray, quartzose, fine grained, subangular, well sorted, slightly siliceous, friable in part, fair porosity, no shows, interbedded Siltstone as above, medium gray to gray brown, sandy grading to very fine grained Sandstone in part, dolomitic in part, argillaceous, tight, mainly no shows, patchy dull orange cut fluorescence in part
435.00 to 440.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine grained, subangular, well sorted, siliceous in part, trace glauconite, pyritic matrix in part, friable in part, streaks poor to fair porosity, no fluorescence, trace pyrobitumen
440.00 to 445.00 (5.00)	<b>SANDSTONE</b> light gray to light to medium gray brown, mainly quartzose, very fine to fine grained, subangular, well sorted, siliceous, slightly dolomitic in part, glauconite, slightly argillaceous in part, friable in part, streaks poor porosity, no shows, trace pyrobitumen, trace Chert, light gray, yellow tan in part, silty and sandy, fossiliferous,

trace Crinoids, tight, no shows

445.00 to 450.00  
(5.00)

**SANDSTONE**

medium brown to gray brown, quartzose, very fine to fine grained, subangular, well sorted, siliceous, friable in part, glauconite, pyritic in part, poor to fair porosity, very faint orange cut fluorescence, scattered pyrobitumen, trace Dolomite streaks, light to medium gray, microcrystalline, slightly argillaceous, tight, no shows, trace Chert, light tan brown, sandy

450.00 to 455.00  
(5.00)

**SANDSTONE**

as above, medium brown to gray brown, very fine to fine grained, siliceous, argillaceous, trace glauconite, mainly tight with trace poor porosity, faint orange cut fluorescence, scattered pyrobitumen

455.00 to 460.00  
(5.00)

**SANDSTONE**

medium gray to brown gray, quartzose, very fine to fine grained, trace medium grained, subangular to subrounded, fair sorting, siliceous, argillaceous, friable with abundant loose disaggregated grains, indicated fair porosity, no shows, trace pyrobitumen, interbedded Siltstone, medium gray, quartzose, very argillaceous, micaceous, tight, no shows

460.00 to 465.00  
(5.00)

**SILTSTONE**

medium gray, quartzose, argillaceous to very argillaceous, micromicaceous, sandy, tight, no shows, scattered Sandstone as above, very fine to fine grained, siliceous, rare trace carbonaceous inclusions, streaks poor porosity, no shows, trace SANDSTONE, light brown, quartzose, very fine to fine grained, highly silicified grading to Chert, tight

465.00 to 470.00  
(5.00)

**SANDSTONE**

light to medium gray, quartzose, fine grained, subangular, well sorted, siliceous, slightly kaolinitic with trace kaolin grains, trace glauconite, friable with scattered loose disaggregated grains, poor to fair porosity, no shows, trace pyrobitumen, trace Sandstone, medium gray brown, quartzose, very fine to fine grained, subangular, fair sorting, very siliceous grading to sandy Chert, slightly dolomitic, tight, no shows, hard

470.00 to 475.00  
(5.00)

**SANDSTONE**

medium gray to medium brown gray, quartzose, very fine to fine grained, subangular, fair sorting, siliceous in part, slightly dolomitic in part, silty, slightly kaolinitic, argillaceous in part with trace Shale breaks, mainly tight with streaks poor porosity, no shows

475.00 to 480.00  
(5.00)

**SILTSTONE**

medium gray to gray brown, quartzose, sandy grading to very fine grained Sandstone in part, slightly dolomitic, siliceous, argillaceous, micromicaceous, tight, no shows, minor Chert, medium gray brown, sandy texture

480.00 to 485.00  
(5.00)

**SANDSTONE**

medium brown to gray brown, quartzose, glauconite, very fine to medium grained, trace coarse grains, subangular to rounded, poor sorting, siliceous, slightly kaolinitic with minor kaolin grains, argillaceous, streaks poor porosity, dead oil staining, fair yellow orange cut fluorescence, minor Siltstone as above

## Sample Descriptions

Storage Units:

Metric

485.00 to 490.00 (5.00)	<b>SANDSTONE</b> medium brown as above, very fine to medium grained with minor coarse grains, subangular to rounded, poor sorting, siliceous, glauconite, poor to fair porosity, dead oil staining with fair orange cut fluorescence
490.00 to 495.00 (5.00)	<b>SANDSTONE</b> as above, very fine to fine grained with scattered medium to coarse grains, subangular to rounded, poor sorting, siliceous, slightly dolomitic, argillaceous in part, glauconite, mainly poor porosity, streaks fair porosity, patchy dead oil staining, fair orange cut fluorescence, minor Chert, light to medium gray, tan brown in part, sandy, pyritic
495.00 to 500.00 (5.00)	<b>SILTSTONE</b> medium gray, quartzose, dolomitic, siliceous, sandy, argillaceous, micaceous, tight, no shows, minor Sandstone as above, trace Chert
500.00 to 505.00 (5.00)	<b>SILTSTONE</b> as above, dolomitic, siliceous, argillaceous, tight no shows, minor Shale, dark brown gray, micromicaceous, silty and sandy in part
505.00 to 510.00 (5.00)	<b>SHALE</b> dark gray to dark brown gray as above, micromicaceous, silty to very silty in part, sandy in part, scattered Siltstone, medium to dark gray brown, quartzose, dolomitic, argillaceous to very argillaceous, tight, no shows, trace Sandstone, light gray, clean, quartzose, very fine to fine grained, subangular, fair sorting, siliceous, trace poor porosity, no shows
510.00 to 515.00 (5.00)	<b>SHALE</b> medium to dark gray brown, silty to very silty grading to argillaceous Siltstone, dolomitic, scattered Dolomite, dark gray brown, microcrystalline, argillaceous, silty and sandy, tight, no shows, minor pyrite, trace Sandstone as above
515.00 to 520.00 (5.00)	<b>SANDSTONE</b> very light gray, quartzose, fine to medium grained, subangular to subrounded, fair sorting, slightly siliceous, clean, friable with scattered loose disaggregated grains, good porosity, no shows
520.00 to 525.00 (5.00)	<b>SANDSTONE</b> very light gray as above, clean, quartzose, fine to medium grained, calcareous in part, fair to good porosity, no shows, scattered Shale, medium gray to green gray, waxy, micromicaceous, minor Limestone, light to medium gray brown, cryptocrystalline, sandy, silty, shaly streaks, tight, no shows
525.00 to 530.00 (5.00)	<b>LIMESTONE</b> medium gray to medium brown gray, cryptocrystalline, sandy to very sandy grading to calcareous SANDSTONE in part, slightly argillaceous, silty, tight, no shows, trace pyrite, trace Chert
530.00 to 535.00 (5.00)	<b>SANDSTONE</b> light to medium gray to brown gray, quartzose, fine to medium grained, subrounded, fair sorting, very calcareous, slightly argillaceous, tight, no shows, interbedded LIMESTONE as above, trace Shale, medium gray to green gray, calcareous, sandy, slightly fossiliferous with trace Crinoids

## Sample Descriptions

Storage Units: Metric

535.00 to 540.00 (5.00)	<b>SANDSTONE</b> very light gray to light gray, quartzose, very fine to fine grained, trace medium grains, subangular to subrounded, fair sorting, calcareous, dolomitic in part, tight, no shows, trace pyrite, minor sandy Limestone as above
540.00 to 545.00 (5.00)	<b>SANDSTONE</b> medium gray to gray brown, mainly quartzose, very fine to medium grained, subangular to subrounded, poor sorting, dolomitic, slightly argillaceous in part, mainly tight with trace poor porosity, patchy dead oil staining, fair yellow orange cut fluorescence, scattered Shale, medium green gray, silty and sandy in part, waxy in part, slightly dolomitic, trace pyrite, minor sandy LIMESTONE as above
545.00 to 550.00 (5.00)	<b>SANDSTONE</b> medium gray, quartzose, very fine to fine grained, subangular, fair sorting, calcareous to dolomitic, argillaceous, siliceous in part, mainly tight, decreasing dead oil staining, scattered green gray Shale as above, silty to very silty, trace dark gray Shale, silty to very silty grading to argillaceous Siltstone, trace pyrite
550.00 to 555.00 (5.00)	<b>SHALE</b> dark gray to dark brown gray, silty, sandy to very sandy grading to very argillaceous Sandstone, scattered Siltstone, medium to dark gray, argillaceous to very argillaceous, sandy, tight, no shows, minor Sandstone, medium to dark gray to dark brown gray, quartzose, very fine to fine grained, subangular, fair sorting, siliceous, pyritic matrix in part, argillaceous, streak poor porosity, scattered dead oil staining, no fluorescence, no cut fluorescence, minor pyrobitumen
555.00 to 560.00 (5.00)	<b>SANDSTONE</b> light gray to light brown gray, quartzose, very fine to medium grained, subangular to subrounded, poor sorting, dolomitic to very dolomitic grading to sandy Dolomite in part, tight, trace spotty dead oil staining, scattered Shale, medium green gray as above, sandy to very sandy in part, minor Dolomite, medium gray, very fine to fine crystalline, sandy to very sandy in part, tight, no shows
560.00 to 565.00 (5.00)	<b>SANDSTONE</b> as above, very dolomitic grading to sandy DOLOMITE
565.00 to 570.00 (5.00)	<b>SANDSTONE</b> medium gray to medium brown gray, quartzose, very fine to medium grained, subangular to subrounded, poor sorting, very dolomitic, argillaceous in part, tight, patchy dead oil staining, weak orange cut fluorescence only, minor Dolomite, medium gray, very fine to medium crystalline, sandy in part, shaly laminations, tight, spotty dead oil staining, scattered Shale, medium to dark gray to green gray, micromicaceous, silty, slightly dolomitic, slightly fossiliferous, trace Crinoids, trace Ostracods
570.00 to 575.00 (5.00)	<b>SANDSTONE</b> medium to brown gray, quartzose, very fine to fine grained, subangular to subrounded, fair sorting, siliceous, slightly argillaceous to very argillaceous in part, pyritic in part, poor porosity, dead oil staining, no fluorescence, no cut fluorescence, scattered Shale, medium to dark gray to green gray as above, silty in part, pyritic with scattered disseminated microcrystalline pyrite, trace Siltstone, medium to dark gray, dolomitic, very argillaceous, tight, no shows, trace Dolomite, light to medium gray, fine

to medium crystalline, sandy in part, tight, no shows

575.00 to 585.00  
(10.00)

**SANDSTONE**

medium gray to gray brown, very fine to fine grained, subangular to subrounded, fair sorting, siliceous, friable in part with scattered loose disaggregated grains, poor to fair porosity, abundant dead oil staining, fair yellow orange cut fluorescence only, interbedded SHALE, medium to dark gray to green gray, micromicaceous, silty in part, waxy in part, trace Dolomite stringers, medium gray to gray brown, fine to coarse crystalline, slightly fossiliferous with trace Crinoid remnants, tight, no shows

585.00 to 590.00  
(5.00)

**SANDSTONE**

medium gray, medium brown gray in part, quartzose, very fine to fine grained, subangular, fair sorting, siliceous to very siliceous, hard, vitreous, argillaceous to very argillaceous in part, slightly dolomitic in part, silty, micaceous in part, tight, no shows, interbedded SHALE medium to dark green gray as above

590.00 to 595.00  
(5.00)

**SANDSTONE**

medium gray brown as above, very fine to fine grained, siliceous to very siliceous, hard, tight, patchy dead oil staining, fair yellow orange cut fluorescence, scattered Shale, medium to dark gray to green gray, waxy in part, pyritic, slightly dolomitic in part, silty

595.00 to 600.00  
(5.00)

**SANDSTONE**

medium gray brown, quartzose, fine grained, subangular, well sorted, slightly siliceous, pyritic, slightly argillaceous with trace green Shale laminations, friable with abundant loose disaggregated grains, fair to good porosity, patchy dead oil staining, no dry fluorescence, fair slow streaming yellow orange cut fluorescence

600.00 to 605.00  
(5.00)

**SANDSTONE**

medium gray brown, mainly quartzose, very fine to fine grained, subangular to subrounded, moderately well sorted, siliceous, slightly argillaceous, friable with scattered loose grains, fair porosity, very faint cut fluorescence only, trace pyrite

605.00 to 610.00  
(5.00)

**SANDSTONE**

medium gray to gray brown as above, very fine to fine grained, subangular to subrounded, moderately well sorted, siliceous, slightly argillaceous, decreasing porosity to poor to fair, patchy dead oil staining, fair yellow orange cut fluorescence, interbedded SHALE, medium to dark gray to green gray, micromicaceous, fissile in part, silty in part, pyritic with scattered disseminated pyrite

610.00 to 615.00  
(5.00)

**SHALE**

dark gray to very dark gray, slightly dolomitic, silty in part, scattered SANDSTONE, dark gray, silt to very fine grained, slightly siliceous, very argillaceous grading to sand; Shale, tight, no shows

615.00 to 620.00  
(5.00)

**SANDSTONE**

medium brown gray, very fine to fine grained, subangular to subrounded, fair sorting, siliceous, argillaceous with minor green Shale laminations, mainly tight, patchy dead oil staining, weak orange cut fluorescence, interbedded Siltstone, light green gray to medium gray, very argillaceous, slightly dolomitic, sandy, micromicaceous, tight, no shows, trace pyrite

## Sample Descriptions

Storage Units: Metric

620.00 to 625.00 (5.00)	<b>SANDSTONE</b> very light gray, clean, quartzose, very fine to lower case fine grained, subangular, well sorted, slightly siliceous, very friable, fair to good porosity, no shows, scattered SANDSTONE, light gray, quartzose very fine to fine grained, subangular to subrounded, well sorted, very dolomitic, tight, no shows
625.00 to 630.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine to fine grained, subangular, well sorted, very dolomitic grading to sandy DOLOMITE, hard, tight, no shows, interbedded SANDSTONE, very light gray, quartzose, very fine grained, subangular, well sorted, slightly siliceous, friable, fair to good porosity, no shows, trace green Shale streaks
630.00 to 635.00 (5.00)	<b>SANDSTONE</b> very light gray, quartzose, clean, very fine to lower case fine grained, subangular, well sorted, slightly siliceous, dolomitic in part, friable, fair porosity, no shows, interbedded SANDSTONE, medium gray, silt to very fine grained, dolomitic, slightly siliceous, argillaceous, tight, no shows, scattered Shale, medium to dark green gray, micromicaceous, waxy, silty in part
635.00 to 640.00 (5.00)	<b>SANDSTONE</b> medium gray, quartzose, silt to very fine grained, subangular, fair sorting, dolomitic, argillaceous to very argillaceous, micromicaceous, trace pyritic matrix, tight, no shows, scattered SHALE, medium to dark gray to green gray, waxy, pyritic, silty in part, sandy to very sandy in part
640.00 to 645.00 (5.00)	<b>SILTSTONE</b> light green gray to light to medium gray, quartzose, siliceous, dolomitic in part, argillaceous to very argillaceous, pyritic, sandy grading to very fine grained Sandstone in part, micromicaceous, tight, no shows, scattered Shale, medium to dark gray to green gray, micromicaceous, silty in part, trace pyrite
645.00 to 650.00 (5.00)	<b>SILTSTONE</b> as above, mainly medium green gray, very argillaceous, micromicaceous, sandy, tight, no shows, scattered Shale, medium to dark green gray, silty and sandy in part, scattered SANDSTONE, light gray to very light gray, quartzose, clean, very fine to fine grained, subangular, well sorted, slightly siliceous, dolomitic in part, trace poor porosity, no shows
650.00 to 655.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, fine grained, subangular to subrounded, well sorted, clean, slightly siliceous, friable, fair to good porosity, no shows, interbedded SANDSTONE, light gray, quartzose, fine to medium grained, subangular to subrounded, fair sorting, dolomitic to very dolomitic grading to sandy Dolomite in part, pyritic, tight, no shows
655.00 to 660.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, fine grained, subangular to subrounded, well sorted, slightly siliceous, very friable with abundant loose disaggregated grains, indicated good porosity, no shows, trace pyrite, poor sample
660.00 to 665.00 (5.00)	<b>SANDSTONE</b> as above, sample is all disaggregated fine quartz grains, indicated good porosity, no shows

## Sample Descriptions

Storage Units:

Metric

665.00 to 670.00 (5.00)	<b>SANDSTONE</b> light gray to very light gray, quartzose, very fine to fine grained, subangular to subrounded, fair sorting, siliceous, slightly calcareous in part, friable, fair to good porosity, no shows, scattered SANDSTONE, light gray, quartzose, very fine to medium grained, subangular to subrounded, poor sorting, calcareous to very calcareous, trace carbonaceous laminations, tight, no shows, trace pyrite
670.00 to 675.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, mainly fine grained, some very fine grained, minor medium grains, subangular to subrounded, well sorted, slightly siliceous, pyritic in part, abundant loose disaggregated grains, good porosity, no shows
675.00 to 680.00 (5.00)	<b>SANDSTONE</b> light gray as above, fine grained, siliceous, very friable, good porosity, no shows, scattered SANDSTONE, light to medium gray, quartzose, very fine to medium grained, subangular, fair sorting, very dolomitic, tight, no shows
680.00 to 685.00 (5.00)	<b>SANDSTONE</b> medium gray, very fine to fine grained, subangular, fair sorting, very dolomitic, argillaceous to very argillaceous, pyritic, tight, no shows, scattered Dolomite, light to medium gray, very fine to medium crystalline, sandy to very sandy in part, slightly argillaceous, tight, no shows, scattered SANDSTONE, light gray as above, fine grained, very friable with good porosity, no shows
685.00 to 690.00 (5.00)	<b>SANDSTONE</b> very light gray, quartzose, fine grained, subangular to subrounded, well sorted, slightly siliceous, very friable, abundant disaggregated grains, good porosity, no shows, minor SANDSTONE, light gray, quartzose, fine to medium grained, subangular to subrounded, fair sorting, dolomitic to very dolomitic, pyritic in part, tight, no shows, trace Shale streaks, dark gray, micromicaceous, sandy
690.00 to 695.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, fine to medium grained, subangular to subrounded, fair sorting, siliceous, friable, scattered loose grains, fair to good porosity, no shows, minor Siltstone, light to medium gray, green gray in part, quartzose, siliceous, dolomitic in part, argillaceous with scattered varved argillaceous laminations, tight, no shows, trace Shale, very dark gray to black, micromicaceous, silty
695.00 to 700.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, fine grained, subangular to subrounded, well sorted, slightly siliceous, pyritic with scattered loose pyrite, friable with abundant loose grains, fair to good porosity, no shows, interbedded SHALE, very dark gray to black, silty, micaceous
700.00 to 705.00 (5.00)	<b>SANDSTONE</b> light to medium gray, quartzose, very fine grained, subangular, well sorted, silty, siliceous, argillaceous trace varved laminations in part, micromicaceous, pyritic, tight, no shows, minor Sandstone, medium gray brown, quartzose, very fine to fine grained, subangular, fair sorting, siliceous, trace poor porosity, dead oil staining in part, no dry fluorescence, weak orange cut fluorescence, trace clean very light gray porous Sandstone as above, minor SHALE, dark gray to black, micaceous, silty



## Sample Descriptions

Storage Units:

Metric

705.00 to 710.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, fine grained, subangular to subrounded, well sorted, siliceous in part, friable, fair to good porosity, no shows, trace pyrite
710.00 to 715.00 (5.00)	<b>SANDSTONE</b> light gray as above, very fine to fine grained, siliceous, dolomitic in part, friable in part, scattered black argillaceous laminations, poor to fair porosity, no shows, interbedded SHALE, very dark gray to black, micaceous, silty and sandy, trace pyrite
715.00 to 720.00 (5.00)	<b>SHALE</b> very dark gray to black, dark brown gray in part, micaceous, silty with scattered Siltstone laminations, minor pyrite, interbedded SANDSTONE, light gray, quartzose, silt to very fine grained, trace fine grained, subangular to subrounded, fair sorting, siliceous, dolomitic, argillaceous with black Shale laminations, mainly tight with trace poor porosity, no shows, trace Siltstone, light to medium gray, quartzose, siliceous, dolomitic, micromicaceous, trace pyrite, tight, no shows
720.00 to 725.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine to fine grained, subangular to subrounded, fair sorting, siliceous and very hard in part, dolomitic in part, slightly kaolinitic, trace poor porosity, no shows, scattered SHALE as above, dark gray to black, sandy, micaceous, trace pyrite, trace Siltstone, light to medium gray, sandy with very fine grained sand, dolomitic, argillaceous, siliceous in part, tight, no shows
725.00 to 730.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine to fine grained, subangular to subrounded, fair sorting, siliceous, trace carbonaceous inclusions, poor porosity, no shows, interbedded SHALE, dark gray to black, micaceous, silty, sandy, trace pyrite, scattered Siltstone laminations, medium gray, siliceous and hard, dolomitic in part, tight, no shows
730.00 to 735.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, fine to medium grained, subangular to subrounded, moderately well sorted, slightly siliceous, slightly kaolinitic, friable with abundant loose disaggregated grains, indicated fair to good porosity, no shows, trace Shale, very dark gray to black, micaceous
735.00 to 740.00 (5.00)	<b>SANDSTONE</b> light to medium gray, quartzose, silt to very fine grained, trace fine grained, subangular to subrounded, fair sorting, siliceous, argillaceous with scattered black Shale laminations, tight, no shows, minor Shale, very dark gray to black as above, micaceous, silty and sandy in part, scattered light gray Sandstone as above, fine grained, friable, poor to fair porosity, no shows
740.00 to 745.00 (5.00)	<b>SANDSTONE</b> light gray to light brown gray, quartzose, very fine to fine grained, subangular to subrounded, moderately well sorted, silty, siliceous, slightly kaolinitic, slightly argillaceous with minor dark gray Shale laminations, mainly tight with trace poor porosity, no shows, scattered SHALE, very dark gray to black, micaceous, silty and sandy in part, trace pyrite
745.00 to 750.00 (5.00)	<b>SANDSTONE</b> as above, light gray, quartzose, very fine to fine grained, siliceous, trace poor porosity no shows, increasing interbedded SHALE, very dark gray to black, micaceous, silty

	with scattered thin Siltstone laminations, sandy to very sandy in part, trace pyrite
750.00 to 755.00 (5.00)	<b>SHALE</b> very dark gray to black, micaceous, fissile, silty with scattered Siltstone laminations, slightly sandy in part, trace pyrite, minor Sandstone, light to medium gray to brown gray, quartzose, very fine to fine grained, subangular, fair sorting, siliceous, argillaceous, kaolinitic in part, silty, slightly carbonaceous in part, tight, no shows
755.00 to 760.00 (5.00)	<b>SHALE</b> dark gray to black as above, dark brown gray in part, silty and sandy, trace pyrite, minor Sandstone, light gray, quartzose, very fine to fine grained, subangular to subrounded, fair sorting, siliceous to very siliceous, argillaceous with scattered dark gray Shale laminations, mainly tight with trace poor porosity, no shows, trace Siltstone, light to medium gray, siliceous, argillaceous, tight
760.00 to 765.00 (5.00)	<b>SHALE</b> as above, very dark gray to black, silty and sandy, carbonaceous laminations, scattered Sandstone, light to medium gray, quartzose, very fine to fine grained, subangular, fair sorting, siliceous to very siliceous, hard, silty in part, slightly argillaceous with black Shale laminations, tight, no shows, minor Siltstone stringers
765.00 to 770.00 (5.00)	<b>SHALE</b> dark gray as above, silty and sandy in part, scattered Sandstone as above, poor sample, bit-trip
770.00 to 775.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, kaolinitic, slightly carbonaceous, scattered black Shale laminations, pyritic in part, friable, streaks poor porosity, no shows, scattered Shale dark gray to black as above
775.00 to 780.00 (5.00)	<b>SANDSTONE</b> light gray as above, mainly very fine to fine grained, some fine to medium grained, siliceous, friable, streak fair porosity, no shows, increasing interbedded SHALE, very dark gray to black, micromicaceous, fissile in part, silty in part, sandy with scattered floating sand grains, minor pyrite
780.00 to 785.00 (5.00)	<b>SHALE</b> very dark gray to black, micaceous, fissile in part, silty with scattered Siltstone laminations, sandy in part, carbonaceous in part, trace pyrite, trace Sandstone as above
785.00 to 790.00 (5.00)	<b>SHALE</b> as above, very dark gray to black, micaceous, silty and sandy in part, trace Sandstone as above
790.00 to 795.00 (5.00)	<b>SANDSTONE</b> very light gray, quartzose, very fine grained, subangular to subrounded, well sorted, slightly siliceous, slightly carbonaceous, friable, fair porosity, no shows, scattered Sandstone, light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, slightly kaolinitic, dolomitic in part, mainly tight with streaks poor porosity, no shows, trace pyrite

## Sample Descriptions

Storage Units: Metric

795.00 to 800.00 (5.00)	<b>SANDSTONE</b> light gray to very light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, kaolinitic, friable in part, mainly tight with streaks poor to fair porosity, no shows, scattered SHALE, dark gray to black, micromicaceous, silty in part, slightly carbonaceous, minor siderite
800.00 to 805.00 (5.00)	<b>SANDSTONE</b> as above, very fine to fine grained, siliceous, slightly kaolinitic, argillaceous in part, friable in part with streaks poor porosity, no shows, scattered SHALE as above, trace pyrite
805.00 to 810.00 (5.00)	<b>SANDSTONE</b> light gray as above, quartzose, very fine to fine grained, slightly siliceous, kaolinitic, scattered black argillaceous laminations, friable with streaks poor to fair porosity, no shows, decreasing dark gray to black Shale as above, trace pyrite
810.00 to 815.00 (5.00)	<b>SANDSTONE</b> light gray to very light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, kaolinitic, minor carbonaceous inclusions, trace dark gray argillaceous laminations, friable in part, mainly tight with streaks poor to fair porosity, no shows, trace Shale as above, dark gray to black, micaceous, sandy, trace pyrite
815.00 to 820.00 (5.00)	<b>SANDSTONE</b> light gray as above, very fine to fine grained, trace medium grained, siliceous, slightly sideritic in part, kaolinitic, mainly tight with trace poor porosity, no shows, minor Ironstone, medium brown to gray brown, sandy with floating sand grains in part to very sandy grading to sideritic Sandstone in part, tight, no shows
820.00 to 825.00 (5.00)	<b>SANDSTONE</b> light gray to very light gray, light brown gray in part, quartzose, mainly fine grained, subangular to subrounded, well sorted, siliceous, dolomitic in part, kaolinitic, trace dark gray argillaceous laminations, friable in part, mainly tight with streaks poor to fair porosity, no shows, scattered sandy Ironstone as above, trace Shale streaks, very dark gray to black, rare trace green waxy Shale
825.00 to 830.00 (5.00)	<b>SANDSTONE</b> light gray to light brown gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, kaolinitic, dolomitic to slightly sideritic in part, friable in part, mainly tight with trace poor porosity, no shows, trace Shale streaks, medium to dark gray, green gray in part, micromicaceous, sandy in part, trace pyrite
830.00 to 835.00 (5.00)	<b>SANDSTONE</b> light gray brown, very fine to fine grained, subangular to subrounded, well sorted, slightly siliceous, kaolinitic, trace carbonaceous specks, streak poor to fair porosity, no shows, trace Shale streaks, dark gray to black, micromicaceous, silty in part with minor thin Siltstone laminations, trace pyrite
835.00 to 840.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine grained, subangular to subrounded, well sorted, siliceous to very siliceous and hard in part, slightly kaolinitic, scattered thin black Shale laminations, tight, no shows

## Sample Descriptions

Storage Units:

Metric

840.00 to 845.00 (5.00)	<b>SANDSTONE</b> light gray to very light gray, quartzose, very fine grained as above, subangular to subrounded, well sorted, slightly siliceous to very siliceous and hard in part, kaolinitic, friable in part, trace poor porosity, no shows
845.00 to 850.00 (5.00)	<b>SHALE</b> dark gray to very dark gray, micromicaceous, fissile, scattered pyrite, trace siderite, trace green gray Shale laminations, scattered Siltstone laminations and inclusions
850.00 to 855.00 (5.00)	<b>SANDSTONE</b> very light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, slightly kaolinitic in part, very friable in part, streak fair to good porosity, no dry fluorescence, patchy fair orange cut fluorescence, minor pyrobitumen in part, scattered SHALE as above
855.00 to 860.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, slightly siliceous, slightly kaolinitic in part, very friable with scattered loose grains, fair to good porosity, fair orange cut fluorescence, scattered pyrobitumen
860.00 to 865.00 (5.00)	<b>SANDSTONE</b> light brown, quartzose, fine grained, subangular to subrounded, well sorted, slightly siliceous, very friable, abundant loose disaggregated grains, fair to good porosity, no shows
865.00 to 870.00 (5.00)	<b>SANDSTONE</b> light gray brown as above, light gray in part, quartzose, fine grained, siliceous and hard in part, fair to good porosity, no shows, minor SHALE, dark gray to black, very dark gray to black and trace gray green, pyritic
870.00 to 875.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous to very siliceous and hard in part, kaolinitic, slightly pyritic, trace dark gray Shale laminations, friable in part, mainly tight with trace poor porosity, no shows
875.00 to 880.00 (5.00)	<b>SANDSTONE</b> as above, light gray to very light gray, quartzose, very fine to fine grained, siliceous, kaolinitic, friable in part, streaks poor to fair porosity, no shows
880.00 to 885.00 (5.00)	<b>SANDSTONE</b> light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, very siliceous and hard in part, kaolinitic, friable in part, mainly tight with trace poor porosity, no shows, trace dark gray Shale laminations, micaceous
885.00 to 890.00 (5.00)	<b>SANDSTONE</b> light gray as above, very fine to fine grained, siliceous, kaolinitic, tight with trace poor porosity, no shows, trace Sandstone, light to medium gray, quartzose, very fine to medium grained, subangular to subrounded, fair sorting, siliceous, dolomitic, kaolinitic, argillaceous in part with trace thin Shale laminations, tight, no shows
890.00 to 895.00 (5.00)	<b>SANDSTONE</b> very light gray, quartzose, very fine grained, subangular, well sorted, siliceous, kaolinitic, tight, no shows, trace pyrite, minor dark gray to black Shale laminations and

stringers

895.00 to 900.00  
(5.00)

**SANDSTONE**

very light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, kaolinitic, friable in part with trace poor porosity, no shows, trace dark gray Shale laminations, trace Sandstone, medium gray, very fine to fine grained, siliceous, dolomitic, argillaceous to very argillaceous, silty, tight, no shows

900.00 to 905.00  
(5.00)

**SANDSTONE**

light gray to very light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, very siliceous and hard in part, vitreous, kaolinitic, minor dark gray to black Shale laminations, trace poor porosity, no shows, minor medium gray argillaceous SANDSTONE as above

905.00 to 910.00  
(5.00)

**SANDSTONE**

as above, light gray to very light gray, very fine to fine grained, siliceous, kaolinitic, tight, no shows

910.00 to 915.00  
(5.00)

**SANDSTONE**

medium gray, quartzose, very fine to fine grained, subangular to subrounded, fair sorting, very dolomitic, very argillaceous, pyritic, tight, no shows, scattered SHALE, medium to dark gray to green gray, very sandy, pyritic, minor Dolomite, medium brown gray, microcrystalline to very fine crystalline, sandy, argillaceous with scattered medium green gray argillaceous laminations, fossiliferous, trace Crinoids, tight, no shows

915.00 to 920.00  
(5.00)

**SHALE**

medium to dark gray green, sandy to very sandy, waxy in part, very dark gray to black in part, fissile, micaceous, silty in part with trace siliceous Siltstone laminations, scattered SANDSTONE, light to medium gray, quartzose, very fine to fine grained, subangular to subrounded, siliceous, kaolinitic, argillaceous with scattered dark gray Shale laminations in part, tight, no shows

920.00 to 925.00  
(5.00)

**SHALE**

medium to dark green gray, micromicaceous, sandy to very sandy in part, interbedded SANDSTONE as above, medium gray, very fine to fine grained, very dolomitic, very argillaceous, tight, no shows, trace Dolomite, medium gray as above, very sandy grading to dolomitic Sandstone, tight, no shows, trace pyrite

925.00 to 930.00  
(5.00)

**SANDSTONE**

light gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, kaolinitic, tight, no shows, scattered Siltstone, medium gray to medium green gray, quartzose, siliceous, dolomitic, very argillaceous, hard, tight, no shows, scattered SHALE, medium to dark green gray, micromicaceous, sandy

930.00 to 935.00  
(5.00)

**SANDSTONE**

light to gray, quartzose, very fine to fine grained, subangular to subrounded, well sorted, siliceous, dolomitic in part, kaolinitic, tight, no shows, trace Siltstone, medium gray to medium green gray as above, very argillaceous, hard, tight, no shows, scattered SHALE, medium to dark green gray, micromicaceous, sandy, carbonaceous with thin carbonaceous and coaly laminations, trace siderite, trace pyrite

935.00 to 940.00 (5.00)	<b>SHALE</b> dark gray to very dark gray to black, medium gray green in part, micromicaceous, sandy with scattered floating sandy grains, silty in part, carbonaceous laminations, scattered Dolomite, medium brown, very fine to fine crystalline, sandy, argillaceous, very pyritic, tight, no shows, scattered Sandstone as above
940.00 to 945.00 (5.00)	<b>SHALE</b> dark gray to black, gray green in part as above, sandy, scattered DOLOMITE as above, medium brown to gray brown, very fine to fine crystalline, sandy, fossiliferous, trace Crinoids, Ostracods, tight, no shows
945.00 to 950.00 (5.00)	<b>DOLOMITE</b> medium brown, very fine to fine crystalline, fossiliferous, Crinoids, tight, no shows, interbedded SHALE as above, medium to dark gray to green gray, micromicaceous, fissile, sandy in part, trace pyrite
950.00 to 955.00 (5.00)	<b>SHALE</b> dark gray to black, dark brown gray in part, micaceous, fissile, slightly calcareous and fossiliferous in part, trace Crinoids, sandy in part, minor Dolomite as above
955.00 to 960.00 (5.00)	<b>LIMESTONE</b> medium gray brown to medium gray, cryptocrystalline, silt to fine grained Packstone, argillaceous, silty, abundant fossil fragments with Crinoids, trace Ostracods, trace Brachiopods, tight, no shows, interbedded SHALE as above, dark gray to black, green gray in part, micaceous, silty, sandy to very sandy in part, trace pyrite
960.00 to 965.00 (5.00)	<b>DOLOMITE</b> mainly medium brown, medium to dark brown to dark gray brown in part, very fine to fine crystalline, argillaceous, slightly calcareous, fossiliferous, Crinoids, Ostracods, tight, no shows, scattered LIMESTONE as above, argillaceous, silty, fossiliferous, Crinoids, trace Ostracods, trace Brachiopods, trace Bryozoans, tight, no shows
965.00 to 970.00 (5.00)	<b>LIMESTONE</b> light gray brown, fine to coarse grained fragmental Packstone, slightly argillaceous, fossiliferous, Crinoids, Brachiopods, trace pellets, tight, no shows, trace pyrite
970.00 to 975.00 (5.00)	<b>LIMESTONE</b> light to medium gray brown as above, fine to coarse grained fragmental Packstone, very fossiliferous, abundant coarse Crinoidal fragments, Brachiopods, trace Bryozoans, tight, no shows
975.00 to 980.00 (5.00)	<b>LIMESTONE</b> medium gray to brown gray, fine to very coarse grained Crinoidal Packstone, slightly argillaceous in part, very fossiliferous, Crinoids, Brachiopods, trace Ostracods, trace pellets, tight, no shows, trace stylolites
980.00 to 985.00 (5.00)	<b>LIMESTONE</b> medium gray to brown gray as above, fine to very coarse grained Packstone, very fossiliferous, Crinoids, Brachiopods, trace Ostracods, trace pellets, tight, no shows, trace stylolites

## Sample Descriptions

Storage Units:

Metric

985.00 to 990.00 (5.00)	<b>LIMESTONE</b> light to medium gray to brown gray, fine to very coarse grained Packstone, slightly argillaceous in part, very fossiliferous, Crinoids, Brachiopods, trace Bryozoans, trace Ostracods, trace pellets, tight, no shows, trace stylolites, rare trace Chert
990.00 to 995.00 (5.00)	<b>LIMESTONE</b> light to medium gray to brown gray as above, fine to very coarse grained Packstone, slightly argillaceous, very fossiliferous, tight, no shows, scattered LIMESTONE, dark gray brown, microcrystalline, dolomitic, fossiliferous, tight, no shows, scattered Chert, light to medium gray, translucent in part
995.00 to 1,000.00 (5.00)	<b>LIMESTONE</b> light gray to light brown gray, fine to very coarse grained Packstone, slightly argillaceous in part, very fossiliferous, Crinoids, trace pellets, tight, no shows, trace stylolites, scattered Chert fragments
1,000.00 to 1,005.00 (5.00)	<b>LIMESTONE</b> light gray to light brown gray as above, Packstone, tight, no shows, scattered LIMESTONE, dark gray brown, microcrystalline to very fine crystalline, Wackestone, very argillaceous, slightly dolomitic in part, fossiliferous, Crinoids, tight, no shows, trace Chert
1,005.00 to 1,010.00 (5.00)	<b>LIMESTONE</b> light gray to light brown gray, fine to very coarse grained Packstone, chalky in part, slightly argillaceous in part, very fossiliferous, Crinoids, Brachiopods, trace pellets, tight, no shows, trace stylolites, scattered LIMESTONE, dark gray brown, microcrystalline to very fine crystalline, Wackestone, very argillaceous grading to Marlstone in part, fossiliferous, Crinoids, tight, no shows, trace Chert
1,010.00 to 1,015.00 (5.00)	<b>LIMESTONE</b> light gray to light to medium brown gray, fine to very coarse grained Packstone, chalky in part, slightly argillaceous in part, very fossiliferous, Crinoids, trace pellets, tight, no shows, trace stylolites, abundant Shale, dark gray, micromicaceous, fissile, sloughing?
1,015.00 to 1,020.00 (5.00)	<b>LIMESTONE</b> light gray to light brown gray, fine to very coarse grained Packstone, chalky in part, slightly argillaceous in part, very fossiliferous, abundant Crinoids, Brachiopods, trace Ostracods, trace pellets, tight, no shows, trace stylolites, scattered Chert fragments, light to dark gray
1,020.00 to 1,028.00 (8.00)	<b>LIMESTONE</b> as above, light gray to light to medium brown gray, dark gray brown in part, fine to very coarse grained fragmental Packstone, slightly argillaceous in part, very fossiliferous, Crinoids, Brachiopods, trace pellets, tight, no shows, trace stylolites, trace pyrite, increasing Chert, light to dark gray, medium to dark gray brown in part, translucent in part, hard