

WID 1857

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Wellsite Geological Report

on

Paramount Berkley Arrowhead C-02
60° 40' 123° 00'

for

Paramount Resources Ltd.

Prepared by:

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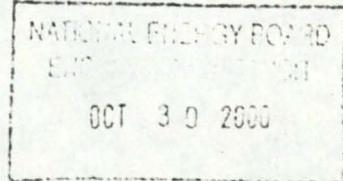


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Casing Data Summary

Storage Units: Metric

Casing Type: Surface

Casing Size: 339.7

Casing Landed @: 504.00

Casing Date: Mar 20, 1999 @ 09:45

Hole Size: 444.5

Total Joints: 38

Plug Down Date: Mar 20, 1999 @ 13:16

of Joints / Length / O.D. / Weight: Ran 37 Joints (505.1m) of 339.7mm 81.1kg/m Lonestar K-55 8md ST&C

Cementing Details: Flushed with 3m3 water, Cement with 52 tonnes (39.6m3) 0-1-0 G & 1% CaCl2.

Remarks: 7m3 returns

Wireline Logging Summary

Storage Units: Metric

Logging Suite Number: 1
 Wireline Logging Company: Baker Atlas
 District: Grande Prairie
 Witness: Colin Bredin

Engineer: Khafizov / Splay
 Unit Number: HL 6544

Was Pressure Control Equipment Utilized: Maximum Deviation: 1.300°
 Was the Logging Job Mechanically Assisted: Hole Size: 311.0

Total Lost Time: 2.00
 Loggers' Total Down Time:
 Total Job Time (From Rig up to Rig down): 8.00

	Measured Depth	True Vertical Depth
Casing Depth Driller	504.00	504.00
Casing Depth Logger	503.20	503.20
Total Depth Driller (Tally)	694.00	694.00
Total Depth Driller (Strap or SLM)	504.00	

General Remarks: Loggers left location without presenting field prints to geologist for inspection. The sonic log was not logged as requested.

Logging Run #: 1
 Date: Mar 24, 1999

Drilling Fluid Data

Drilling Fluid Type:	Invert	Fluid Density:	985	Viscosity:	50	pH:	Fluid Loss:
Mud Resistivity (Rm):	@						
Mud Resistivity (Rm) @ BHT:	@					Maximum Temperature:	42.6°
Mud Filtrate Resistivity (Rmf):	@					Source (Rmf):	
Mud Cake Resistivity (Rmc):	@					Source (Rmc):	

Logging Run Information

Date on Bottom: Mar 24, 1999
 Total Depth Logger: 692.20 (MD) 692.20 (TVD)

Logging Tools: HDIL - GR from 688.3m to 503.2m
 ZDL-CNL-GR-XYCAL from 682m to Surface

Remarks: No problems

Hole Conditions: Good

Wireline Logging Summary

Storage Units Metric

Logging Run #: 2
Date: Mar 24, 1999

Drilling Fluid Data

Drilling Fluid Type:	Invert	Fluid Density:	985	Viscosity:	50	pH:	Fluid Loss:
Mud Resistivity (Rm):	@	◦					
Mud Resistivity (Rm) @ BHT:	@	◦				Maximum Temperature:	◦
Mud Filtrate Resistivity (Rmf):	@	◦				Source (Rmf):	
Mud Cake Resistivity (Rmc):	@	◦				Source (Rmc):	

Logging Run Information

Date on Bottom: Mar 24, 1999
Total Depth Logger: 692.20 (MD) (TVD)

Logging Tools: MAC-GR-CAL tool failed

Remarks: Unable to log, no backup available.

Hole Conditions: Good

Logging Run #: 3
Date: Mar 24, 1999

Drilling Fluid Data

Drilling Fluid Type:	Invert	Fluid Density:	985	Viscosity:	50	pH:	Fluid Loss:
Mud Resistivity (Rm):	@	◦					
Mud Resistivity (Rm) @ BHT:	@	◦				Maximum Temperature:	◦
Mud Filtrate Resistivity (Rmf):	@	◦				Source (Rmf):	
Mud Cake Resistivity (Rmc):	@	◦				Source (Rmc):	

Logging Run Information

Date on Bottom: Mar 25, 1999
Total Depth Logger: 692.40 (MD) 692.40 (TVD)

Logging Tools: DAL-GR-CAL from 688.3m to 503.2m

Remarks: Sonic was not pulled through casing to surface as requested. Loggers left location without presenting field logs to geologist.

Hole Conditions: Good

Deviation Survey Points

Storage Units Metric

Survey Type: /

Measured Depth	Drift Angle (°)	Azimuth (°)	Measured Depth	Drift Angle (°)	Azimuth (°)
52.00	0.125				
100.00	1.000				
130.00	0.500				
175.00	0.750				
212.00					
260.00	0.875				
310.00	0.500				
348.00	1.000				
376.00					
385.00	1.000				
415.00	1.000				
444.00	0.750				
472.00	1.000				
500.00	0.750				
550.00	0.750				
598.00	1.250				
635.00	1.000				
674.00	1.250				

Drilling Fluid Summary

Storage Units: Metric

Drilling Fluid Type: Water based Gel Mud

From: 0 To: 504

Drilling Fluid Type: Invert

From: 504 To: 694

Formation Top Summary

Stores Units

Metric

Kelly Bushing Elevation:
Ground Elevation:

454.10
447.20

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
FL St. John <i>Scatter</i>	457.00	450.00	450.00	449.00	449.00	5.10	60.00
Ft. St. John <i>Garbutt</i>	518.00	510.00	510.00	509.00	509.00	-54.90	94.80
Ft. St. John <i>Chinkeh</i>	618.00	605.50	605.50	603.80	603.80	-149.70	44.70
Flett	641.00	649.50	649.50	648.50	648.50	-194.40	

Formation Evaluations

Storage Units: Metric

Kelly Bushing Elevation: 454.10
Ground Elevation: 447.20

Casing Flange Elevation:

All Depths Measured from Kelly Bushing Elevation

Group: Ft. St. John **Era:** Mesozoic
Formation: Scatter **Series:** Lower
Member: **Period:** Cretaceous
Boundary Type: conformable **Stage:**
Fault Type: **Age (Approx):** Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	450.00	450.00	4.10	60.00
Log Top	449.00	449.00	5.10	60.00

Evaluation:

Upper Scatter is interbedded SHALE and SANDSTONE light gray, light brown, salt and pepper, very fine to fine grained, subangular to subround, well sorted, firm to very friable, calcareous cement, siliceous in part, speckled glauconitic, patchy oil stain, no dry, fair streaming wet cut fluorescence, scattered intergranular porosity 12-14%. no significant gas effect. Lower Scatter is interbedded SHALE and SANDSTONE light gray, light to medium brown, salt and pepper, very fine to fine grained, subangular to subround, medium to well sorted, friable, siliceous cement, argillaceous to very argillaceous in part, speckled glauconitic, patchy oil stain, streaming wet cut fluorescence, no visible porosity.

Conclusion:

Reservoir potential but no apparent gas. Looks wet.

Group: Ft. St. John **Era:** Mesozoic
Formation: Garbutt **Series:** Lower
Member: **Period:** Cretaceous
Boundary Type: conformable **Stage:**
Fault Type: **Age (Approx):** Million years.

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	510.00	510.00	-55.90	95.50
Log Top	509.00	509.00	-54.90	94.80

Evaluation:

The Garbutt is predominately SHALE medium gray, medium gray silty, fissile, platy to blocky.

Conclusion:

No reservoir potential.

Formation Evaluations

Storage Units

Metric

Kelly Bushing Elevation: 454.10
Ground Elevation: 447.20

Casing Flange Elevation:

All Depths Measured from Kelly Bushing Elevation

Group: Ft. St. John
Formation: Chinkeh
Member:
Boundary Type: conformable
Fault Type:

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

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	605.50	605.50	-151.40	44.00
Log Top	603.80	603.80	-149.70	44.70

Evaluation:

Upper Chinkeh is SANDSTONE light to medium brown, salt and pepper, predominately quartz, very fine to medium grained, subangular to subround, medium to well sorted, firm to friable, siliceous cement, slightly argillaceous in part, trace of clay infilling, predominately well indurated, patchy oil stain, no fluorescence, scattered intergranular porosity 12 to 14%, very weak gas effect. Middle Chinkeh is Interbedded SILTSTONE, COAL and SANDSTONE light to medium brown, salt and pepper, silty to very fine grained, subangular to subround, medium sorted, very argillaceous in part, firm, siliceous cement, very patchy oil stain, no fluorescence, no visible porosity, minor coal gas. Lower Chinkeh is a SANDSTONE light gray, salt and pepper, fine to medium grained, subangular to subround, medium to well sorted, very friable to poorly consolidated, clayey in part, no stain, no fluorescence, intergranular porosity 15 to 18%, looks wet. Basal Chinkeh (Fantasque ?) is predominately CHERT clear, white, light brown, dark brown, dark blue gray variegated, massive, high torque while drilling may suggest fracturing, no apparent gas effect.

Conclusion:

Upper Chinkeh has reservoir potential.

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

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

	Measured Depth	True Vertical Depth	Subsea	Thickness
Sample Top	649.50	649.50	-195.40	
Log Top	648.50	648.50	-194.40	

Evaluation:

Flett is predominately a LIMESTONE light gray white, medium gray argillaceous, mottled medium to dark brown, cryptocrystalline, mudstone, tight, trace of pellets and crinoid plates, minor dark brown CHERT laminae, common SHALE thinbeds

Conclusion:

No reservoir potential to this point.

Sample Descriptions

Storage Units Metric

10.00 to 15.00 (5.00)	100% CEMENT Oilfield cement
	100% TILL glacial drift, sand and clay with occasional cobblestones
15.00 to 20.00 (5.00)	100% TILL as above
20.00 to 25.00 (5.00)	100% TILL glacial drift, sand and clay with occasional cobblestones
25.00 to 30.00 (5.00)	100% TILL as above
30.00 to 35.00 (5.00)	100% TILL glacial drift, sand and clay with occasional cobblestones
35.00 to 40.00 (5.00)	100% TILL as above
40.00 to 45.00 (5.00)	100% TILL glacial drift, sand and clay with occasional cobblestones
45.00 to 50.00 (5.00)	100% TILL as above
50.00 to 55.00 (5.00)	100% TILL glacial drift, sand and clay with occasional cobblestones
55.00 to 60.00 (5.00)	100% TILL as above
60.00 to 65.00 (5.00)	100% TILL glacial drift, sand and clay with occasional cobblestones
65.00 to 70.00 (5.00)	100% TILL as above
70.00 to 75.00 (5.00)	50% SHALE medium gray, light to medium gray, subfissile to fissile, platy 50% TILL glacial drift, sand and clay with occasional cobblestones
75.00 to 80.00 (5.00)	100% SHALE medium gray, dark gray, minor light brown, subfissile to fissile, platy
80.00 to 85.00 (5.00)	100% SHALE medium gray, dark gray, minor medium brown sideritic, fissile, platy
85.00 to 90.00 (5.00)	100% SHALE as above, abundant sand cavings

Sample Descriptions		Storage Units	Metric
90.00 to 95.00 (5.00)	100% SHALE as above, common cavings		
95.00 to 100.00 (5.00)	100% SHALE medium to dark gray, medium gray, medium gray silty, fissile, platy to blocky		
100.00 to 105.00 (5.00)	100% SHALE medium gray, medium gray very silty, sandy in part, fissile, blocky, common disseminated pyrite		
105.00 to 110.00 (5.00)	100% SHALE medium gray, medium gray silty, trace of disseminated pyrite, fissile, platy to blocky		
110.00 to 115.00 (5.00)	100% SHALE as above		
115.00 to 120.00 (5.00)	100% SHALE medium gray, medium to dark gray brown, fissile, platy to blocky		
120.00 to 125.00 (5.00)	100% SHALE as above		
125.00 to 130.00 (5.00)	-1% NO SAMPLE		
130.00 to 135.00 (5.00)	100% SHALE medium gray, medium to dark gray, silty in part, fissile, platy to blocky		
135.00 to 140.00 (5.00)	100% SHALE as above		
140.00 to 145.00 (5.00)	100% SHALE medium gray, medium to dark gray, silty in part, fissile, platy to blocky		
145.00 to 150.00 (5.00)	100% SHALE as above		
150.00 to 155.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, platy to blocky, minor SILTSTONE dark brown, argillaceous, sideritic.		
155.00 to 160.00 (5.00)	100% SHALE as above		
160.00 to 165.00 (5.00)	60% SANDSTONE light gray, medium gray, salt and pepper, silty to fine grained, subangular to subround, medium sorted, friable, calcite cement, clay infilling, speckled glauconitic, slightly argillaceous, no stain, no fluorescence, no visible porosity		
	40% SHALE as above		
165.00 to 170.00 (5.00)	50% SANDSTONE as above, sideritic in part		

Sample Descriptions

Storage Units Metric

165.00 to 170.00 (5.00)	50% SHALE medium gray, medium gray brown, silty, fissile, platy to blocky
170.00 to 175.00 (5.00)	80% SANDSTONE light gray, salt and pepper, silty to very fine grained, subangular to subround, well sorted, firm to friable, argillaceous in part, speckled glauconitic, calcite cement, clay infilling in part, no stain, no fluorescence, patchy intergranular porosity 6-8%
	20% SHALE as above
175.00 to 180.00 (5.00)	50% SANDSTONE as above
	50% SHALE medium gray, medium gray silty, sandy in part, fissile, blocky to platy
180.00 to 185.00 (5.00)	50% SANDSTONE as above, very argillaceous in part
	50% SHALE as above
185.00 to 190.00 (5.00)	100% SANDSTONE light gray, salt and pepper, silty to very fine grained, subangular to subround, well sorted, very friable to poorly consolidated, light calcite cement, argillaceous in part, speckled glauconitic, no stain, no fluorescence, intergranular porosity to 20%, minor SHALE as above
190.00 to 195.00 (5.00)	100% SANDSTONE as above
195.00 to 200.00 (5.00)	50% SANDSTONE as above, abundant cavings
	50% SHALE medium gray, medium gray silty, fissile, blocky to platy
200.00 to 205.00 (5.00)	90% SANDSTONE light gray, salt and pepper, predominately quartz, silty to very fine grained, subangular to subround, well sorted, very friable, light siliceous cement, slightly calcareous in part, minor speckled glauconitic, no stain, no fluorescence, scattered intergranular porosity to 15%
	10% SHALE as above
205.00 to 210.00 (5.00)	100% SANDSTONE as above
210.00 to 215.00 (5.00)	100% SANDSTONE light gray, salt and pepper, predominately quartz, silty to very fine grained, subangular to subround, well sorted, very friable, light siliceous cement, slightly calcareous, speckled glauconitic, no stain, no fluorescence, scattered intergranular

Sample Descriptions

Storage Units:

Metric

		porosity to 15%
215.00 to 220.00 (5.00)	100% SANDSTONE as above	
220.00 to 225.00 (5.00)	90% SANDSTONE light gray, salt and pepper, predominately quartz, silty to very fine grained, subangular to subround, well sorted, slightly argillaceous, very friable to poorly consolidated, slightly calcareous, light siliceous cement, speckled glauconitic in part, no stain, no fluorescence, scattered intergranular porosity 8-10%	
	10% SHALE as above	
225.00 to 230.00 (5.00)	80% SANDSTONE as above	
	20% SHALE medium gray, medium gray silty, sandy in part, fissile, platy to blocky, trace medium brown sideritic	
230.00 to 235.00 (5.00)	100% SANDSTONE as above	
235.00 to 240.00 (5.00)	70% SANDSTONE light gray, salt and pepper, silty to very fine grained, subangular to subround, well sorted, very friable, slightly argillaceous, calcareous in part, light siliceous cement, speckled glauconitic, no stain, no fluorescence, scattered intergranular porosity 6-8%	
	30% SHALE medium gray, medium gray silty, fissile, blocky to platy	
240.00 to 245.00 (5.00)	90% SANDSTONE as above	
	10% SHALE medium gray, medium gray silty, fissile, blocky	
245.00 to 250.00 (5.00)	80% SANDSTONE light gray, light to medium gray argillaceous, salt and pepper, silty to very fine grained, subangular to subround, medium to well sorted, very friable, slightly calcareous, light siliceous cement, speckled glauconitic, no stain, no fluorescence, scattered intergranular porosity 6-8%	
	20% SHALE medium gray, medium gray silty, medium brown, fissile, blocky	
250.00 to 255.00 (5.00)	60% SANDSTONE as above	
	60% SHALE as above	

Sample Descriptions

Storage Units: Metric

255.00 to 260.00 (5.00)	60% SHALE as above 40% SANDSTONE as above
260.00 to 265.00 (5.00)	50% SANDSTONE light gray, medium gray, salt and pepper, silty to very fine grained, subangular to subround, well sorted, argillaceous in part, very friable to poorly consolidated, slightly calcareous, speckled glauconitic, light siliceous cement in part, no stain, no fluorescence, scattered intergranular porosity 6-8%
	50% SHALE as above
265.00 to 270.00 (5.00)	70% SANDSTONE as above, medium gray argillaceous 30% SHALE medium gray, medium to dark gray, medium to dark brown, subfissile to fissile, blocky to platy
270.00 to 275.00 (5.00)	70% SANDSTONE medium gray, light gray, salt and pepper, silty to very fine grained, subangular to subround, medium sorted, very argillaceous in part, very poorly consolidated, slightly calcareous, no stain, no fluorescence, no visible porosity 30% SHALE as above
275.00 to 280.00 (5.00)	60% SHALE medium gray, medium gray brown, silty in part, subfissile to fissile, blocky, trace of disseminated pyrite 40% SANDSTONE light to medium gray, medium gray, salt and pepper, silty to very fine grained, subangular to subround, medium to well sorted, argillaceous, friable, slightly calcareous, speckled glauconitic, no stain, no fluorescence, no visible porosity
280.00 to 285.00 (5.00)	90% SHALE medium gray, medium gray silty, medium gray brown, subfissile to fissile, predominately blocky 10% SANDSTONE as above
285.00 to 290.00 (5.00)	100% SHALE medium to dark gray, dark gray, silty in part, subfissile to fissile, blocky to platy, common sand cavings
290.00 to 295.00 (5.00)	100% SHALE as above

Sample Descriptions		Storage Units	Metric
295.00 to 300.00 (5.00)	100% SHALE medium gray, medium to dark gray, silty in part, subfissile to fissile, platy to blocky		
300.00 to 305.00 (5.00)	100% SHALE as above		
305.00 to 310.00 (5.00)	60% SHALE as above		
	40% SANDSTONE light gray, salt and pepper, predominately silty, very fine grained in part, subangular to subround, well sorted, friable, siliceous, argillaceous, no stain, no fluorescence, no visible porosity		
310.00 to 315.00 (5.00)	90% SHALE medium gray, medium gray silty, fissile, blocky		
	10% SANDSTONE as above		
315.00 to 320.00 (5.00)	90% SHALE as above		
	10% SANDSTONE as above		
320.00 to 325.00 (5.00)	80% SHALE medium gray, medium gray silty, medium gray brown, fissile, blocky to platy		
	20% SANDSTONE light to medium gray, salt and pepper, silty to very fine grained, fine grained in part, subangular to subround, medium to well sorted, firm to friable, siliceous cement, slightly calcareous, argillaceous, speckled glauconitic, no stain, no fluorescence, no visible porosity		
325.00 to 330.00 (5.00)	80% SHALE as above		
	20% SANDSTONE light gray, medium gray, salt and pepper, silty to very fine grained, subangular to subround, medium to well sorted, friable, siliceous in part, slightly calcareous, very argillaceous in part, no stain, no fluorescence, no visible porosity		
330.00 to 335.00 (5.00)	70% SHALE medium gray, medium to dark gray, very silty in part, fissile, predominately blocky		
	20% SILTSTONE light gray, medium gray, argillaceous, slightly calcareous, tight		
	10% SANDSTONE as above		

Sample Descriptions

Storage Units

Metric

335.00 to 340.00 (5.00)	100% SHALE medium gray, medium to dark gray, very silty in part, fissile, blocky to platy, common SILTSTONE laminae	
340.00 to 345.00 (5.00)	80% SHALE as above	
	10% SANDSTONE as above	
	10% SILTSTONE as above	
345.00 to 350.00 (5.00)	100% SHALE medium gray, medium to dark gray silty, fissile, platy to blocky, common SANDSTONE laminae	
350.00 to 355.00 (5.00)	90% SHALE medium gray, medium gray silty to sandy, fissile, blocky to platy	
	10% SANDSTONE light gray, medium gray argillaceous, salt and pepper, silty to very fine grained, subangular to subround, medium to well sorted, friable, slightly calcareous, siliceous cement, speckled glauconitic, no stain, no fluorescence, no visible porosity, trace sideritic	
355.00 to 360.00 (5.00)	100% SHALE light gray, medium gray silty, fissile, platy to blocky, common SANDSTONE thinbeds	
360.00 to 365.00 (5.00)	100% SHALE as above	
365.00 to 370.00 (5.00)	100% SHALE as above	
370.00 to 375.00 (5.00)	90% SHALE medium gray, medium to dark gray, very silty in part, fissile, blocky to platy	
	10% SANDSTONE light gray, medium gray argillaceous, salt and pepper, silty to very fine grained, subangular to subround, medium to well sorted, friable, siliceous cement, calcareous in part, slightly argillaceous, speckled glauconitic, no stain, no fluorescence, no visible porosity	
375.00 to 380.00 (5.00)	90% SHALE medium gray, medium gray silty, fissile, platy to blocky	
	10% SANDSTONE as above	
380.00 to 385.00 (5.00)	90% SHALE as above	

Sample Descriptions**Storage Units****Matrix**

380.00 to 385.00 (5.00)	10% SANDSTONE thinbeds, light to medium gray, salt and pepper, silty to very fine grained, subangular to subround, medium to well sorted, friable, argillaceous, slightly calcareous, speckled glauconitic, no stain, no fluorescence, no porosity	
385.00 to 390.00 (5.00)	90% SHALE as above	
	10% SANDSTONE as above	
390.00 to 395.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, blocky to platy	
395.00 to 400.00 (5.00)	100% SHALE as above	
400.00 to 405.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, blocky to platy	
405.00 to 410.00 (5.00)	100% SHALE as above	
410.00 to 415.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, blocky to platy	
415.00 to 420.00 (5.00)	100% SHALE medium to dark gray, medium gray silty, fissile, platy to blocky, common cavings	
420.00 to 425.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, blocky to platy, minor cavings	
425.00 to 430.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, blocky to platy, minor cavings	
430.00 to 435.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, blocky to platy	
435.00 to 440.00 (5.00)	100% SHALE as above	
440.00 to 445.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, blocky to platy	
445.00 to 450.00 (5.00)	100% SHALE as above	
450.00 to 455.00 (5.00)	50% SANDSTONE light gray, salt and pepper, very fine grained, fine grained in part, subangular to subround, well sorted, friable to firm, siliceous cement, slightly argillaceous, speckled glauconitic, no stain, no fluorescence, no visible porosity	
	50% SHALE medium gray, medium gray silty, light gray brown, fissile, platy to blocky	

Sample Descriptions

Storage Units

Matrix

455.00 to 460.00 (5.00)	60% SANDSTONE light gray, light brown, salt and pepper, very fine to fine grained, subangular to subround, well sorted, firm to very friable, calcareous cement, siliceous in part, speckled glauconitic, patchy oil stain, no dry, fair streaming wet cut fluorescence, scattered intergranular porosity 12-14%.
	40% SHALE as above
460.00 to 465.00 (5.00)	70% SANDSTONE as above
	30% SHALE medium gray, medium brown, fissile, platy
465.00 to 470.00 (5.00)	60% SANDSTONE light gray, light brown, salt and pepper, very fine to fine grained, subangular to subround, well sorted, firm to very friable, calcareous cement, siliceous in part, speckled glauconitic, patchy oil stain, no dry, fair streaming wet cut fluorescence, scattered intergranular porosity to 15%
	40% SHALE as above
470.00 to 475.00 (5.00)	70% SANDSTONE as above
	30% SHALE medium gray, medium brown, fissile, platy to blocky
475.00 to 480.00 (5.00)	70% SANDSTONE light gray, light to medium brown, salt and pepper, very fine to fine grained, subangular to subround, well sorted, friable to very friable, slightly calcareous, siliceous cement, speckled glauconitic, patchy oil stain, fair streaming wet cut fluorescence, scattered intergranular porosity 6-8%
	30% SHALE as above
480.00 to 485.00 (5.00)	80% SANDSTONE as above
	20% SHALE medium gray, medium brown, fissile, platy
485.00 to 490.00 (5.00)	60% SHALE medium gray, medium gray silty, fissile, blocky to platy
	40% SANDSTONE as above
490.00 to 495.00 (5.00)	70% SHALE light gray, medium gray, medium gray silty, fissile, blocky to platy

		Sample Descriptions	Storage Units	Metric
490.00 to 495.00 (5.00)	30% SANDSTONE light gray, light to medium brown, salt and pepper, very fine to fine grained, subangular to subround, medium to well sorted, friable, siliceous cement, argillaceous to very argillaceous in part, speckled glauconitic, patchy oil stain, strong wet cut fluorescence, no visible porosity			
495.00 to 500.00 (5.00)	70% SHALE as above			
	30% SANDSTONE as above			
500.00 to 505.00 (5.00)	80% SHALE medium gray, medium gray brown, silty in part, fissile, platy to blocky			
	20% SANDSTONE as above			
505.00 to 510.00 (5.00)	60% SHALE medium gray, silty to sandy, fissile, blocky			
	40% SANDSTONE light to medium gray brown, salt and pepper, silty to very fine grained, subangular to subround, medium to well sorted, argillaceous, slightly calcareous, patchy oil stain, no visible porosity			
510.00 to 515.00 (5.00)	90% SHALE medium gray, medium gray silty, sandy in part, fissile, blocky to platy			
	10% SANDSTONE as above			
515.00 to 520.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, platy to blocky			
520.00 to 525.00 (5.00)	100% SHALE as above			
525.00 to 530.00 (5.00)	100% SHALE medium gray, medium gray silty, fissile, predominately platy			
530.00 to 535.00 (5.00)	100% SHALE medium gray, medium to dark gray, fissile, platy			
535.00 to 540.00 (5.00)	100% SHALE as above			
540.00 to 545.00 (5.00)	100% SHALE medium gray, medium to dark gray, fissile, platy			
545.00 to 550.00 (5.00)	100% SHALE as above			

Sample Descriptions

Storage Units: Metric

550.00 to 555.00 (5.00)	100% SHALE medium gray, medium to dark gray, fissile, platy
555.00 to 560.00 (5.00)	100% SHALE as above
560.00 to 565.00 (5.00)	100% SHALE medium gray, medium to dark gray, fissile, platy, minor medium gray silty
565.00 to 570.00 (5.00)	100% SHALE medium gray, medium to dark gray, fissile, platy
570.00 to 575.00 (5.00)	100% SHALE as above
575.00 to 580.00 (5.00)	100% SHALE medium gray, medium to dark gray, minor medium gray silty, fissile, platy
580.00 to 585.00 (5.00)	100% SHALE as above
585.00 to 590.00 (5.00)	100% SHALE medium gray, medium to dark gray, minor medium gray silty, fissile, platy
590.00 to 595.00 (5.00)	100% SHALE medium gray, medium to dark gray, fissile, platy, trace of bentonite
595.00 to 600.00 (5.00)	100% SHALE as above, minor bentonitic laminae, trace of SANDSTONE light to medium brown, quartzose, argillaceous, silty to very fine grained, subangular to subround, firm, sideritic, tight
600.00 to 605.00 (5.00)	100% SHALE medium gray, medium to dark gray, medium to dark brown sideritic, minor dark green glauconitic, fissile, platy to blocky, Thinbeds of SANDSTONE light brown, salt and pepper, quartzose, silty to very fine grained, subangular to subround, medium to well sorted, firm, siliceous cement, calcareous in part, no visible porosity, trace of chert, minor nodular and disseminated pyrite
605.00 to 610.00 (5.00)	90% SANDSTONE light to medium brown, salt and pepper, predominately quartz, very fine to medium grained, subangular to subround, medium to well sorted, firm to friable, siliceous cement, slightly argillaceous in part, trace of clay infilling, predominately well indurated, patchy oil stain, no fluorescence, scattered intergranular porosity 12 to 14%
	10% SHALE as above
610.00 to 615.00 (5.00)	30% SANDSTONE light to medium brown, salt and pepper, silty to very fine grained, subangular to subround, medium sorted, very argillaceous in part, firm, siliceous cement, very patchy oil stain, no fluorescence, no visible porosity

		Sample Descriptions	Storage Units	Metric
610.00 to 615.00 (5.00)	30% SHALE medium gray, fissile, platy			
	30% SILTSTONE light to medium brown, medium gray, sandy, argillaceous, tight			
	10% COAL black, vitreous			
615.00 to 620.00 (5.00)	60% SHALE medium gray, medium to dark brown, light gray bentonitic, fissile, platy			
	40% SANDSTONE light gray brown, light to medium brown, salt and pepper, silty to very fine grained, fine grained in part, subangular to subround, medium to well sorted, firm to friable, clean to argillaceous, siliceous cement, very spotty oil stain, no fluorescence, no visible porosity			
620.00 to 625.00 (5.00)	100% SANDSTONE light gray brown, salt and pepper, predominately quartz, fine to medium grained, subangular to subround, medium to well sorted, very friable, light siliceous cement, very spotty oil stain, no fluorescence, scattered intergranular porosity 12 to 18%			
625.00 to 630.00 (5.00)	50% SANDSTONE as above, white clay infilling in part			
	50% SHALE medium gray, light to medium gray, dark brown to black carbonaceous, fissile, platy to blocky			
630.00 to 635.00 (5.00)	100% SANDSTONE light gray, salt and pepper, fine to medium grained, subangular to subround, medium to well sorted, very friable to poorly consolidated, clayey in part, no stain, no fluorescence, intergranular porosity 15 to 18%, minor SHALE as above			
635.00 to 640.00 (5.00)	100% SANDSTONE as above			
640.00 to 645.00 (5.00)	60% SANDSTONE as above			
	20% CHERT varicolored, massive			
	20% SHALE medium gray, medium gray sandy, fissile, blocky to platy			
645.00 to 650.00 (5.00)	60% CHERT clear, white, light brown, dark brown, dark blue gray variegated, massive			
	20% SANDSTONE as above			

Sample Descriptions

Storage Units Metric

645.00 to 650.00 (5.00)	20% SHALE medium to dark gray, dark gray, fissile, platy
650.00 to 655.00 (5.00)	90% LIMESTONE mottled light to dark brown, cryptocrystalline, mudstone, argillaceous in part, tight 10% CHERT as above
655.00 to 660.00 (5.00)	100% LIMESTONE mottled light to medium brown, dark brown argillaceous in part, cryptocrystalline, mudstone, tight, trace of dark brown laminar CHERT
660.00 to 665.00 (5.00)	80% LIMESTONE light gray white, medium gray argillaceous, mottled medium to dark brown, cryptocrystalline, mudstone, tight, trace of pellets and crinoid plates 20% SHALE medium gray, dark gray, calcareous, fissile, platy
665.00 to 670.00 (5.00)	90% LIMESTONE light gray, medium gray, mottled light to medium brown, argillaceous in part, cryptocrystalline, mudstone 10% SHALE as above
670.00 to 675.00 (5.00)	90% LIMESTONE light gray, medium gray, mottled gray brown, cryptocrystalline, mudstone, no visible porosity, minor dark brown Chert laminae 10% SHALE medium gray, dark gray, calcareous, fissile, platy
675.00 to 680.00 (5.00)	100% LIMESTONE as above
680.00 to 685.00 (5.00)	100% LIMESTONE mottled light to medium brown, gray brown, dark gray brown, cryptocrystalline, mudstone, trace of dark brown laminar Chert, trace of SHALE medium to dark gray, calcareous, fissile, platy
685.00 to 690.00 (5.00)	100% LIMESTONE as above
690.00 to 695.00 (5.00)	100% LIMESTONE mottled light to medium brown, medium gray brown, dark gray brown, cryptocrystalline, mudstone, argillaceous in part, trace of Chert, minor SHALE medium to dark gray, dark gray brown, calcareous, fissile, platy