

OCS-Y-2321 Burger J 001

Waters Petroleum Advisors

Ryan Massey / Jeff McBeth

1500'- 1530' SILTSTONE 70% light to medium gray with common white to light gray tuffaceous matrix, argillaceous, soft, easily friable; CLAYSTONE 30% medium gray, soft, friable

1530'- 1560' CLAYSTONE 100% medium gray, stiff to mushy, cohesive, soft, smooth

1560'- 1590' CLAYSTONE 100% medium gray, lumpy to mushy, soft, irregular cuttings habit, smooth to silty

1590'- 1620' CLAYSTONE 100% medium gray, lumpy to mushy, slightly adhesive, irregular cuttings habit, smooth, trace coal

1620'- 1650' CLAYSTONE 100% medium gray, lumpy to mushy, soft, mostly pulverulent, irregular cuttings habit, smooth, trace tuff

1650'- 1680' CLAYSTONE 100% medium gray, lumpy to mushy, soft, mostly pulverulent, irregular cuttings habit, smooth

1680'- 1710' CLAYSTONE 100% medium gray, lumpy to non-cohesive, pulverulent

1710'- 1740' No Sample

1740'- 1770' No Sample

1770'- 1800' CLAYSTONE 100% medium gray with trace light gray, lumpy to mushy, easily friable, blocky, smooth to waxy

1800'- 1830' CLAYSTONE 100% medium gray, mushy to malleable, silty, easily friable, common blocky

1830'- 1860' SILTSTONE 90% medium to light gray, easily friable, argillaceous; SANDSTONE 10% light gray, lower fine to upper very fine, calcareous cement, well sorted

1860'- 1890' SILTSTONE 95% medium gray, easily friable, argillaceous, occasionally carbonaceous; SANDSTONE 5% light gray, lower fine to upper very fine, slightly calcareous, well sorted

1890'- 1920' CLAYSTONE 60% medium gray, soft, earthy, crumbly; SILTSTONE 40% light gray, occasionally mica, slightly calcareous

1920'- 1950' CLAYSTONE 80% light to medium gray, soft to firm, blocky, smooth, non calcareous; SILTSTONE 20% light gray, firm, non calcareous, trace tuff

1950'- 1980' CLAYSTONE 85% light to medium gray, soft to occasionally firm, occasionally earthy, amorphous; SILTSTONE 15% light gray, firm, slightly calcareous, common carbonaceous material

1980'- 2010' CLAYSTONE 80% medium gray, lumpy to mushy, soft, easily friable; LIMESTONE 20% cream to tan to dark gray, grades friable to firm to hard, amorphous to earthy, very fine, rare dolomite, rare chert nodule

2010'- 2040' CLAYSTONE 85% medium gray, soft, easily friable; LIMESTONE 15% tan to dark gray, grades firm to hard, amorphous to earthy, very fine, rare dolomite, rare chert nodule

2040'- 2070' CLAYSTONE 95% medium gray, friable, soft to firm, earthy, carbonaceous; LIMESTONE 5% tan to light gray, firm to hard, earthy, mudstone, very fine, rare dolomite

2070'- 2100' SILTSTONE 70% light gray to medium gray, friable, firm, carbonaceous, argillaceous; CLAYSTONE 30% medium gray, earthy, soft, mushy, fragile, slightly calcareous

2100'- 2130' CLAYSTONE 90% light gray, firm to soft, earthy, silty, rare very fine lower sand grains, non calcareous; SILTSTONE 10% light gray, firm, non calcareous

2130'- 2160' CLAYSTONE 100% light gray to medium gray, soft to firm, earthy, silty, carbonaceous non calcareous

2160'- 2190' CLAYSTONE 100% light gray to gray, firm, fragile, blocky, smooth, slightly silty

2190'- 2220' CLAYSTONE 100% light gray to gray, firm, blocky, smooth, slightly silty, slightly carbonaceous, slightly calcareous

2220'- 2250' CLAYSTONE 100% light gray to medium gray, firm, blocky, silty in part, carbonaceous, slightly calcareous, trace very fine grain sand

2250'- 2280' CLAYSTONE 100% light gray to medium gray, firm, blocky, silty in part, slightly carbonaceous, slightly calcareous

2280'- 2310' CLAYSTONE 100% medium gray, firm, blocky to platy, smooth, increasing silt, carbonaceous, non calcareous

2310'- 2340' CLAYSTONE 90% medium gray, firm, blocky, carbonaceous, silty; SILTSTONE 10% light gray, firm, fragile, nodular

2340'- 2370' CLAYSTONE 85% medium gray, firm, blocky, silty, carbonaceous, silty; SILTSTONE 15% light gray, firm, fragile, nodular, trace limestone

2370'- 2400' CLAYSTONE 70% medium gray to light gray, friable to firm, blocky, silty; SILTSTONE 30% light gray, friable, nodular, slightly calcareous matrix

2400'- 2430' CLAYSTONE 60% medium gray to light gray, friable to firm, blocky, silty; SILTSTONE 40% medium gray with trace light brown, friable, nodular, slightly calcareous matrix

2430'- 2460' CLAYSTONE 100% medium gray with trace light gray, friable to firm, blocky to nodular, trace silty, PDC bit curling

2460'- 2490' CLAYSTONE 80% medium to light gray, friable to firm, blocky, silty, PDC bit curling;
SILTSTONE 20% light gray, friable, nodular

2490'- 2520' CLAYSTONE 70% medium to light gray, friable, blocky, silty, PDC bit curling; SILTSTONE 30%
light gray, friable, nodular, trace tuffaceous matrix, trace calcareous matrix

2520'- 2550' CLAYSTONE 70% medium to light gray, friable, blocky, silty, PDC bit curling; SILTSTONE 30%
light gray, friable, nodular, trace slightly calcareous

2550'- 2580' CLAYSTONE 60% medium to light gray, friable, blocky, silty; SILTSTONE 40% light gray,
friable to firm, tabular, argillaceous, trace slightly calcareous

2580'- 2610' CLAYSTONE 90% medium to light gray, friable, blocky, occasionally silty; SILTSTONE 10%
light gray, friable to firm, argillaceous, rare calcareous matrix

2610'- 2640' CLAYSTONE 100% medium gray, friable to firm, blocky, silty, common PDC bit curling

2640'- 2670' CLAYSTONE 60% medium gray, firm to friable, blocky, occasionally silty, trace butter
curling, rare calcareous; SILTSTONE 40% light to medium gray, silt to very fine, friable to firm, moderate
argillaceous to silty cement

2670'- 2700' CLAYSTONE 80% medium gray, firm to friable, blocky, occasionally silty, trace butter curling, rare slightly calcareous; SILTSTONE 20% light gray, rare very fine grains, friable to firm, silty to slightly calcareous cement

2700'- 2730' CLAYSTONE 100% medium to light gray, friable, pulverulent to blocky, occasionally silty with very fine quartz grains embedded

2730'- 2760' SILTSTONE 70% light gray, silty to very fine, firm to friable, argillaceous to calcareous cement, trace pyrite; CLAYSTONE 30% medium gray, firm, blocky, smooth, trace slightly calcareous

2760'- 2790' CLAYSTONE 100% medium gray, firm to easily friable, blocky to nodular, occasionally silty, trace carbonaceous flecks

2790'- 2820' CLAYSTONE 90% medium gray, firm to moderate hard, blocky to nodular, occasionally silty, trace carbonaceous flecks; SILTSTONE 10% light gray, very fine to silty, calcareous cement, moderately hard

2820'- 2850' CLAYSTONE 90% medium to dark gray, firm to friable, blocky to nodular, silty, trace carbonaceous flecks; SILTSTONE 10% light gray, silty to very fine, calcareous cement, moderately hard

2850'- 2880' CLAYSTONE 100% medium to dark gray, easily friable, mushy to tacky, pulverulent, trace carbonaceous flecks

2880'- 2910' CLAYSTONE 100% medium to dark gray, soft to easily friable, trace carbonaceous flecks

2910'- 2940' CLAYSTONE 100% medium to dark gray, soft to friable, firm in part, slightly silty, carbonaceous flecks, slightly calcareous

2940'- 2963' CLAYSTONE 100% medium to dark gray, soft to friable, silty in part, scattered carbonaceous material

2973'- 3000' CLAYSTONE 100% gray with trace medium dark gray, soft to easily friable, abundant hydrophilic disseminated clay particles, rarely silty

3000'- 3030' CLAYSTONE 100% gray, soft to moderately hard, trace grading to mudstone, calcareous, common disseminated clays

3030'- 3060' CLAYSTONE 95% gray, soft to easily friable, mushy, trace silty, slightly calcareous; SILTSTONE 5% gray, silt to lower very fine, calcareous

3060'- 3090' CLAYSTONE 95% gray, soft to easily friable, trace silty, slightly calcareous; SILTSTONE 5% gray, silt to lower very fine, calcareous, carbonaceous

3090'- 3120' CLAYSTONE 90% gray, soft, earthy, silty in part; SILTSTONE 10% gray, rarely carbonaceous, slightly calcareous

3120'- 3150' CLAYSTONE 85% light gray to gray, soft to occasionally firm, earthy to blocky, increasing silt; SILTSTONE 15% gray, carbonaceous laminations, non calcareous

3150'- 3180' CLAYSTONE 80% light gray to gray, soft to occasionally firm, earthy to blocky, silty in part; SILTSTONE 20% gray, carbonaceous in part, non calcareous

3180'- 3210' CLAYSTONE 85% gray, soft to occasionally firm, earthy to blocky, silty in part, non calcareous; SILTSTONE 15% gray, carbonaceous in part, rarely calcareous

3210'- 3240' CLAYSTONE 70% gray to medium gray, soft, mushy, earthy, increasing silt; SILTSTONE 30% gray, carbonaceous, non calcareous

3240'- 3270' CLAYSTONE 75% gray to medium gray, soft to firm, fragile, blocky, silty in part; SILTSTONE 25% gray, occasionally very fine lower sand, carbonaceous, non calcareous

3270'- 3295' CLAYSTONE 60% gray to medium gray, soft to firm, fragile, earthy, silty/sandy in part; SILTSTONE 35% gray, carbonaceous, SANDSTONE 5% in part

3295'- 3315' CLAYSTONE 55% gray to medium gray, soft, mushy, fragile, earthy, silty/sandy in part, SILTSTONE 35%; SANDSTONE 10% very light gray, very fine to very fine lower, sub rounded, sub elongate, moderately cemented, silty, calcareous

3315'- 3330' CLAYSTONE 40% medium gray, soft, mushy, fragile, earthy, silty/sandy in part, SILTSTONE 40%; SANDSTONE 20% very light gray, very fine grained, sub rounded, sub elongate, moderately cemented, silty, slightly calcareous

3330'- 3360' CLAYSTONE 35% gray to medium gray, soft, fragile; SILTSTONE 40% light gray to gray; SANDSTONE 25% very light gray, very fine grained, sub rounded to sub angular, sub elongate, moderately cemented, silty, slightly calcareous

3360'- 3390' CLAYSTONE 40% medium gray to dark gray, soft to occasionally firm, mushy, fragile; SILTSTONE 40% light gray to gray; SANDSTONE 20% light gray, very fine grained, sub rounded, sub elongate, moderately cemented, silty, increasingly carbonaceous, slightly calcareous

3390'- 3420' CLAYSTONE 40% medium gray, soft to occasionally firm, fragile; SILTSTONE 30% gray, carbonaceous; SANDSTONE 30% light gray to gray, very fine grained, sub rounded to sub angular, sub elongate, moderately to good calcareous cement

3420'- 3450' CLAYSTONE 60% medium light gray to medium gray, soft to occasionally firm, mushy, fragile, SILTSTONE 40% gray, carbonaceous, rare very fine grain sand

3450'- 3480' CLAYSTONE 85% gray, soft, fragile, slightly fissile, non calcareous, silty; SILTSTONE 15% gray, firm, fragile, carbonaceous, slightly calcareous

3480'- 3510' CLAYSTONE 80% light gray to gray, soft, fragile, mushy, occasionally firm, non calcareous; SANDSTONE 20% very light gray to light gray, very fine grain, sub angular, well sorted, calcareous cement, carbonaceous

3510'- 3540' CLAYSTONE 80% medium light gray to medium gray, soft, fragile, mushy, occasionally firm, non calcareous; SILTSTONE 10% gray, firm, fragile, carbonaceous, slightly calcareous; SANDSTONE 10% very light gray to light gray, very fine grain, sub angular, well sorted, calcareous cement, carbonaceous

3540'- 3570' CLAYSTONE 75% medium light gray to medium gray, soft to firm, fragile, blocky in part, calcareous, SILTSTONE 25% light gray to gray, firm, fragile, carbonaceous

3570'- 3600' CLAYSTONE 90% medium light gray to medium gray, blocky, slightly calcareous; SILTSTONE 10% gray, firm, fragile, decreasing carbonaceous material

3600'- 3630' SILTSTONE 40% light gray to medium gray, soft, fragile, carbonaceous laminations, occasional fine grain sand, slightly calcareous; CLAYSTONE 60% medium light gray to medium gray, blocky, slightly calcareous

3630'- 3660' CLAYSTONE 65% medium light gray to medium gray, soft to firm, fragile, blocky in part, rare SHALE cutting; calcareous, SILTSTONE 35% light gray to gray, firm, fragile, carbonaceous

3660'- 3690' SILTSTONE 35% light gray to medium gray, soft, fragile, decreasing carbonaceous material; CLAYSTONE 65% light gray to medium gray, soft, firm, fragile,

3690'- 3720' CLAYSTONE 100% medium gray, soft to firm, fragile, calcareous, slightly silty

3720'- 3750' CLAYSTONE 100% medium light gray to medium gray, firm, fragile, calcareous, slightly silty

3750'- 3780' CLAYSTONE 100% medium light gray to medium gray, firm to occasionally hard, fragile

3780'- 3810' CLAYSTONE 100% medium light gray to medium, soft to occasionally firm, fragile

3810'- 3840' CLAYSTONE 100% medium light gray, soft to occasionally firm, fragile, occasionally silty

3840'- 3870' CLAYSTONE 100% medium light gray, soft to friable, trace silt

3870'- 3900' CLAYSTONE 100% medium light gray, friable to firm friable, silty

3900'- 3930' CLAYSTONE 100% medium light gray, friable to firm friable, silty, common disseminated clay

3930'- 3960' CLAYSTONE 100% medium light gray with occasional light brown hues and trace medium dark gray, friable to moderately hard, common mushy, slight silt

3960'- 3990' CLAYSTONE 100% medium light gray, friable to firm, trace mushy, trace silt, very weak HCL reaction

3990'- 4020' CLAYSTONE 100% medium light gray with occasional light brown hues and trace medium dark gray, friable to moderately hard, trace mushy, common silt

4020'- 4050' CLAYSTONE 100% medium light gray with common light brown hues and trace hard medium dark gray fragments, soft to friable with trace moderately hard siltstone, trace mushy to disseminated

4050'- 4080' CLAYSTONE 100% medium gray with disseminated light brown clay, soft to easily friable, blocky to tabular, trace silt

4080'- 4110' CLAYSTONE 100% medium gray, mushy, soft to easily friable, trace PDC cuttings habit, rare calcareous siltstone

4110'- 4140' CLAYSTONE 100% medium gray, mushy, soft to easily friable, rare calcareous siltstone

4140'- 4170' CLAYSTONE 100% medium gray, mushy, soft to easily friable, trace PDC cuttings habit

4170'- 4200' CLAYSTONE 100% medium gray, mushy, soft to easily friable, fair amount disseminated clay

4200'- 4230' CLAYSTONE 100% medium gray, soft to easily friable, mushy, rare silt

4230'- 4260' CLAYSTONE 100% medium gray, mushy, soft to easily friable, fair amount PDC cuttings habit, common amorphous

4260'- 4290' CLAYSTONE 100% medium gray, soft to firm friable, blocky, trace PDC cuttings habit, slightly silty

4290'- 4320' CLAYSTONE 100% medium gray, firm to friable, blocky, trace PDC cuttings habit, trace calcareous siltstone

4320'- 4350' CLAYSTONE 100% medium gray, blocky to amorphous, soft to easily friable, fair amount PDC cuttings habit

4350'- 4380' CLAYSTONE 100% medium dark gray with trace moderately hard dark gray claystone, blocky, soft to friable, common PDC cuttings

4380'- 4410' CLAYSTONE 100% medium dark gray, blocky, soft to friable, common PDC cuttings, silty

4410'- 4440' CLAYSTONE 100% medium dark gray, soft to friable, abundant PDC cuttings, blocky

4440'- 4470' CLAYSTONE 100% medium dark gray, soft to friable, abundant PDC cuttings, blocky, silty, trace pyrite, trace small sandstone fragments, very fine, weakly cemented, tuffaceous matrix likely gave off dull light green fluorescence, no cut or other oil indicators

4470'- 4500' CLAYSTONE 100% medium dark gray, soft to friable, abundant PDC cuttings, blocky, silty, trace small sandstone fragments, very fine, tuffaceous matrix likely gave off dull light green fluorescence, no cut or other oil indicators

4500'- 4530' CLAYSTONE 100% medium dark gray, soft to firm friable, common PDC cuttings, blocky, trace small sandstone fragments, very fine, calcareous cement

4530'- 4560' CLAYSTONE 100% medium dark gray, soft to firm friable, common PDC cuttings, blocky, trace small sandstone fragments, very fine, calcareous cement

4560'- 4590' CLAYSTONE 100% medium dark gray, soft to firm friable, common PDC cuttings, blocky, trace siltstone with weak reaction to HCL

4590'- 4620' CLAYSTONE 95% medium dark gray, soft to firm friable, common PDC cuttings, blocky, trace silty; Sandstone 5% very fine, light gray, sub-round, well sorted, moderate calcareous cement, fair visible porosity, slightly tuffaceous?, dull light green fluorescence, no cut, no stain

4620'- 4650' CLAYSTONE 100% medium gray, soft to friable, common PDC cuttings, blocky, trace very fine calcareous sandstone

4650'- 4680' CLAYSTONE 100% medium gray, soft to friable, common PDC cuttings, blocky, rare very fine calcareous sandstone

4680'- 4710' CLAYSTONE 100% medium gray, soft to friable, common PDC cuttings, blocky, rare very fine calcareous sandstone

4710'- 4740' CLAYSTONE 80% medium gray, soft to friable, occasionally hard SHALE cuttings, common PDC cuttings, blocky, non calcareous; SILTSTONE 20% light gray to medium gray, thin carbonaceous bedding, calcareous cement, grades to very fine lower sand

4740'- 4770' CLAYSTONE 95% medium light gray to medium gray, soft to friable, occasionally firm, common PDC cuttings, blocky, non calcareous; SILTSTONE 5% light gray to medium gray, carbonaceous material scattered, calcareous cement

4770'- 4800' CLAYSTONE 95% medium light gray to medium gray, soft to friable, firm, common PDC cuttings, blocky, non calcareous; SILTSTONE 5% light gray, calcareous cement

4800'- 4830' CLAYSTONE 100% medium gray, soft to friable, firm, blocky to earthy, non calcareous, slightly silty

4830'- 4860' CLAYSTONE 100% medium light gray to medium gray, soft to friable, occasional PDC cuttings, non calcareous, slightly silty

4860'- 4890' CLAYSTONE 100% medium gray, soft, fragile, non calcareous, slightly silty

4890'- 4920' CLAYSTONE 100% medium light gray to medium gray, soft to friable, non calcareous, increasing silt

4920'- 4950' CLAYSTONE 90% medium light gray to medium gray, soft to friable, non calcareous, silty in part; SH 10% dark gray, firm to hard, occasionally brittle, earthy to fissile in part, non calcareous

4950'- 4980' CLAYSTONE 100% medium light gray, soft to friable, non calcareous, rarely silty

4980'- 5010' CLAYSTONE 100% light gray to medium light gray, soft, fragile, non calcareous

5010'- 5040' CLAYSTONE 85% medium dark gray, firm, fragile, crumbly, pyrite, slightly calcareous, silty in part, rare sand grains, medium, sub angular; SHALE 10% medium dark gray, firm, poorly fissile; LIMESTONE 5%

5040'- 5070' CLAYSTONE 75% medium light gray to medium dark gray, firm, fragile, crumbly, non calcareous, silty in part; SHALE 20% medium dark gray, poorly fissile, non calcareous; TUFF 5%

5070'- 5100' CLAYSTONE 85% medium dark gray, firm, fragile, crumbly, non calcareous, silty in part; SHALE 10% medium dark gray, poorly fissile, non calcareous; TUFF 5%

5100'- 5130' CLAYSTONE 90% medium dark gray to dark gray, soft to firm, fragile, crumbly, trace tuff; SILTSTONE 10% medium gray, trace sand

5130'- 5160' CLAYSTONE 90% medium dark gray to dark gray, firm, fragile, crumbly, trace tuff; SILTSTONE 10% medium gray, trace sand

5160'- 5190' CLAYSTONE 100% medium dark gray to dark gray, soft to firm, mushy, brittle in places, silty in part

5190'- 5220' CLAYSTONE 80% medium gray to medium dark gray, soft to firm, mushy, rare pyrite, silty in part, rare tan limestone; SHALE 20% dark gray to black, hard, brittle, fissile

5220'- 5250' CLAYSTONE 80% medium gray to medium dark gray with brown hue, soft to firm, silty in part, rare sand, medium lower grained; SHALE 20 dark gray to black, hard, brittle, sub fissile

5250'- 5280' CLAYSTONE 90% medium gray to medium dark gray with brown hue, soft to firm, fragile, rare pyrite, silty in part, rare sand grains; SHALE 10% dark gray, hard, brittle, sub fissile

5280'- 5310' CLAYSTONE 80% medium gray with brown hue, soft to firm, fragile, rare pyrite, increasing silt, rare sand grains; SHALE 20% dark gray, hard, brittle, sub fissile to fissile

5310'- 5340' CLAYSTONE 90% medium gray with brown hue, soft to firm, fragile, blocky, increasing silt, rare sand grains; SHALE 10% medium gray, hard, brittle, sub fissile to fissile

5340'- 5370' CLAYSTONE 100% medium gray with brown hue, soft, fragile, mushy, silty in part, limestone present

5370'- 5400' CLAYSTONE 90% medium light gray with brown hue, soft, fragile, 10% SILTY, disseminated pyrite, common limestone

5400'- 5423' CLAYSTONE 95% medium light gray with brown hue, soft, fragile, 5% SILTY in part, pyrite, trace limestone, rare fine lower sand grain

5423'- 5431' CEMENT

5430'- 5460' CLAYSTONE 60% medium light gray to medium gray, soft, fragile; SHALE 25% medium dark gray, hard to brittle, earthy, slightly silty; SILSTONE 15% light gray, occasionally grades to very fine sandstone, rare pyrite

5460'- 5490' CLAYSTONE 85% medium light gray to medium gray, soft, fragile, rare chert, silty in part, occasional calcareous tuff; SHALE 15% medium gray to medium dark gray, hard, brittle, earthy, pyrite

5490'- 5520' CLAYSTONE 95% medium light gray to medium gray, soft, fragile, rare chert, silty in part, rare pyrite, occasional calcareous tuff; Shale 5% medium gray, hard, brittle, slightly carbonaceous in part

5520'- 5550' SILTSTONE 60% medium gray with brownish hue, occasional pyrite, increasing thin carbonaceous laminations, trace tuff in part, very light gray sand, grades from silt to very fine to medium lower grain size, sub rounded, poor to moderate sorting; CLAYSTONE 30% medium gray, soft, fragile; SHALE 10% medium gray to medium dark gray

5550'- 5580' SILTSTONE 50% medium gray with brownish hue, occasional pyrite, thin carbonaceous laminations, trace tuff in part, very light gray sand, grades from silt to very fine to medium lower grain size, sub rounded, poor to moderate sorting; CLAYSTONE 40% medium gray, soft; SHALE 10% medium gray to medium dark gray

5580'- 5610' SILTSTONE 60% medium gray with brownish hue, common pyrite, common carbonate, trace tuff, grading to very fine gray sand; SHALE 20% medium dark gray, firm to moderately hard; CLAYSTONE 20% medium gray, soft to firm

5610'- 5640' CLAYSTONE 70% yellowish gray to tan and medium gray with brownish hues, firm to firm friable, yellowish gray are tuffaceous and calcareous whereas gray tend to be silty; SILTSTONE 20% medium gray with brownish hues, argillaceous matrix; SHALE 10% medium dark gray, firm to moderately hard

5640'- 5670' CLAYSTONE 95% medium gray to medium dark gray with common brownish hues, firm to hard, moderate to well indurated, blocky to elongated, occasionally silty, trace pyrite; SANDSTONE 5% light gray with translucent to transparent, very fine with trace floating medium grains, sub round to sub angular, poor sorting, calcareous cement

5670'- 5700' CLAYSTONE 95% medium gray to medium dark gray with common brownish hues, firm to moderately hard, moderate to well indurated, blocky to elongated, occasionally silty, trace PDC cuttings habit, trace soft carbonate material, trace hydrated clays; SHALE 5% dark gray to grayish black, splintery to bladed, thin laminations, hard

5700'- 5730' SILTSTONE 60% medium gray with brownish hue, firm to friable, occasionally grading to lower very fine, argillaceous matrix, trace pyrite; CLAYSTONE 40% medium gray to medium dark gray with common brownish hues, firm to friable, moderately indurated, commonly silty, trace pyrite, trace SHALE

5730'- 5750' SILTSTONE 50% medium gray with brownish hue, friable to firm, grading to very fine sand, argillaceous matrix; CLAYSTONE 40% medium dark gray with brownish hues, firm to friable, occasionally grading to silty; SANDSTONE 10% translucent to transparent to light gray hues, unconsolidated, disaggregated, very fine to upper medium, poorly sorted, sub round to round

5750'- 5760' SILTSTONE 50% medium gray with brownish hue, friable to firm, grading to very fine sand, argillaceous matrix; CLAYSTONE 40% medium dark gray with brownish hues, firm to friable, occasionally grading to silty; SANDSTONE 10% translucent to transparent to light gray hues, unconsolidated, disaggregated, very fine to upper medium, poorly sorted, sub round to round

5760'- 5770' SILTSTONE 40% medium gray with brownish hue, friable, grading to very fine sand, argillaceous matrix; CLAYSTONE 40% medium dark gray with brownish hue, firm to friable, grading to silty; SS 20% light gray with translucent and transparent grains, very fine to medium grain, poor sorting, common lithics, loose unconsolidated grains

5770'- 5780' SANDSTONE 60% light gray with translucent and transparent grains, very fine to medium grain, poor sorting, abundant lithics, loose unconsolidated grains; SILTSTONE 30% medium gray with brownish hue, friable, grading to very fine sand, argillaceous matrix; CLAYSTONE 10% medium dark gray with brownish hue

5780'- 5790' SHALE / CLAYSTONE 90% dark gray with brownish hues, friable to moderately hard, blocky to flaky; SILTSTONE 10% medium gray, friable, grading to very fine sand

5790'- 5820' SHALE 70% dark gray, friable to moderately hard, flaky to splintery; CLAYSTONE 20% medium gray, soft to friable, hydrated, rounded to amorphous, occasionally mushy; SILTSTONE 10% light gray, friable, trace loose sand

5820'- 5850' SANDSTONE 60% light to medium gray, loose unconsolidated upper very fine to lower fine, rounded to subrounded quartz, well sorted; CLAYSTONE 40% medium gray to dark gray, amorphous to blocky, shaley, flaky to splintery

5850'- 5880' SANDSTONE 80% gray to medium gray with abundant translucent to transparent and common white quartz grains, very fine to fine with scattered medium, well to moderate sorted, sub round, abundant carbonaceous, trace siderite, trace glauconite; CLAYSTONE 20% medium gray to dark gray, soft to firm,

5880'- 5910' SANDSTONE 70% light gray with scattered fragments of clear quartz and glauconite grains in a tuffaceous matrix, very fine to fine with trace medium, predominantly loose unconsolidated, moderate sorting, subrounded, common lithics, trace glauconite, trace 2-3mm pyrite pebbles; SHALE 30% medium gray to dark gray, firm to moderately hard

5910'- 5940' SANDSTONE 80% light gray to medium gray with abundant transparent to translucent quartz grains, well sorted, subrounded to subangular, abundant carbonaceous material, trace siderite, common lithics; SHALE 10% dark gray, moderately hard, splintery to flaky; CLAYSTONE 10% medium gray, mushy to firm, amorphous to nodular

5940'- 5950' SANDSTONE 90% light gray to medium gray with abundant transparent to translucent quartz grains, well sorted, subrounded to subangular, abundant carbonaceous material, trace siderite, common lithics; SHALE 10% dark gray, moderately hard, splintery to flaky

5950'- 5960' SANDSTONE 90% light gray to medium gray with abundant transparent to translucent grains quartz, well sorted, subrounded to subangular, abundant carbonaceous material, common lithics; SHALE 10% dark gray, moderately hard, splintery to flaky

5960'- 5970' SANDSTONE 90% light gray to medium gray with abundant transparent to translucent quartz grains, well sorted, subrounded to subangular, abundant carbonaceous material, common lithics; CLAYSTONE 10% medium gray, soft to firm, mushy, amorphous

5970'- 5980' SANDSTONE 80% light gray to medium gray with abundant transparent to translucent quartz grains, well sorted, subrounded to subangular, abundant carbonaceous material, common lithics; SILTSTONE 20% medium gray with brownish hues, soft to friable, argillaceous matrix, clayey, mushy, amorphous

5980'- 5990' SANDSTONE 60% light gray to medium gray with abundant transparent to translucent quartz grains, fine lower to fine upper, well sorted, subrounded to subangular, abundant carbonaceous material, common lithics; SILTSTONE 40% medium gray with brownish hues, soft to friable, argillaceous matrix, rare glauconite, slightly clayey, amorphous

5990'- 6000' SANDSTONE 50% light gray to medium light gray with abundant transparent to translucent quartz grains, fine lower to very fine upper, well sorted, subangular to subrounded, carbonaceous material; SILTSTONE 50% medium light gray with slight brownish hue, soft to friable, argillaceous matrix, slightly clayey, amorphous

6000'- 6010' SANDSTONE 50% light gray to medium light gray with abundant transparent to translucent quartz grains, fine lower to very fine upper, well sorted, subangular to subrounded, carbonaceous material scattered; SILTSTONE 50% medium light gray with slight brownish hue, soft to friable, argillaceous matrix, increasing clay, amorphous

6010'- 6050' SILTSTONE 55% medium light to medium gray with slight brownish hue, soft to friable, argillaceous matrix, increasing clay content, amorphous; SANDSTONE 45% light gray to medium light gray with abundant transparent to translucent quartz grains, fine lower to very fine upper, well sorted, subangular to subrounded, carbonaceous material scattered

6050'- 6080' SILTSTONE 55% medium light to medium gray with slight brownish hue, soft to friable, argillaceous matrix, increasing clay content, amorphous; SANDSTONE 45% light gray to medium light gray with abundant transparent to translucent quartz grains, fine lower to very fine upper, well sorted, subangular to subrounded, carbonaceous material scattered

6080'- 6110' CLAYSTONE 80% medium gray to medium dark gray with brownish hue, soft to occasionally firm, earthy, occasionally silty; SHALE 20% medium dark gray to dark gray, hard, brittle, elongated cuttings

6110'- 6140' CLAYSTONE 90% medium gray to medium dark gray with brownish hue, soft to occasionally firm, earthy, increasingly silty; SHALE 10% medium dark gray to dark gray, hard, brittle, elongated cuttings

6140'- 6170' CLAYSTONE 80% medium gray to medium dark gray with brownish hue, soft to firm, earthy, silty in part, carbonaceous, rare calcareous tuff; SHALE 20% medium dark gray to dark gray, hard, brittle, elongated cuttings

6170'- 6200' CLAYSTONE 95% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, silty in part, carbonaceous, rare calcareous tuff; SHALE 5% medium dark gray to dark gray, hard, brittle, elongated cuttings

6200'- 6230' CLAYSTONE 95% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, carbonaceous, rare calcareous tuff; SHALE 5% medium dark gray to dark gray, hard, brittle, elongated cuttings

6230'- 6260' CLAYSTONE 90% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, carbonaceous, rare calcareous tuff; SHALE 10% medium dark gray to dark gray, hard, brittle, elongated cuttings

6260'- 6290' CLAYSTONE 80% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, silty in part, carbonaceous, rare calcareous tuff, siderite; SHALE 20% medium dark gray to dark gray, hard, brittle, elongated cuttings

6290'- 6320' CLAYSTONE 80% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, silty in part, carbonaceous, rare calcareous tuff, siderite; SHALE 20% medium dark gray to dark gray, hard, brittle, elongated cuttings

6320'- 6350' SILTSTONE 35% medium light to medium gray with slight brownish hue, silt grades to fine lower grain size, soft to friable, occasionally hard, argillaceous matrix, carbonaceous, fragile glauconitic clay, sideritic cement, pyrite; CLAYSTONE 65% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, sideritic cement

6350'- 6380' CLAYSTONE 80% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, silty in part, carbonaceous, rare calcareous tuff, siderite; SHALE 20% medium dark gray to dark gray, hard, brittle, elongated cuttings

6380'- 6410' CLAYSTONE 90% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, increasing silt, carbonaceous, rare calcareous tuff, rare glauconitic clay; SHALE 10% medium dark gray to dark gray, hard, brittle, elongated cuttings

6410'- 6440' CLAYSTONE 90% medium gray to medium dark gray with brownish hue, soft to firm, occasionally hard, earthy, increasing silt, carbonaceous, rare calcareous tuff, rare glauconitic clay; SHALE 10% medium dark gray to dark gray, hard, brittle, elongated cuttings

6440'- 6460' SANDSTONE 45% light gray to medium gray with abundant transparent to translucent quartz grains, fine lower grains to silty, moderately sorted, subrounded to subangular, weak calcareous cement in part, tuffaceous clay matrix, abundant carbonaceous material, common lithics, rare pyrite, glauconite, N/S visible oil, Fluorescence: moderately abundant, spotty, orange, Cut: slow, dull, yellow; CLAYSTONE 45%; SHALE 10%

6460'- 6470' SANDSTONE 65% light gray to medium gray with abundant transparent to translucent quartz grains, fine lower grains to silty, moderately sorted, subrounded to subangular, weak calcareous cement in part, tuffaceous clay matrix, abundant carbonaceous material, common lithics, rare pyrite, glauconite, N/S visible oil, Fluorescence: moderately abundant, spotty, orange, Cut: slow, dull, yellow; CLAYSTONE 25%; SHALE 10%

6470'- 6480' SANDSTONE 60% light gray to medium gray with abundant transparent to translucent quartz grains, fine lower grains to silty, moderately sorted, subrounded to subangular, weak calcareous cement in part, tuffaceous clay matrix, abundant carbonaceous material, common lithics, rare pyrite,

glauconite, N/S visible oil, Fluorescence: moderately abundant, spotty, orange, Cut: slow, dull, yellow;
CLAYSTONE 30%; SHALE 10%

6480'- 6490' SANDSTONE 60% light gray to medium gray with abundant transparent to translucent quartz grains, fine lower grains to silty, moderately sorted, subrounded to subangular, weak calcareous cement in part, tuffaceous clay matrix, abundant carbonaceous material, common lithics, rare pyrite, glauconite, N/S visible oil, Fluorescence: moderately abundant, spotty, orange, Cut: slow, dull, yellow;
CLAYSTONE 30%; SHALE 10%

6490'- 6500' SANDSTONE 50% light gray to medium gray with abundant transparent to translucent quartz grains, very fine to fine, subrounded to subangular, unconsolidated to consolidated with weak calcareous cement, dull yellow fluorescence over 40% sample, slow dull yellow crush cut fluorescence, dull yellow residual fluorescence; SILTSTONE 30% light gray to medium gray, soft to moderately hard, friable; CLAYSTONE 20% light gray to medium gray, soft to moderately hard, moderate induration, silty, slightly calcareous

6500'- 6520' SANDSTONE 40% light gray to medium gray with abundant transparent to translucent quartz grains, very fine to fine, subrounded to subangular, unconsolidated to consolidated with weak calcareous cement, dull yellow fluorescence over 40% sample, immediate bright yellow crush cut fluorescence, dull yellow residual fluorescence; CLAYSTONE 40% light gray to medium gray, soft to moderately hard, moderate induration, silty, slightly calcareous; SILTSTONE 20% light gray to medium gray, soft to moderately hard, friable

6520'- 6530' SILTSTONE 60% light gray to medium gray, easily friable to friable, dull yellow fluorescence even over 40% of sample, faint slow dull yellow crush fluorescence, dull yellow fluorescence;
SANDSTONE 20% light gray to medium gray with abundant translucent to transparent quartz grains, very fine to fine, subangular to subrounded, unconsolidated, common calcareous, dull yellow fluorescence, immediate bright yellow crush cut fluorescence, dull yellow residual fluorescence; CLAYSTONE 20% light gray to medium gray, soft to moderately hard, moderate induration, silty, slightly calcareous

6530'- 6540' SILTSTONE 60% light gray to medium gray, firm friable to easily friable, slightly calcareous, dull yellow fluorescence even over 40% of sample, faint immediate bright yellow crush fluorescence, dull yellow residual fluorescence; SANDSTONE 20% light gray to medium gray with abundant translucent to transparent quartz grains, very fine to fine, subangular to subrounded, predominantly unconsolidated trace calcareous cement, trace glauconite, dull yellow fluorescence, immediate bright yellow crush fluorescence, dull yellow residual fluorescence; CLAYSTONE 20% medium gray, soft to moderately hard, amorphous to platy, silty

6540'- 6550' SILTSTONE 70% light gray to medium gray, friable to easily friable, slightly calcareous, dull yellow fluorescence even over 40% of sample, faint immediate bright yellow crush fluorescence, dull yellow residual fluorescence; SANDSTONE 20% light gray to medium gray with abundant translucent to transparent quartz grains, very fine to fine, subangular to subrounded, predominantly unconsolidated trace calcareous cement, trace glauconite, dull yellow fluorescence, immediate bright yellow crush fluorescence, dull yellow residual fluorescence; CLAYSTONE 10% medium gray, soft to moderately hard, amorphous to platy, silty

6550'- 6560' SILTSTONE 70% light gray to medium gray, friable to easily friable, slightly calcareous, dull yellow fluorescence even over 40% of sample, faint slow bright yellow crush fluorescence, dull yellow residual fluorescence; SANDSTONE 20% light gray to medium gray with abundant translucent to transparent quartz grains, very fine to fine, subangular to subrounded, predominantly unconsolidated trace calcareous cement, trace glauconite, dull yellow fluorescence, immediate bright yellow crush fluorescence, dull yellow residual fluorescence; CLAYSTONE 10% medium gray, soft to moderately hard, amorphous to platy, silty

6560'- 6570' SANDSTONE 50% light gray to medium gray with abundant transparent to translucent, very fine to fine, subangular to rounded, loose unconsolidated quartz grains and lithics with trace glauconite, trace fine to medium calcareous fragments; SILTSTONE 30% light gray to medium gray, easily friable to friable, argillaceous to calcareous matrix, dull yellow fluorescence over 30% of sample, faint slow bright yellow crush fluorescence, dull yellow residual fluorescence; CLAYSTONE 20% medium gray, soft to easily friable, amorphous to platy, silty

6570'- 6600' SILTSTONE 60% medium gray with brownish hues, firm friable to friable, argillaceous matrix, commonly clayey, trace grading to very fine sand; CLAYSTONE 40% medium dark gray, firm friable, trace dark flaky to splintery SHALE

6600'- 6630' CLAYSTONE 70% medium dark gray to medium gray with brownish hues, moderately hard to friable to soft, scattered hydrated amorphous clays, grading to silty in parts; SILTSTONE 30% medium gray with brownish hues, friable to firm, argillaceous matrix, common loose very fine sand grains in sample

6630'- 6660' CLAYSTONE 70% gray to light gray with brownish hues, firm to firm friable, commonly gritty, grading to siltstone; SILTSTONE 30% light gray with brownish hues, moderately hard to firm, trace grading to very fine sand, slightly calcareous, common loose very fine sand grains

6660'- 6690' CLAYSTONE 80% medium dark gray with brownish hues, firm friable to moderately hard with trace soft, blocky to nodular with trace hydrated amorphous clay, trace grading to silt; SILTSTONE 20% medium gray with brownish hues, firm friable, common carbonaceous flecks, trace dark flaky to splintery SHALE

6690'- 6720' CLAYSTONE 100% medium dark gray with brownish hues, firm friable to soft, blocky to amorphous, abundant hydrated clays, common grading to silt, trace flaky to splintery black to dark gray SHALE

6720'-6750' CLAYSTONE 100% medium dark gray with brownish hues, firm friable-soft, blocky-amorphous, trace hydrated clays, commonly grading-silt, trace splintery black-dark gray SHALE

6750'-6780' CLAYSTONE 100% medium dark gray with brownish hues, firm friable-soft, blocky-amorphous, trace hydrated clays, commonly grading-silt, trace splintery black-dark gray SHALE

6780'-6800' CLAYSTONE 60% medium dark gray with brownish hues, firm friable to soft, blocky-amorphous, commonly grading to silt; SANDSTONE 40% light gray with abundant transparent, very fine to lower fine, well sorted, loose unconsolidated quartz grains with abundant carbonaceous flecks, common lithics

PROPRIETARY