



# BELLOY PETROLEUM CONSULTING LTD.

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## N.E.B. COPY

APACHE CANADA LTD.

GEOLOGICAL REPORT

APACHE PARAMOUNT NOGHA B-23

300-B-23-6640-12545-0

B-23, 66° 32' 05.292" North, 125° 49' 33.237" West

Prepared for: Ross Pitman

A.F.E. # NT-04-0210

Prepared by: Robert Reid B. Sc.

### WELL DATA SUMMARY

Well Name: APACHE PARAMOUNT NOGHA B-23  
300-B-23-6640-12545-0

Licence #: File: WID # 1995, 1998

Well Location: B-23, 66° 32' 05.292" North, 125° 49' 33.237" West

Licensee: APACHE CANADA LTD. Field Name: Undefined  
Lahee Class: Exploratory AFE#: NT-04-0210

Elevation: Ground: 311.27 m  
Kelly Bushing: 315.75 m

Surface Co-ordinates: 66° 32' 05.292" North, 125° 49' 33.237" West

Contractor: Nabors Drilling Rig #62

Spud Date: 04-02-09-1700

Hole Size: Conductor Barrel: 444.00 mm  
Surface: 311.00 mm  
Main: 216.00 mm

Conductor Casing: Set at 60.00 m K.B. 339.7 mm 101.3 kg/m  
Drilled Out: 04-02-09-1830

Surface Casing: Set at 604.00 m K.B. 244.5 mm 59.53 kg/m  
Drilled Out: 04-03-04-1815

Production Casing: 177.8 mm; 43.16 Kg/m

Total Depth: 1476.00 m 04-03-13-2130

Cores: None

Drill Stem Tests: None on Penetration

Open Hole Logs: Schlumberger Norman Wells  
PEX / AIT / LDT / GR T.D. to 20.0 m, 1:240; 1:600  
DSI / EMS / GR T.D. to 20.0 m, 1:240; 1:600  
VSP T.D. to 20.0 m, 1:240; 1:600

Well Status: Cased as a Gas Well Rig release Date: 04-03-18

Ditch Samples: 5.0 meter intervals collected from 0.0 m to T.D. washed & viald for  
APACHE CANADA LTD. & N.E.B.

APACHE PARAMOUNT NOGHA B-23

GEOLOGICAL MARKERS

K.B. ELEVATION: 315.75 m

<u>Formation</u>	<u>Sample Depth (m)</u>	<u>Log Depth (m)</u>	<u>Log Subsea (m)</u>
Franklin Mtn - Cherty	8.5	-	-
Conductor	60.0	-	-
Franklin Mountain - Rhythmic	-	160.0	155.8
Franklin Mountain - Cyclic	-	547.0	-231.3
Surface Casing	604.0	604.0	-288.3
Saline River - Upper Clastics	702.0	702.0	-386.3
Saline River - Upper Salt	774.0	767.0	-451.3
Saline River - Shale	894.5	899.0	-583.3
Saline River - Lower Salt	915.0	917.0	-601.3
Mount Cap - Upper Shale	1184.0	1187.0	-871.3
Mount Cap - Chert	1223.0	1228.0	-912.3
Mount Cap - Lower	1300.0	1335.0	-1019.3
Mount Cap Clastics Zone	1366.5	1365.5	-1049.8
Mount Cap - Basal Shale		1395.0	-1079.3
Mount Clarke "A" Zone	1420.5	1419.0	-1103.3
Mount Clarke "B" Zone		1427.5	-1111.8
Mount Clarke "C" Zone		1433.0	-1117.3
Proterozoic	1447.5	1446.0	-1130.3
Total Depth	1476.0	1475.0	-1159.25

Note: Drilled Blind F / 167 to 604m, NO RETURNS

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

0-5

Till (100%): variable organic material, pebbles, clay silty with sandy material.

--- FRANKLIN MOUNTAIN - CHERTY 8.5 m ---

5-10

Dolomite (65%): buff, mottled off-white to trace dark gray, slightly chalky, predominantly finely crystalline to very finely crystalline, slightly calcareous, dense, trace poor porosity to 3%, no visible fluorescence cut;

Till (35%): as above.

10-15

Dolomite (100%): light gray, cream, occasional white, microcrystalline, massive, slightly fossiliferous, tight, trace poor intercrystalline porosity, no (questionable) shows.

15-20

Dolomite (100%): buff, light gray to cream, black, medium gray, off white, predominantly very finely crystalline, occasional chalky, common argillaceous, common silty to sandy, calcarenite in part, dolomite in part, occasional chert, tight, questionable fluorescence, questionable weak dull spotty streaming blue milky cut.

20-25

Dolomite (100%): tan, buff, off white, medium to light gray, black, predominantly very finely crystalline, occasional chalky, common argillaceous, silty in part, trace imbedded chert, tight, trace poor porosity to 2%, no visible fluorescence cut.

25-30

Dolomite (100%): medium to light gray, medium brown, predominantly very finely crystalline, occasional chalky, occasional microcrystalline, common argillaceous, common silty, occasional chert, tight, spotty dull fluorescence, weak white spotty cut.

30-35

Dolomite (100%): buff, off white, medium to light gray, black, predominantly very finely crystalline, occasional chalky, common argillaceous, silty in part, trace imbedded chert, tight, trace poor porosity to 5%, no visible fluorescence cut.



APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

35-40

Dolomite (100%): cream to buff, medium to light gray, off white, black, predominantly very finely crystalline, occasional chalky, common silty, slightly cherty, trace lithographic grains, argillaceous, tight, occasional intercrystalline poor porosity to 3%, no visible fluorescence, very weak slow (questionable) faint milky cut.

40-45

Dolomite (100%): dark gray tan, medium gray, off white, black, predominantly very finely crystalline, occasional chalky, common silty, slightly cherty, spotty lithographic, occasional dolomite, argillaceous in part, predominantly tight, occasional intercrystalline poor porosity to 1%, trace pinpoint and fracture porosity to 1%, no visible fluorescence, questionable spotty cut.

45-50

Dolomite (100%): light gray to cream, tan, dark gray, very finely crystalline to chalky, occasional microcrystalline, common silty, dolomite to very dolomite in part, slightly cherty, trace angular off white chert fragments, tight, questionable fluorescence, questionable weak dull spotty streaming blue milky cut.

50-55

Dolomite (100%): medium to light gray, very light brown, black, predominantly very finely crystalline, occasional chalky, occasional microcrystalline, trace spotty argillaceous patches, common silty, occasional chert, tight, no visible fluorescence cut.

---- CONDUCTOR 60.0 m ----

55-60

Dolomite (100%): mottled gray, off white, cream, medium to light brown, predominantly very finely crystalline, occasional microcrystalline, rare chalky, slightly silty, slightly cherty, trace lithographic grains, minor argillaceous patches, tight, occasional intercrystalline poor porosity to 2%, trace pinpoint porosity to 1%, no visible fluorescence cut.

60-65

Dolomite (100%): amber, off-white, mottled white brown, microcrystalline, common very finely crystalline, occasional chalky, part calcareous to 5%, silica in part to 1%, trace chert, rare spotty argillaceous, predominantly dense, predominantly tight with trace poor intercrystalline porosity, no visible shows.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

65-70

Dolomite (100%): mottled gray, trace off-white, trace mottled, trace black, increasingly chalky, predominantly very finely crystalline to weak microcrystalline, minor sucrosic, trace calcareous material along fragments edges, minor thin interbeds of chert, rare argillaceous in part, occasional silica, increased streaks of poor intercrystalline porosity to 3%, predominantly poor intercrystalline to tight, no visible shows.

70-75

Dolomite (100%): light gray, buff, becoming spotty brown gray to brown, predominantly microcrystalline, rare dark brown to black, cryptocrystalline, mottled with white and glassy chert, occasional microcrystalline to very finely crystalline chert, local nodules and slightly argillaceous, dense, tight, no visible shows.

75- 85

Dolomite (100%): light gray to brown, part buff, occasional light gray, cryptocrystalline, matrix common microcrystalline with finely crystalline streaks, rare micro sucrosic, predominantly clean, part mottled with white and glassy microcrystalline to finely crystalline chert, tight (1 to 2%) with streaks poor (2%), pinpoint intercrystalline and micro vuggy porosity, vugs are plugged with fine to medium crystalline glassy chert, predominantly lined with very fine to finely cryptocrystalline calcareous to silica material, rare spotty pyrobitumen associated with rare spotty vuggy porosity, no visible fluorescence or cut.

85-90

Dolomite (100%): off white, light gray white, tan in part, predominantly very finely crystalline, sandy in part, argillaceous in part, spotty calcareous, trace scattered chert fragments, tight with streaks poor intercrystalline porosity, questionable spotty very light oil stain (dead bituminous flakes), no fluorescence, no real visible cut.

90-95

Dolomite (100%): off white, buff, medium to light gray, very light tan, predominantly very finely crystalline, occasional chalky, occasional microcrystalline, common argillaceous, common silty, occasional chert, tight, no visible fluorescence cut.

95-100

Dolomite (100%): off white, light gray to cream, tan, dark gray, very finely crystalline to chalky, occasional microcrystalline, common silty, calcareous to very calcareous in part, slightly cherty, trace angular off white chert fragments, tight, questionable fluorescence, questionable weak dull spotty streaming blue milky cut.

SAMPLE DESCRIPTIONS

Depth (m)

100-105

Dolomite (100%): cream, occasional white, microcrystalline, predominant stringer material, slightly fossiliferous, tight, trace poor intercrystalline porosity, no (questionable) shows.

105-110

Dolomite (100%): 45 to 50% off-white to amber, white to light gray white, trace translucent to bright white, predominantly microcrystalline to occasional cryptocrystalline, occasional very finely crystalline, trace clear to translucent with cryptocrystalline subhedral crystals, predominantly clean, trace chert, rare black dead bituminous flakes, tight to trace poor intercrystalline porosity to 2%, no visible fluorescence cut.

110-115

Dolomite (100%): off white, buff, medium to light gray, very light tan, predominantly very finely crystalline, sandy in part, argillaceous in part, spotty calcareous, tight to fair porosity, minor spotty very light oil stain, immediate bright green milky white halo cut;

Chert (trace): white, white, tan, speckled, slightly mottled, common angular cryptocrystalline shards, occasional silty, spotty calcareous, tight to poor porosity, rare spotty tan petroleum stain, immediate spotty bright fluorescence cut.

115-120

Dolomite (100%): 60% off-white and bright white, yellow amber, trace light gray white, very finely crystalline to microcrystalline, minor sucrosic, trace finely crystalline, trace subhedral calcareous crystalline rhombs, clean, very slightly spotty argillaceous patches, cherty in part, trace white subeuhedral calcareous specks, streaks, poor intercrystalline porosity to 2%, trace sucrosic (vuggy) porosity to 1%, minor fracture porosity less than 1%, no visible fluorescence cut.

120-125

Dolomite (100%): opaque white to translucent and bright white, very finely crystalline to microcrystalline, trace chalky to sucrosic, mottled in part with white calcareous and chert fragments, predominantly tight, trace poor developed pinpoint porosity to 1%, trace fracture porosity to less than 2% (questionable), no visible fluorescence cut.

125-130

Dolomite (100%): off white to amber, trace light gray to cream, rare tan, predominantly very finely crystalline to microcrystalline, trace calcareous patches, cherty in part, tight, questionable fluorescence, no visible cut.

SAMPLE DESCRIPTIONS

Depth (m)

130-135

Dolomite (100%): mottled white to occasional white gray, trace amber, trace tan, common very finely crystalline, occasional microcrystalline to cryptocrystalline, trace scattered chalky material, occasional imbedded sand or silt with minor chert, very poor calcarenite in part, rare argillaceous spots, hard, poor intercrystalline porosity, rare pinpoint porosity, no visible shows.

135-140

Dolomite (100%): off white to amber, trace tan to opaque, trace mottled gray, trace cream, predominantly very fine to finely crystalline, occasional microcrystalline, rare sucrosic, rare silty (questionable), slightly scattered cherty patches, rare lithographic grains (questionable), minor spotty argillaceous, tight, occasional intercrystalline poor porosity to 4%, trace pinpoint porosity to 1%, trace sucrosic porosity to 2%, no visible fluorescence cut.

140-145

Dolomite (100%): off white to tan, common orange to limonitic (10 to 15%), opaque, trace light gray, trace buff, predominantly very fine to upper medium crystalline with very fine to finely crystalline matrix material, occasional scattered medium to coarse crystalline, occasional sucrosic fragments to 3%, locally slightly cherty or weak argillaceous, rare carbonaceous specks (questionable), dense, tight (3 to 4%) intercrystalline and pinpoint with subangular few streaks (4 to 6%) of micro vuggy porosity, vugs lined with medium to finely crystalline dolomite or plugged with white and glassy very fine to fine euhedral dolomite crystals, trace fracture porosity (1 to 2%), minor spotty calcareous patches and fragments edges grading to dolomitic limestone (2 to 3%), no visible fluorescence or cut.

145-150

Dolomite (100%): off white, buff, medium to light gray, very light tan, predominantly very finely crystalline, occasional chalky, occasional microcrystalline, common argillaceous, common silty, occasional chert, tight, trace intercrystalline porosity in very finely crystalline fragments, no visible fluorescence cut.

150-155

Dolomite (100%): off white, buff, medium to light gray, very light tan, amber, trace dark gray predominantly very finely crystalline to microcrystalline, trace calcareous patches, minor cherty to slightly silty in part, tight, questionable fluorescence, no visible cut.



APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

155-160

Dolomite (100%): off white, light gray, buff, light brown gray to very light brown, predominantly very fine to finely crystalline, rare mottled with white and glassy chert, occasional microcrystalline, local nodules and slightly argillaceous, dense, predominantly tight, trace poor intercrystalline porosity to 5%, no visible shows.

160-167

No Sample, No Returns, Lost Circulation.

167-170

No Sample in subangular Lost Circulation Situation, No Returns.

170-600

No Sample, Lost Circulation, No Returns.

---- SURFACE CASING 604.0 m ----

600-604

No Sample;

Lost Circulation, No Returns, Drill Blind to Surface Casing Point of 604.0 m

604-605

Cement (65%): light gray, speckled;

Dolomite (35%): off white cream, chalky in part, predominantly very finely crystalline, poor intercrystalline porosity, no visible shows.

605-615

Dolomite (95%): cream white to white buff, occasional light tan, very finely crystalline, trace crystalline chalky, trace microcrystalline, wackestone in part, poor intercrystalline porosity, no visible shows;

Mudstone (5%): black, dense, common soft, calcareous in part, blocky.

615-620

Dolomite (100%): buff, off white, dull, trace white microcrystalline tight limestone, argillaceous in part, rare silty stringers, poor intercrystalline porosity to 5%, no visible shows.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

620-625

Dolomite (100%): tan white, light gray, very finely crystalline, calcareous in part, 5 to 10% grading to dolomitic limestone, patchy argillaceous streaks, dense with trace poor intercrystalline porosity, no shows;

625-630

Dolomite (100%): buff, off white, dull to earthy, predominantly very fine to finely crystalline, poor porosity, no shows.

630-635

Dolomite (100%): buff, off white, dull amber, as above, no visible fluorescence cut.

635-640

Dolomite (100%): off white, tan, trace light yellow, very finely crystalline, common mudstone fragments and streaks, silica in part, minor drusy quartz, occasional coarse euhedral calcareous crystals, trace poor intercrystalline porosity, trace fracture porosity, rare pinpoint porosity to 1%, no visible fluorescence, questionable spotty blooming white cut.

640-645

Dolomite (100%): buff, off white, dull amber, very fine to finely crystalline, minor microcrystalline, minor scattered nodular chert, no visible stain, poor intercrystalline porosity, no visible pinpoint or vuggy porosity, no visible fluorescence, no shows.

645-650

Dolomite (100%): buff, off white, dull amber, similar to above.

650-655

Dolomite (100%): buff, off white, dull amber, predominantly very finely crystalline, occasional chalky, rare silty, rare cherty, trace lithographic grains (questionable), trace argillaceous patches, poor intercrystalline poor porosity to 4%, no visible fluorescence, questionable very weak slow faint milky cut.

655-660

Dolomite (100%): buff, off white, dull amber, very fine to finely crystalline, poor intercrystalline porosity, trace shaly mudstone laminations, no visible fluorescence cut.



SAMPLE DESCRIPTIONS

Depth (m)

660-665

Dolomite (100%): trace pyritic, occasional calcareous laminations, predominantly very finely crystalline, occasional chalky, occasional calcareous rims on dolomite fragments, part grading to dolomitic mudstone, predominantly tight, occasional intercrystalline poor porosity to 3%, no visible fluorescence, questionable even cut.

665-675

Dolomite (95%): buff, light gray, cryptocrystalline to microcrystalline, mottled with occasional buff white and glassy matrix and occasional very finely crystalline anhydrite, locally laminated argillaceous patches, tight with trace scattered intercrystalline porosity to 5%, no visible shows, part grading to shale:

Shale (5%): light gray, part gray to green, part black, subfissile, dolomitic, rare scattered minor pyrite, minor silty streaks, rare glaze.

675-680

Dolomite (90%): buff, light gray, off white, very finely crystalline to microcrystalline, mottled in part, slightly argillaceous, slightly anhydrite, occasional shaly to mudstone streaks and patches, poor intercrystalline rare spotty pinpoint porosity less than 1%, no visible shows:

Mudstone with Shale (10%): light green, black, red, dark gray, dense, massive, grading from dolomite.

680-685

Dolomite (95%): buff, light gray, cryptocrystalline to microcrystalline, mottled with occasional buff white and glassy matrix and occasional very finely crystalline anhydrite, locally laminated argillaceous patches, predominantly tight, trace scattered intercrystalline porosity to 3%, no visible shows:

Mudstone and Shale (5%): light gray, part green gray to varicolored (reddish), black, subfissile, dolomitic, silty in part, minor calcareous rims on fragments.

685-690

Dolomite (90%): off white, buff, light gray, very fine to finely crystalline, trace microcrystalline, mottled in part, occasional argillaceous, poor intercrystalline porosity, no visible shows:

Mudstone with Shale (10%): light green, black, red, dark gray, dense, massive.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

690-695

Dolomite (90%): 50% off-white, 50% mottled tan and white, very fine to finely microcrystalline, trace chalky to minor sucrosic, argillaceous in part, minor loose pyritic, tight, no visible effective porosity, questionable fluorescence, no visible cut;

Shale (10%): varicolored, part micromicaceous, subfissile to fissile.

695-700

Dolomite (90%): as above, no visible shows;

Shale (10%): dark gray, occasional varicolored, argillaceous, dolomitic, minor calcareous, predominantly platy.

--- SALINE RIVER --- UPPER CLASTICS 702.0 m ---

700-705

Dolomite (95%): buff, light brown, light gray, very fine to finely crystalline, wackestone in part, trace silty, no visible stain, predominantly tight intercrystalline porosity, trace spotty pinpoint porosity, no visible fluorescence cut;

Shale (5%): red, dark gray, fissile in part, part micromicaceous, common interbedded limestone, silty in part, argillaceous in part, common pyritic, moderately hard.

705-710

Dolomite (50%): off white, light gray, very light tan, predominantly very finely crystalline, occasional chalky, occasional microcrystalline, trace anhydrite, slightly argillaceous, tight, no visible fluorescence cut;

Shale (25%): red, dark gray, dolomitic in part, silty in part, well indurated, platy in part;

Siltstone (25%): red, light gray brown, light greenish gray, earthy, part friable, sandy in part, calcareous, dolomitic, pyritic, grading to very fine sandstone, tight, no shows.

710-715

Shale (50%): red, dark gray, fissile in part, part micromicaceous, common interbedded limestone, silty in part, argillaceous in part, common pyritic, moderately hard;

Dolomite (50%): off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity;

Shale (trace): varicolored, red, light to medium greenish green, slightly argillaceous, dolomitic, calcareous in part, part micromicaceous, subfissile to fissile.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

715-720

Shale (50%): red, dark gray, fissile in part, part micromicaceous, common interbedded limestone, silty in part, argillaceous in part, common pyritic, moderately hard;

Dolomite (50%): off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity;

Shale (trace): varicolored, red, light to medium greenish green, slightly argillaceous, dolomitic, calcareous in part, part micromicaceous, subfissile to fissile.

720-725

Shale (35%): varicolored, red, light to medium greenish green, slightly argillaceous, dolomitic, calcareous in part, part micromicaceous, subfissile to fissile;

Siltstone (35%): gray, varicolored, anhydrite to dolomite, quartzose in part, tight;

Dolomite (25%): off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity;

Sandstone (5%): light gray, rare varicolored, silty to lower fine grains, part quartzose, slightly cherty, tight to trace poor porosity, no visible fluorescence cut.

725-735

Dolomite (75%): buff, light brown, very finely crystalline, wackestone in part, packstone in part, occasional silty, occasional calcareous, predominantly dense and tight, trace poor intercrystalline with trace vuggy porosity, no shows;

Shale (20%): red, varicolored, argillaceous to clayey in part, micromicaceous, platy;

Siltstone (5%): red, light gray, varicolored, silty to lower very fine grains, part quartzose, slightly anhydrite, slightly cherty, dolomite and calcareous cement, tight with trace poor porosity, no visible fluorescence cut.

735-740

Siltstone (60%): varicolored, red, anhydrite to dolomite, quartzose in part, tight;

Shale (30%): dark gray, black, common silty, trace black angular chert, blocky;

Dolomite (10%): buff, light brown, very finely crystalline, wackestone in part, packstone in part, occasional silty, occasional calcareous, predominantly dense and tight, trace poor intercrystalline with trace vuggy porosity, no visible shows.

SAMPLE DESCRIPTIONS

Depth (m)

740-750

Dolomite (50%): mottled gray, cream, medium to light brown, predominantly very finely crystalline, occasional microcrystalline, occasional chalky, common silty, slightly cherty, trace lithographic grains, argillaceous, tight, occasional intercrystalline poor porosity to 4%, trace pinpoint porosity to 1%, no visible fluorescence cut;

Shale (25%): red, light green, dark gray, dolomitic to slightly calcareous in part, rare pyritic, hard, blocky;

Siltstone (25%): red, gray, varicolored, anhydrite to dolomite, quartzose in part, tight.

750-755

Shale (50%): black, part silty, slightly carbonaceous, blocky to subfissile, occasional platy;

Siltstone (30%): red, gray, varicolored, anhydrite to dolomite, quartzose in part, tight;

Dolomite (20%): buff, light brown, very finely crystalline, wackestone in part, packstone in part, occasional silty, occasional calcareous, predominantly dense and tight, trace poor intercrystalline with trace vuggy porosity, no visible shows.

755-765

Dolomite (75%): mottled gray, cream, medium to light brown, predominantly very finely crystalline, occasional microcrystalline, occasional chalky, common silty, slightly cherty, trace lithographic grains, argillaceous, tight, occasional intercrystalline poor porosity to 4%, trace pinpoint porosity to 1%, no visible fluorescence cut;

Shale (20%): red, calcareous in part, trace pyritic, hard, cavings in part, blocky;

Siltstone (5%): red, gray, varicolored, anhydrite to dolomite, argillaceous in part, tight.

--- SALINE RIVER - UPPER SALT 774.0 m ---

765-775

Dolomite (85%): buff, light brown, very fine to finely crystalline, occasional microcrystalline, wackestone in part, packstone in part, occasional silty, occasional calcareous, dense trace poor intercrystalline porosity, no visible shows;

Shale (10%): red, calcareous in part, trace pyritic, hard, cavings in part, blocky;

Siltstone (5%): red, gray, varicolored, anhydrite to dolomite, argillaceous in part, tight.



APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

775-785

Dolomite (40%): mottled white, off-white, common tan, very finely crystalline, part calcareous to 5% calcareous fragments, rare silica grains, argillaceous to very argillaceous, predominantly dense, poor porosity, no visible shows;

Shale (40%): varicolored (red), dark gray, fissile in part, part micromicaceous, dolomitic to slightly calcareous, argillaceous in part, moderately hard;

Salt (20%): clear, red to white, occasional light amber, predominantly massive.

785-795

Dolomite (40%): mottled white, off-white, common tan, very finely crystalline, part calcareous to 5% calcareous fragments, rare silica grains, argillaceous to very argillaceous, predominantly dense, poor porosity, no visible shows;

Shale (40%): varicolored (red), dark gray, fissile in part, part micromicaceous, dolomitic to slightly calcareous, argillaceous in part, moderately hard;

Salt (20%): clear, red to white, occasional light amber, predominantly massive.

795-800

Salt (90%): white, translucent, opaque, varicolored (yellow) massive, dense;

Anhydrite (5%): white, off white, slightly sucrosic, common dolomitic, massive, trace anhydrite eyes imbedded in salt fragments;

Dolomite (5%): off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity.

800-810

Salt (95%): tan to off white, massive, common interbedded shale;

Shale (5%): black, varicolored, platy.

810-815

Salt (90%): white, red pink, trace translucent, varicolored (yellow) massive, dense;

Shale (5%): black, varicolored, platy.

815-820

Salt (100%): white, translucent, opaque, varicolored (yellow) massive, dense.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

820-825

Salt (60%): white, red pink, varicolored (yellow) massive, dense;

Siltstone (20%): red to pink, granular to gritty, poorly indurated, poor porosity, common dolomitic, occasional weak calcareous, slightly anhydrite, anhydrite filling pore throats, no visible effective porosity, no shows;

Shale (20%): black, varicolored, platy.

825-830

Salt (100%): clear, translucent with siltstone, trace calcareous patches, trace tan limestone stringers;

Siltstone (trace): light gray, dark gray, dolomitic in part, tight;

Shale (trace): medium gray, occasional light green gray, rare red, preserv platy.

830-835

Salt (100%): clear, translucent with siltstone, trace calcareous patches, trace tan limestone stringers;

Siltstone (trace): light gray, dark gray, dolomitic in part, tight;

835-845

Dolomite (40%): off-white, 50% mottled tan and white, very finely crystalline, to microcrystalline, trace chalky to minor sucrosic, argillaceous in part, no visible effective porosity, questionable fluorescence, no cut;

Salt (40%): clear, translucent with siltstone, trace calcareous patches, trace tan limestone stringers;

Siltstone (10%): light gray, dark gray, dolomitic in part, tight;

Shale (10%): red, varicolored, platy.

845-855

Salt (100%): clear, translucent, red;

Siltstone (trace): light gray, dark gray, dolomitic in part, tight;

Shale (trace): medium gray, occasional light green gray, rare red, preserv platy.

855-860

Salt (100%): clear, translucent, red, massive, splintery;

Siltstone (trace): light gray, dark gray, dolomitic in part, tight;

Shale (trace): red, varicolored, platy.



APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

860-865

Salt (100%): tan, granular, abundant shale partings, granular.

870-875

Shale (55%): medium to dark gray, as above;

Salt (45%): orange, white, mottled red, anhydrite in part,

875-880

Shale (55%): medium to dark gray, black in part, occasional gritty, platy to blocky;

Salt (45%): orange, white, mottled red, anhydrite in part,

880-885

Shale (55%): medium to dark gray, as above;

Salt (45%): orange, white, mottled red, anhydrite in part;

Siltstone (trace): red, light to medium gray, dolomitic, sandy in part, slightly anhydrite, tight.

885-890

Salt (80%): as above;

Shale (20%): as above.

----- SALINE RIVER - SHALE 894.5 m -----

890-895

Shale (55%): medium to dark gray, as above;

Salt (45%): orange, white, mottled red, anhydrite in part;

Siltstone (trace): red, light to medium gray, dolomitic, sandy in part, slightly anhydrite, tight.

895-905

Shale (65%): medium to dark gray, poorly indurated, slightly argillaceous, predominantly blocky;

Salt (35%): varicolored, light gray, off white, massive, occasional interbedded shale laminations.

905-910

Shale (65%): medium to dark gray, poorly indurated, slightly argillaceous, predominantly blocky;

Salt (35%): varicolored, light gray, off white, massive, occasional interbedded shale laminations.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

---- SALINE RIVER - LOWER SALT 915.0 m ----

910-915

Salt (70%): as above;

Shale (20%): as above;

Siltstone (5%): as above.

915-920

Shale (65%): medium to dark gray, poorly indurated, slightly argillaceous, predominantly blocky;

Salt (35%): varicolored, light gray, off white, massive to splintery with interbedded shale;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

920-925

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

925-930

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

930-935

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

935-940

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Occasional siltstone stringers material;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

940-950

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Occasional siltstone stringers material;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

950-960

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Occasional siltstone stringers material;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

960-965

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Occasional siltstone stringers material;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

965-975

Shale (65%): medium to dark gray, blocky, poorly indurated, mudstone in part;

Salt (35%): varicolored, light gray, off white, predominantly massive, interbedded with shale;

Occasional siltstone stringers material;

Anhydrite (trace): white, varicolored, slightly calcareous, tight.

975-980

Salt (60%): white, varicolored, massive, common interbedded with shale;

Shale (30%): black, varicolored (medium red to light green), platy in part, occasional blocky;

Siltstone (10%): varicolored, dolomitic in part, occasional calcareous specks, occasional argillaceous, tight.

980-985

Salt (60%): white, varicolored, massive, common interbedded with shale;

Shale (30%): black, varicolored (medium red to light green), platy in part, occasional blocky;

Siltstone (10%): varicolored, dolomitic in part, occasional calcareous specks, occasional argillaceous, tight.

985-990

Salt (60%): white, varicolored, massive, common interbedded with shale;

Shale (30%): black, varicolored (medium red to light green), platy in part, occasional blocky;

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Siltstone (10%): varicolored, dolomitic in part, occasional calcareous specks, occasional argillaceous, tight.

990-995

Salt (60%): white, varicolored, massive, common interbedded with shale;

Shale (30%): black, varicolored (medium red to light green), platy in part, occasional blocky;

Siltstone (10%): varicolored, dolomitic in part, occasional calcareous specks, occasional argillaceous, tight.

995-1000

Salt (60%): white, varicolored, massive, common interbedded with shale;

Shale (30%): black, varicolored (medium red to light green), platy in part, occasional blocky;

Siltstone (10%): varicolored, dolomitic in part, occasional calcareous specks, occasional argillaceous, tight.

1000-1005

Salt (60%): white, varicolored, massive, common interbedded with shale;

Shale (30%): black, varicolored (medium red to light green), platy in part, occasional blocky;

Siltstone (10%): varicolored, dolomitic in part, occasional calcareous specks, occasional argillaceous, tight.

1005-1010

Salt (100%): white, tan, interbedded with shale, trace anhydrite minute lense.

1010-1020

Salt (70%): white, tan, interbedded with shale, cherty in part, trace anhydrite minute lense;

Shale (25%): dark gray, black, medium to light gray, trace varicolored, common interbedded salt and dolomite, silty in part, argillaceous in part, moderately hard to poorly indurated, mudstone in part;

Dolomite (5%): buff, off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity.

1020-1030

Salt (70%): white, tan, interbedded with shale, cherty in part, trace anhydrite minute lense;

Shale (25%): dark gray, black, medium to light gray, trace varicolored, common interbedded salt and dolomite, silty in part, argillaceous in part, moderately hard to poorly indurated, mudstone in part;

Dolomite (5%): buff, off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity.

1030-1040

Salt (70%): white, tan, interbedded with shale, cherty in part, trace anhydrite minute lense;

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Shale (25%): dark gray, black, medium to light gray, trace varicolored, common interbedded salt and dolomite, silty in part, argillaceous in part, moderately hard to poorly indurated, mudstone in part;

Dolomite (5%): buff, off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity.

1040-1060

Salt (75%): clear, translucent, trace scattered iron stain, massive;

Mudstone (25%): light gray, gritty, shaly in part, silty in part, poorly indurated, dolomitic, blocky.

1060-1080

Salt (70%): white, tan, interbedded with shale, cherty in part, trace anhydrite minute lense;

Shale (25%): dark gray, black, medium to light gray, trace varicolored, common interbedded salt and dolomite, silty in part, argillaceous in part, moderately hard to poorly indurated, mudstone in part;

Dolomite (5%): buff, off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity.

1080-1100

Salt (70%): white, tan, interbedded with shale, cherty in part, trace anhydrite minute lense;

Shale (25%): dark gray, black, medium to light gray, trace varicolored, common interbedded salt and dolomite, silty in part, argillaceous in part, moderately hard to poorly indurated, mudstone in part;

Dolomite (5%): buff, off white, amber, light gray white, slightly argillaceous, slightly anhydrite, poor porosity.

1100-1110

Salt (60%): buff, white, trace yellow to orange, massive, dense, soft;

Siltstone (20%): black to dark gray, granular to gritty, poorly indurated, poor porosity, common dolomitic, occasional weak calcareous, slightly anhydrite, anhydrite filling pore throats, no visible effective porosity, no shows;

Shale (20%): black, varicolored, common interbedded salt and dolomite, cherty in part, platy.

1110-1125

Salt (60%): buff, white, trace yellow to orange, massive, dense, soft;

Siltstone (20%): black to dark gray, granular to gritty, poorly indurated, poor porosity, common dolomitic, occasional weak calcareous, slightly anhydrite, anhydrite filling pore throats, no visible effective porosity, no shows;

Shale (20%): black, varicolored, common interbedded salt and dolomite, cherty in part, platy.

1125-1130

Salt (75%): clear, translucent, trace scattered iron stain, massive;



APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Mudstone (25%): light gray, gritty, shaly in part, silty in part, poorly indurated, dolomitic, blocky.

1130-1135

Salt (95%): dull white, red stain white, massive, sucrosic in part;

Shale (5%): as above, blocky.

1135-1140

Salt (95%): tan to white, trace varicolored, massive;

Shale (5%): light to medium gray, occasional black, poorly indurated, as mudstone in part, platy to blocky.

1140-1145

Shale (95%): medium gray, black, dolomitic in part, trace interbedded shale, predominantly platy;

Salt (5%): white, tan, slightly shaly, massive.

1145-1150

Salt (95%): tan, off white, massive;

Shale (5%): medium gray green to black when wet with interbedded salt, medium gray when dry, part silty and gritty, poorly indurated, part as shaly dolomite.

1150-1165

Salt (60%): buff, white, trace yellow to orange, massive, dense, soft;

Siltstone (20%): black to dark gray, granular to gritty, poorly indurated, poor porosity, common dolomitic, occasional weak calcareous, slightly anhydrite, anhydrite filling pore throats, no visible effective porosity, no shows;

Shale (20%): black, varicolored, common interbedded salt and dolomite, cherty in part, platy.

1165-1180

Salt (60%): buff, white, trace yellow to orange, massive, dense, soft;

Siltstone (20%): black to dark gray, granular to gritty, poorly indurated, poor porosity, common dolomitic, occasional weak calcareous, slightly anhydrite, anhydrite filling pore throats, no visible effective porosity, no shows;

Shale (20%): black, varicolored, common interbedded salt and dolomite, platy.



APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

---- MOUNT CAP - UPPER SHALE 1184.0 m ----

1180-1185

Salt (50%): tan, off white, massive;

Shale (50%): medium gray green to black when wet with interbedded salt, medium gray when dry, part silty and gritty, poorly indurated, part as shaly dolomite.

1185-1200

Salt (60%): buff, white, trace yellow to orange, massive, dense, soft;

Siltstone (20%): dark gray, varicolored in part, red to pinkish, granular to gritty, poorly indurated, poor porosity, common dolomitic, occasional weak calcareous, slightly anhydrite, anhydrite filling pore throats, no visible effective porosity, no shows;

Shale (20%): black, varicolored, common interbedded salt and dolomite, cherty in part, platy.

1200-1210

Shale (65%): medium to dark gray, common micromicaceous, minor questionable fossil, common grading to muddy dolomite, silty with rare silt streaks, subfissile (questionable) to predominantly blocky;

Dolomite (25%): light gray, tan, dark gray, very finely crystalline to chalky, occasional microcrystalline, common silty, dolomite calcareous to very dolomite calcareous in part, slightly cherty, trace angular off white chert fragments, tight, no fluorescence cut;

Siltstone (10%): light gray, speckled, light green, calcareous in part, tight, no shows.

1210-1220

Shale (70%): medium to dark gray, black, dolomite in part, slightly calcareous, well indurated, blocky;

Dolomite (25%): light gray, tan, dark gray, very finely crystalline to chalky, occasional microcrystalline, common silty, dolomite calcareous to very dolomite calcareous in part, slightly cherty, trace angular off white chert fragments, tight, no fluorescence cut;

Siltstone (5%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, tight, no shows.

---- MOUNT CAP - CHERT 1223.0 m ----

1220-1230

Shale (70%): medium to dark gray, black, dolomite in part, slightly calcareous, well indurated, blocky;

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Dolomite (25%): light gray, tan, dark gray, very finely crystalline to chalky, occasional microcrystalline, common silty, slightly cherty, trace angular off white chert fragments, tight, no fluorescence cut;

Siltstone (5%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, tight, no shows.

1230-1235

Shale (70%): medium to dark gray, black, dolomite in part, slightly calcareous, well indurated, blocky;

Dolomite (25%): light gray, tan, dark gray, very finely crystalline to chalky, occasional microcrystalline, common silty, dolomite calcareous to very dolomite calcareous in part, slightly cherty, trace angular dark black brown, and rare off white chert fragments, tight, no fluorescence cut;

Siltstone (5%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, rare sand grains, tight, no visible shows.

1235-1245

Shale (90%): medium to dark gray, black, dark black green, common silky luster, dolomite in part, slightly calcareous, well indurated, common platy to occasional blocky;

Dolomite (10%): light gray, brown to tan, chalky white and dull, dark gray, very finely crystalline to chalky, occasional microcrystalline, common silty, slightly cherty, only subangular trace to minor angular brown chert fragments, trace poor intercrystalline porosity in crystalline fragments to 3%, no fluorescence cut;

Siltstone (trace): light gray, speckled white reddish, dolomitic, weak calcareous on fragment edges, no visible porosity, no visible shows.

1245-1250

Shale (60%): medium to dark gray, black, occasional dark to medium black green, very dolomite in part, rare calcareous, predominantly well indurated, common platy;

Dolomite (30%): predominantly dark brown, dark gray, very finely crystalline to chalky, occasional microcrystalline, common subhedral dolomite crystals, minor subrounded white minute chert fragments, minor silty, predominantly poor intercrystalline porosity, no fluorescence cut;

Siltstone (10%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, no visible sand grains, as subangular sandy dolomitic limestone in part, predominantly tight, no visible shows.

1250-1255

Shale (90%): as above;

SAMPLE DESCRIPTIONS

Depth (m)

Dolomite (5%): dark brown, brownish gray, predominantly microcrystalline, common finely crystalline, earthy and very fine grained crystalline, slightly argillaceous, dolomitic and trace calcareous matrix, questionable rare anhydrite, tight with trace poor porosity <5%, no shows;

Siltstone (5%): as above, tight.

1255-1260

Shale (45%): gray brown, greenish gray, 50% vitreous lustre, common earthy;

Dolomite (45%): brown to tan, brownish gray, very fine to finely crystalline, microcrystalline, slightly silty, minor calcareous, trace argillaceous, tight with trace poor vuggy and intercrystalline porosity, no shows;

Siltstone (10%): light gray, rare light brown, trace grading to very fine dolomite sandstone, trace argillaceous, questionable bituminous, rare calcareous, predominantly blocky, tight, no shows.

1260-1265

Shale (75%): as above;

Dolomite (15%): light white gray, occasional tan brown, very fine to crystalline, trace chalky to grainy, occasional earthy, occasional very weak calcareous, poor porosity, no cut;

Siltstone (10%): light gray, trace gray brown, minor greenish gray, earthy, part friable, sandy in part, calcareous to dolomitic, tight, no shows.

1265-1270

Shale (45%): gray brown, greenish gray, 50% vitreous lustre, common earthy;

Dolomite (45%): brown to tan, brownish gray, very fine to finely crystalline, microcrystalline, slightly silty, minor calcareous, trace argillaceous, tight with trace poor vuggy and intercrystalline porosity, no shows;

Siltstone (10%): light gray, rare light brown, trace grading to very fine dolomite sandstone, trace argillaceous, questionable bituminous, rare calcareous, predominantly blocky, tight, no shows.

1270-1280

Shale (70%): black, carbonaceous, part micromicaceous, fissile to blocky, cavings in part (questionable);

Siltstone (25%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, rare sand grains, tight, no visible shows;

Dolomite (5%): medium to light gray, very light brown, black, predominantly very finely crystalline, occasional chalky, occasional microcrystalline, common argillaceous, common silty, occasional chert, tight, no visible fluorescence cut.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

1280-1290

Shale (80%): black, carbonaceous, part micromicaceous, subfissile to fissile;

Dolomite (10%): light gray to cream, medium gray, predominantly very finely crystalline, common chalky, calcareous in part, part grading to dolomitic limestone, minor chert, tight, questionable fluorescence, no visible cut;

Siltstone (10%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, rare sand grains, tight, no visible shows.

---- MOUNT CAP - LOWER 1300.0 m ----

1290-1300

Shale (75%): dark to medium gray, common gray black, trace medium black green, common subvitreous lustre, occasional micromicaceous;

Dolomite (15%): as above, tight, no shows;

Siltstone (10%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, rare sand grains, tight, no visible shows.

1300-1305

Shale (100%): dark to medium gray, common gray black, trace medium black green, common subvitreous lustre, occasional micromicaceous, common platy, occasional subfissile;

Siltstone (trace): light gray, blocky, trace sandy, trace imbedded sand grains, dolomitic, tight;

Dolomite (trace): off white, opaque, predominantly as stringers material, common as dolomitic mudstone, slightly calcareous, no visible porosity, no shows.

1305-1310

Shale (100%): as above;

Dolomite (trace): off white, opaque, predominantly as stringers material, common as dolomitic mudstone, slightly calcareous, no visible porosity, no shows;

Siltstone (trace): light gray, friable, speckled weak consolidated, dolomitic, weak calcareous in part, tight, no shows.

1310-1315

Shale (100%): black, dark gray, as above.

1315-1320

Shale (70%): as above;



SAMPLE DESCRIPTIONS

Depth (m)

Dolomite (20%): light white gray, occasional tan brown, very fine to crystalline, trace chalky to grainy, occasional earthy, occasional very weak calcareous, poor porosity, no cut;

Siltstone (10%): light gray, trace gray brown, minor greenish gray, earthy, part friable, sandy in part, calcareous to dolomitic, tight, no shows.

1320-1330

Shale (80%): gray brown, greenish gray, 50% vitreous lustre, common earthy;

Dolomite (10%): brown to tan, brownish gray, very fine to finely crystalline, microcrystalline, slightly silty, minor calcareous, tight with trace poor intercrystalline porosity, no shows;

Siltstone (10%): light gray, rare light brown, trace grading to very fine dolomite sandstone, trace argillaceous, questionable bituminous, rare calcareous, predominantly blocky, tight, no shows.

1330-1335

Shale (75%): dark gray to brown, blocky, very calcareous, bituminous, trace pyritic;

Sandstone (15%): medium gray, reddish gray, earthy, very fine grained, predominantly subrounded, well sorted, dolomitic with trace calcareous cement, trace anhydrite (questionable), tight to poor intergranular porosity <5%, no fluorescence questionable cut;

Dolomite (10%): light to medium brown, gray brown, cryptocrystalline to microcrystalline, slightly silty, calcareous, argillaceous, tight to poor vuggy and intercrystalline porosity, no shows.

1335-1340

Shale (85%): medium to dark gray black, occasional varicolored, part micromicaceous, as above, platy;

Sandstone (15%): red blocky, medium gray, tan, light gray, very fine to fine grains, common silty, weak quartzose, subrounded to subangular, well sorted, dolomitic to spotty calcareous, spotty argillaceous, weak consolidated to friable, consolidated, poor to trace fair porosity to 8%, no effective porosity, immediate fair dull spotty cut;

Dolomite with Siltstone (15%): as above, tight, no shows.

1340-1345

Shale (80%): gray to black, platy to blocky;

Sandstone (10%): light brown, light gray, very fine to fine grains, quartzose, subrounded, well sorted, calcareous to dolomite, spotty argillaceous, weak consolidated, poor to rare fair porosity to 8%, slow questionable spotty fluorescence cut;

Siltstone (10%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part, rare sand grains, tight, no visible shows;

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Chert (5%): white, brown tan, speckled, slightly mottled, common angular cryptocrystalline shards, occasional silty, spotty calcareous, tight spotty tan petroleum stain, immediate slow fluorescence cut.

1345-1350

Shale (70%): dark gray, trace varicolored, weak dolomitic, platy to blocky;

Siltstone (25%): dark to light gray, mottled brown in part, light gray, dolomitic, friable, no visible porosity;

Dolomite (5%): brown, variable gray, chalky, occasional microcrystalline, part as dolomitic mudstone, questionable porosity, no shows.

1350- 1357.5

Shale (70%): dark gray, trace varicolored, weak dolomitic, platy to blocky;

Siltstone (25%): light gray, mottled tan to white in part, dolomitic, friable, no visible porosity, no cut;

Dolomite (5%): variable gray, chalky, part as dolomitic mudstone, questionable porosity, no shows.

1357.5-1360

Shale (80%): 95% light green, 5% light green gray to medium dark gray, common platy;

Dolomite (20%): light gray, trace light brown, part as dolomitic mudstone, soft, part hard, well indurated, part microcrystalline, tight, no shows;

Siltstone (10%): white gray, soft, common calcareous, part as silty mudstone, tight.

1360-1365

Dolomite (40%): light gray, trace light brown, part as dolomitic mudstone, soft, part hard, well indurated, part microcrystalline, tight, no shows;

Shale (30%): predominantly light to medium green, common light green gray to medium dark gray, dolomitic in part, common platy;

Siltstone (30%): light gray, speckled, rare varicolored, dolomitic, weak calcareous in part to locally very calcareous, tight, no shows.

--- MOUNT CAP CLASTICS ZONE 1366.5 m ---

1365-1367.5

Dolomite (30%): light gray, trace light brown, part as dolomitic mudstone, soft, tight, no shows;

Shale (25%): light to dark green, common subvitreous luster, platy;



SAMPLE DESCRIPTIONS

Depth (m)

Siltstone (25%): light gray to dirty white, calcareous, common as dolomitic mudstone, soft, questionable porosity, no shows;

Sandstone (50%): light gray, tan, light to medium gray brown, upper very fine to upper fine grains, trace medium grains, subrounded quartzose, well sorted, rare silica cement, predominantly dolomitic to calcareous cement, in part sandy matrix, in part dolomitic matrix, trace argillaceous grains, predominantly good intergranular porosity to 8%, fair to good even cut.

1367.5-1370

Siltstone (50%): light gray, gritty silty, common sandy grading to very fine grains sandstone, dolomitic, friable to very weak consolidated, questionable porosity, no shows;

Sandstone (45%): light gray, fine to medium grains, quartzose, subrounded, well sorted, partly consolidated, part weakly consolidated, trace spotty oil stain fragments, good intergranular porosity to 10%, no visible fluorescence, fair to good even milky cut;

Shale (5%): dark black green gray, as above.

1370-1372.5

Sandstone (50%): light gray, trace tan, predominantly fine grains, quartzose, subrounded, well sorted, common dolomitic to calcareous cement, rare silica cement, spotty oil stain, good porosity to 7%, shows as above;

Dolomite (50%): medium gray, trace light brown, cryptocrystalline, occasional microcrystalline, wackestone in part, packstone in part, minor silty, occasional calcareous, predominantly dense and tight, trace poor intercrystalline with trace vuggy porosity, no visible shows.

1372.5-1375

Dolomite (40%): dark gray, cryptocrystalline, occasional microcrystalline to very finely crystalline, wackestone in part, packstone in part, occasional silty, occasional calcareous, predominantly dense and tight, trace poor intercrystalline porosity, no visible shows;

Sandstone (40%): dark gray, fine to medium grains, frosted quartz, trace clear quartz, subrounded, predominantly well sorted, weak consolidated to friable, dolomitic to calcareous cement, silica cement, occasional moderately high relief conglomerate fragments to 3%, rare pyritic, common good porosity, predominantly good intergranular porosity to 8% with questionable streaks to 10%, questionable spotty green fluorescence, immediate dull even blue milky cut;

Siltstone (15%): as above, part as dolomitic mudstone;

Shale (5%): dark black gray, as above, cavings in part.

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

1375-1377.5

Sandstone (40%): as above, 50% friable, 50% weak consolidated, very dolomitic, fair quartz grains relief with trace good porosity, common poor intergranular porosity to 6%, trace questionable slow streaming fluorescence, poor spotty halo cut:

Dolomite (40%): dark gray, predominantly microcrystalline to cryptocrystalline, occasional very finely crystalline, silty in part, spotty calcareous, tight, no shows:

Siltstone (20%): dark to light gray, common sand and lithographic included, dolomitic, poor porosity, no shows.

1377.5-1382.5

Dolomite (65%): brown, variable gray, chalky, occasional microcrystalline, part as dolomitic mudstone, questionable porosity, no shows:

Siltstone (20%): light to medium gray, black gray, very dolomitic, part as dolomitic mudstone, tight:

Sandstone (10%): light brown, light gray, very fine to fine grains, quartzose, subrounded, well sorted, calcareous to dolomite, spotty argillaceous, weak consolidated, poor to rare fair porosity to 7%, slow questionable spotty fluorescence cut:

Shale (10%): gray to black, platy to blocky.

1382.5-1390

Dolomite (65%): variable gray, microcrystalline, part as dolomitic mudstone, questionable porosity, no shows:

Siltstone (15%): varicolored, dolomite matrix in part, dolomitic with minor silica cement, friable, poor porosity, no shows:

Shale (15%): medium gray, light green, trace varicolored, in part micromicaceous, subfissile;

Sandstone (5%): light gray, tan, light to medium gray brown, lower fine to upper fine grains, trace medium grains, subangular to subrounded quartzose, well sorted, rare silica, in part sandy matrix, in part dolomitic matrix, trace argillaceous grains, poor porosity to 6%, questionable even cut:

1390-1395

Dolomite (45%): brown, variable gray, chalky, occasional microcrystalline, common as dolomitic mudstone, questionable porosity, no shows:

Shale (45%): gray to black, platy;

Shale (10%): black, gritty, predominantly blocky.

1395-1400

Dolomite (50%): brown, black, microcrystalline, part as dolomitic mudstone, questionable porosity, no shows:

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Siltstone (40%): light brown, varicolored, gray white, dolomite matrix in part, dolomitic, fair, soft, poor intergranular porosity, no shows;

Shale (10%): medium gray, trace light green, waxy in part, in part micromicaceous, subfissile to platy.

1400-1405

Dolomite (45%): brown, tan, gray, very finely crystalline, common microcrystalline, predominantly as dolomitic mudstone, predominantly dense, minor euhedral dolomitic and calcareous fragments, trace poor intercrystalline porosity, trace fracture porosity, no shows;

Sandstone (45%): light gray, predominantly fine with trace medium grains, quartzose, subrounded, well sorted, weak calcareous to very dolomite cement, trace imbedded glauconitic, clayey in part, weak consolidated to very friable, infer good porosity in friable, no visible fluorescence, questionable spotty cut;

Siltstone (10%): light gray, varicolored in part, tan gray, part very fine grains quartzose, silica, minor spotty calcareous, trace sandy dolomitic fragments, tight, no shows.

1405-1410

Dolomite (35%): brown, tan, very finely crystalline, predominantly as dolomitic mudstone, predominantly dense, minor euhedral dolomitic and calcareous fragments, trace poor intercrystalline porosity, trace fracture porosity, no shows;

Siltstone (35%): light gray, varicolored in part, tan gray, part very fine grains quartzose, silica, minor spotty calcareous, trace sandy dolomitic fragments, tight, no shows;

Sandstone (30%): light gray, predominantly fine with trace medium grains, quartzose, subrounded, well sorted, weak calcareous to very dolomite cement, trace imbedded glauconitic, clayey in part, weak consolidated to very friable, infer good porosity in friable, no visible fluorescence, questionable spotty cut.

1410-1415

Siltstone (65%): light gray, in part, tan gray, part very fine grains quartzose, minor spotty calcareous cement, dolomitic cement, dolomitic fragments, tight, no shows;

Dolomite (35%): brown, variable gray, chalky, predominantly microcrystalline, occasional very finely crystalline, part as dolomitic mudstone, questionable porosity, no shows.

1415-1420

Siltstone (50%): light gray, tan gray, part very fine grains quartzose, silica, minor spotty calcareous, trace sandy dolomitic fragments, trace green shale fragments, tight, no shows;

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Sandstone (30%): light gray, predominantly fine with trace medium grains, quartzose, subrounded, well sorted, weak calcareous to very dolomite cement, abundant imbedded glauconitic, clayey in part, less than 1% pyritic nodules, weak consolidated to very friable, infer good porosity in friable, no visible fluorescence, questionable spotty cut;

Dolomite (20%): brown, tan, very finely crystalline, predominantly as dolomitic mudstone, predominantly dense, minor euhedral dolomitic and calcareous fragments, trace poor intercrystalline porosity, trace fracture porosity, no shows.

--- MOUNT CLARKE "A" ZONE 1420.5 m ---

1420-1425

Sandstone (80%): opaque, off white frosted, light gray, tan, quartzose, 85% unconsolidated as pebbles thus upper medium to very coarse grains, rounded and predominantly well sorted, 15% friable to weak consolidated thus fine to medium grains, subrounded to subangular, well sorted, dolomitic with trace calcareous cement, rare silica cement, moderately high relief quartz in weak consolidated fragments, trace light brown oil stain to 15%, infer good porosity in unconsolidated, 6 to 9% intergranular porosity in friable and weak consolidated fragments, questionable spotty green fluorescence, dull slow even milky cut;

Siltstone (10%): light gray, part as dolomitic mudstone;

Shale (10%): medium green, dark black green.

1425-1430

Sandstone (50%): light gray, translucent, tan, fine to medium grains, subrounded, predominantly well sorted, weak consolidated to slightly friable, silica cement, spotty very weak silica overgrowths, occasional moderately high relief quartz fragments to 3%, common poor porosity, trace good intergranular porosity to 8%, questionable streaks to 10%, questionable spotty green fluorescence, immediate weak milky cut;

Siltstone (30%): light gray, speckled in part, trace calcareous to part dolomite fragments, part as dolomitic mudstone (questionable), poor porosity, no visible shows;

Shale (20%): medium glassy green, platy.

1430-1435

Sandstone (60%): light gray, translucent, opaque, opaque, off white frosted, lower medium to upper very coarse pebbles, 100% quartzose, rounded to subrounded, trace subangular to angular fragments with conchoidal fractures, 100% unconsolidated, infer good to very good intergranular porosity, questionable spotty green fluorescence, dull slow even milky cut;



SAMPLE DESCRIPTIONS

Depth (m)

Sandstone (20%): light gray, trace tan with oil stain, quartzose, subrounded to subangular, occasional weak to moderately spotty very weak silica overgrowths, trace spotty quartz grains relief, trace spotty very light brown oil stain, well to weak consolidated, occasional good intergranular to 10%, questionable spotty green fluorescence, very slow even halo milky cut;

Siltstone (10%): white, light gray, soft, chalky in part, dolomitic, tight;

Shale (10%): green, black, platy.

1435-1440

Sandstone (80%): light gray, clear, translucent, opaque, predominantly fine to lower coarse grains, 100% quartzose, rounded to subrounded with common subangular, variable sorted, predominantly poorly sorted, 80% weak consolidated, 20% loose, occasional moderately weak silica overgrowths, 1 to 2% pyritic nodules that are upper medium to upper very coarse in size, rare imbedded pyritic, occasional good quartz grains relief, trace spotty very light brown oil stain, variable porosity 6 to 10%, questionable spotty green fluorescence, very slow even halo milky cut;

Siltstone (10%): white, light gray, soft, chalky in part, dolomitic, tight;

Shale (10%): green, black, platy.

1440-1442.5

Sandstone (70%): off white, translucent, opaque, predominantly fine to medium grains, 100% quartzose, subrounded to subangular, well sorted, 1 to 2% pyritic predominantly as coarse to lower very coarse nodules with rare pyritic spherical fossil fragments, predominantly weak consolidated, trace loose, common good quartz grains relief, trace spotty very light brown oil stain, again variable porosity 6 to 10%, questionable spotty green fluorescence, again very slow even halo milky cut;

Siltstone (20%): white, light gray, hard to moderately soft, slightly dolomitic, tight;

Shale with Dolomite (10%): varicolored, blocky.

1442.5-1445

Sandstone (45%): light gray, trace tan with oil stain, quartzose, subrounded to subangular, well sorted, common weak silica overgrowths, common quartz grains relief, 1 to 2% pyritic predominantly as coarse to lower very coarse nodules with rare pyroxene spherical fossil fragments, trace spotty very light brown oil stain, weak consolidated, occasional good intergranular to 8%, questionable spotty green fluorescence, very slow even halo milky cut;

Siltstone (35%): white, light gray, soft, dolomitic mudstone in part, tight, no effective porosity;



APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

Sandstone (10%): light gray, translucent, clear, fine to medium grains, 100% quartzose, rounded to subangular, unconsolidated, infer good to very good intergranular porosity, questionable spotty green fluorescence, dull slow cut;

Shale (10%): black, common interbedded dolomitic mudstone with sandstone grains.

1545-1447

Sample directly off shaker

Sandstone (95%): light gray, translucent, opaque, stained red, lower medium to upper very coarse pebbles, 100% quartzose, rounded to subrounded, 100% unconsolidated, infer good to very good intergranular porosity, dull slow even milky cut masked by red stain;

Basalt (5%): red, soft, common interbedded siltstone, well weathered.

--- PROTEROZOIC 1447.5 m ---

1445-1447.5

Basalt (80%): red, soft, common interbedded siltstone and shale, weathered;

Sandstone (20%): as above, 100% unconsolidated, good porosity, weak cut.

1447.5-1450

Basalt (100%): red, soft, common interbedded siltstone and shale, weathered, common erosion secondary material.

1450-1452.5

Basalt (100%): red, soft, common interbedded siltstone and shale, weathered.

1452.5-1455

Siltstone (40%): red, light gray, bentonite in part, slightly argillaceous, trace interbedded sandstone and dolomite fragments, trace interbedded shale, tight;

Shale (30%): red, soft, well weathered, blocky;

Dolomite (25%): orange, red, microcrystalline to cryptocrystalline, argillaceous in part, hard, no visible porosity, no visible shows;

Limestone (5%): red, orange, predominantly very finely crystalline, rare chert, tight with trace poor porosity, no fluorescence, questionable pale cut;

APACHE PARAMOUNT NOGHA B-23

SAMPLE DESCRIPTIONS

Depth (m)

1455-1465

Dolomite (45%): medium steely gray, dark gray, varicolored, occasional very light blue gray, microcrystalline, slightly calcareous, blocky, tight;

Siltstone (45%): varicolored, predominantly gray, red, slightly calcareous, trace disseminated pyrite, tight;

Limestone (5%): red to gray, slightly dolomitized in part, microcrystalline, slightly silty, predominantly tight with trace poor fracture and vuggy porosity, no visible fluorescence or cut;

Shale (5%): medium gray, fissile, part as dolomitic mudstone, micromicaceous in part, light gray, silty in part, blocky.

1465-1476

Dolomite (65%): medium to dark gray, microcrystalline, patch poor intercrystalline porosity, no stain or shows;

Siltstone (30%): medium gray, trace varicolored, argillaceous, rare sandy, predominantly dolomitic with trace calcareous, tight;

Shale (5%): dark gray, part tabular, part blocky.

TOTAL DEPTH 1476.0 m

## APACHE PARAMOUNT NOGHA B-23

## DAILY MUD PROPERTIES

DATE	DEPTH (m)	DENSITY Kg/M3	WATER LOSS (cm3/30 min)	FILTER CAKE (mm)	pH	VISCOSITY (s/l)	PV/YP	GELS
04-02-08	60	1010	-	-	9.5	44	-	-
04-02-09	65	1030	20.0	2.0	10.0	250	8 / 43.57	23 / 30
04-02-10	101	1030	15.4	2.0	8.0	35	6 / 3.83	3 / 7
04-02-11	130	1030	-	-	10.0	40	-	-
04-02-12	145	1040	13.0	-	10.0	52	-	-
04-02-13	145	1000	Lost Circulation Situation_Run 3 LCM Pills_Minimal Returns			-	-	-
04-02-14	152	1000	Lost Circulation Situation_Run Cement Plug			28	-	-
04-02-15	152	1000	Lost Circulation Situation_Run LCM Pill			28	-	-
04-02-16	152	1000	Lost Circulation Situation_Run LCM Pill & Cmt Plug			28	-	-
04-02-17	165	1000	Lost Circulation Situation_Run LCM Pills			28	-	-
04-02-18	167	1000	Lost Circulation Situation_Run 2 "Poly Plugs"			28	-	-
04-02-19	167	1000	Lost Circulation Situation_Run 2 "Poly Plugs"			28	-	-
04-02-20	167	1000	Lost Circulation Situation_Run 2 "Poly Plugs"			28	-	-
04-02-21	255	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-02-22	332	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-02-23	400	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-02-24	474	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-02-25	530	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-02-26	530	1000	Lost Circulation Situation_Run LCM Pill, Cmt Plugs			28	-	-
04-02-27	562	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-02-28	604	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-02-29	604	1000	-	-	-	28	-	-
04-03-01	604	1000	-	-	-	28	-	-
04-03-02	604	1000	-	-	-	28	-	-
04-03-03	604	1000	-	-	-	28	-	-
04-03-04	615.0	1000	Drilling Ahead Blind in Lost Circulation Situation			28	-	-
04-03-05	789.0	955	Oil Mud	0.5	-	55	-	0 / 0
04-03-06	1091.0	1020	Oil Mud	0.5	-	122	21 / 5.27	2.5 / 4.0
04-03-07	1201.0	1095	Oil Mud	0.5	-	170	14 / 7.66	3.5 / 4.5
04-03-08	1248.0	1140	Oil Mud	0.5	-	210	28 / 7.66	3.5 / 5.0
04-03-09	1272.0	1135	Oil Mud	0.5	-	155	12 / 7.18	3.0 / 4.5

## APACHE PARAMOUNT NOGHA B-23

## DAILY MUD PROPERTIES

DATE	DEPTH (m)	DENSITY Kg/M3	WATER LOSS (cm3/30 min)	FILTER CAKE (mm)	pH	VISCOSITY (s/l)	PV/YP	GELS
04-03-10	1367	1155	Oil Mud	0.5	-	180	28 / 8.14	4.0 / 6.0
04-03-11	1437	1185	Oil Mud	0.5	-	165	32 / 10.53	5.0 / 7.5
04-03-12	1456	1165	Oil Mud	0.5	-	260	-	-
04-03-13	1457	1190	Oil Mud	0.5	-	170	27 / 9.58	4.5 / 7.0
04-03-13	1464	1205	Oil Mud	0.5	-	170	29 / 8.14	4.0 / 6.5
04-03-14	1476	1205	Oil Mud	0.5	-	210	29 / 9.10	5.0 / 7.5
04-03-15	1476	1200	Oil Mud	0.5	-	240	-	-
04-03-16	1476	1200	Oil Mud	0.5	-	210	-	-

APACHE PARAMOUNT NOGHA B-23

<u>SURVEY RECORD</u>			
<u>DEPTH</u> (m)	DEVIATION (degrees)	DEPTH (m)	DEVIATION (degrees)
60	0.00	831	1.00
86	0.20	841	1.00
123	0.30	860	1.10
164	0.50	879	0.70
195	0.75	908	0.60
223	0.50	937	0.90
253	0.50	985	0.70
280	1.00	1033	0.80
310	0.75	1062.00	1.00
339	0.75	1091.00	0.60
371	0.50	1139.00	0.60
398	0.25	1188.00	1.20
426	0.25	1197.00	1.40
455	0.75	1227.00	1.20
485	0.75	1255.00	1.80
507	1.00	1284.00	2.10
530	0.75	1303.00	1.90
593	1.50	1313.00	1.60
619	0.50	1332.00	0.20
673	0.50	1361.00	0.80
715	1.20	1381.00	1.20
745	2.40	1409.00	1.70
764	1.60	1428.00	2.00
783	1.30	1441.00	2.00
802	0.50	1456.00	2.00



## APACHE PARAMOUNT NOGHA B-23

BIT RECORD

BIT	SIZE (mm)	MAKE	TYPE	JETS (mm)	SERIAL #	DEPTH IN (m)	DEPTH OUT (m)	DRILLED	HOURS	CONDITION
1A	445	na	na	na	na	0	60	60	na	n / a
1	311	HUGHES	ATJ-20	OPEN	E86ZF	60	145	85	35.75	4-3-BT-G-E-1-CT-HP
2	311	HUGHES	ATJ-20	OPEN	E86ZF	145	152	7	4.75	4-4-BT-H-E-1-WT-HP
3	311	HUGHES	GT-S1	OPEN	026ZH	152	165	13	3.50	6-4-WT-A-E-1-NR-HP
4	311	HUGHES	ATJ-33C	OPEN	ZK23DM	165	371	206	45.50	5-3-CT-G-E-I-WT-HR
5	311	HUGHES	HRS44	OPEN	6006514	371	530	159	30.50	3-3-WT-A-E-I-WT-TD
6	216	HUGHES	HRS44	3 x 24.5	6006414	530	604	74	16.25	4-4-CT-H-E-I-WT-TD
7	216	HUGHES	HCM404	6 x 16.0	7103394	604	1258	654	57.25	8-8-LT-A-E-1-NR-PR
8	216	HUGHES	HX-S30	3 x 20.0	5040437	1258	1456	198	56.25	3-2-CT-H-E-I-WT-TD

**APACHE PARAMOUNT NOGHA B-23****Detailed Wireline Logging Report**

Logging Company : Schlumberger Base: Norman Wells  
Logging Engineer : Kelly Roncin, Unit # 3052  
Elevations : Ground : 311.27  
Kelly Bushing : 315.75  
Total Depth : Drillers : 1476.00 m Licence # : File: WID # 1995, 1998  
Loggers : 1475.00 m  
Hole Size : 216.00 Casing Depth : 604.00 m  
Hole Orientation : Vertical Casing Size : 244.5 mm  
Maximum Deviation : 2 deg Casing Weight : 59.53 kg/m

---

**Mud Parameters**

Mud Type : Invert  
Density : 1200  
Viscosity : 240  
PH : -  
Fluid Loss : -  
Salinity : - Rmf : -  
BHT : 21 deg C

---

**Operations Summary**

Hole Condition Prior to Logging : Seem to be Good  
Circulation time after Wiper Trip : 1.5 hrs  
Number of Wiper Trips : 2, 1(7 stand) after TD, 1(complete) after cleaning "Bridge" at 911m  
Details of Wiper Trips : 1) 7 Stand Wiper Trip, 2) Complete Cleanout Wiper Trip ( From  
Surface to 1476m to Surface ).  
Number of Runs in the Hole : 4  
Succeeded : 3 Failed : 1 Total : 4

---

**Time Report**

Loggers Called for : 04-03-14-2400 Logging Completed : 04-03-15-1630  
Loggers Arrived : 04-03-13-1200 Loggers Released : 04-03-15-1830  
Loggers Rigged Up : 04-03-14-2400 Total Logging Time : 15.5 hrs.  
Loggers On Bottom : 04-03-15-0100 Total time on site : 42 hrs.

---

**Comments**

Run #1 - Casing Loggers: 604,0m  
Failed WireLine Run hit a bridge at 910 to 911m, RIH / pipe & bit to knock off Bridge-Ledge & Run to bottom to Circulate - Clean out Well again. Basically a very good "WireLine Logging" job.  
Future Casing Size : 177.80 mm, 43.16 kg/m

---

**Log Runs**

<u>Run #</u>	<u>Tools Run</u>	<u>Intervals :</u>	<u>Scales:</u>
1	PEX / AIT / LDT / GR	T.D. to 20.0 m	1:240; 1:600
2	DSI / EMS / GR	T.D. to 20.0 m	1:240; 1:600
3	VSP	T.D. to 20.0 m	1:240; 1:600

# DAILY PROGRESS SUMMARY REPORT

GEOLOGIST: Robert Reid B. Sc.  
WELL NAME: APACHE PARAMOUNT NOGHA B-23  
LOCATION: B-23, 66° 32' 05.292" North, 125° 49' 33.237" West  
OPERATOR: APACHE CANADA LTD.

DATE	DAY F/SPUD	REPORT TIME	FROM	TO	DRILLED	OPERATIONS SUMMARY
04-01-30	NA	24:00				Robert Reid_Geologist_Travel from Calgary to Nabors Rig # 62 Camp Site( Which by Road is Essentially 80 km South of Colville Lake, NWT).
04-01-31	NA	24:00				Go to Colville Airstrip / Wilf Swan, Pick Up Geological Supplies & Gas Detector. Drop Off some Supplies at AKITA Rig # 51, Back to Nabor's Camp with Bob Braithwaite.
04-02-01	NA	24:00	0.0	60.0	60.0	Finished Running "Conductor Barrel" on B-23 site; 339.7mm Conductor set at 60m by "Rat Hole Rig".
04-02-02	NA	24:00				Prepare to Move Nabor's Rig # 62 on Lease_After Cementing Conductor & Blasting Shale Pit.
04-02-03	NA	24:00				Spotted Part of "Rig" Complex ( Tanks, Etc).
04-02-04	NA	24:00				Spotted Part of "Rig" itself on "Drill Site" B-23.
04-02-05	NA	24:00				Moved in Remainder of Rig and Rig Shacks.
04-02-06	NA	24:00				Still Rigging Up, "Stand Up" Derrick at 14:30 hrs. RR take some of Crew to "Colville Air Strip.
04-02-07	NA	24:00				Still Rigging Up, Installing & Checking Stack -Diverter, Rig Up BOP's, General "Rig Up".
04-02-08	NA	24:00				Pick Up Directional Tools at 24:00.
04-02-09	1	24:00	60	66.0	6.0	Drill 311mm Hole to 66m, Clean out Mud tanks.
04-02-10	2	24:00	66.0	111.0	45.0	Drilling Ahead / Mud Motor & 311mm Bit to 111m.
04-02-11	3	24:00	111.0	130.0	19.0	Directional work - Pick Up Mud Motor
04-02-12	4	24:00	130.0	145.5	15.5	After Drilling to 145.5m_Lost circulation so after not getting returns are now Pulling out of hole to lay down mud motor.
04-02-13	5	24:00	145.5	145.5	0.0	RIH / Bit after Pumping last Lcm Pill ( 3rd )open ended for lost circulation.
04-02-14	6	24:00	145.5	145.5	0.0	RIH to Tag Cement after Running a Cement Plug.
04-02-15	7	24:00	145.5	152.0	6.5	Wait On Cementers (Still a Lost Circulation Situation)
04-02-16	8	24:00	152.0	156.0	4.0	Wait on Water_Build Volume, Lost Circulation situation
04-02-17	9	24:00	156.0	165.0	9.0	WOC after Pumping another Cement Plug- lost circulation.
04-02-18	10	24:00	165.0	167.0	2.0	Mixing Arrived Material for "Poly Pill"( Lost Circulation).
04-02-19	11	24:00	167.0	167.0	0.0	RIH to Btm to test "Poly Plugs(Lost Circulation situation)
04-02-20	12	24:00	167.0	167.0	0.0	POOH, Wait on Last Poly Plug, Make Up Kelly Hose & Blow, Prepare to Test this last Poly Plug & Drill ahead "Normal or Blind"
04-02-21	13	24:00	167.0	255.0	88.0	Drill Blind 311mm Hole to 255m, Rig Service
04-02-22	14	24:00	255.0	332.0	77.0	Drill Blind 311mm Hole to 332m and Pump 10m3 LCM Pill
04-02-23	15	24:00	332.0	400.0	68.0	Drill Blind 311mm Hole to 400m and Pump 10m3 LCM Pill
04-02-24	16	24:00	400.0	474.0	74.0	Drill Blind to 475m KB at 22:45 & WOW until 24:00
04-02-25	17	24:00	474.0	530.0	56.0	RIH Open Ended, Prepare LCM pill & Poly Plug. (Drilled Blind to Proposed 244.4mm Csg Depth of 530m?)
04-02-26	18	24:00	530.0	530.0	0.0	RIH to Try to Tag Cement Plug #1, NO Returns.
04-02-27	19	24:00	530.0	562.0	32.0	Drill Blind 311mm hole at 562m(Target=600m=Csg Pt ?)
04-02-28	20	24:00	562.0	604.0	42.0	Wait On Bank for Cement Bulker, Prepare to Run 244.5mm Surface Casing.
04-02-29	21	24:00	604.0	604.0	0.0	Repair Power Tongs & Begin to Run 244.4mm Surface Casing. ( Surface Casing set at 604m KB )



## DAILY PROGRESS SUMMARY REPORT

GEOLOGIST: Robert Reid B. Sc.  
WELL NAME: APACHE PARAMOUNT NOGHA B-23  
LOCATION: B-23, 66° 32' 05.292" North, 125° 49' 33.237" West  
OPERATOR: APACHE CANADA LTD.

[illegible]





# BELLOY PETROLEUM CONSULTING LTD.

Suite 102, 902 - 9th Avenue S.E.  
Calgary, Alberta T2G 0S4  
24 Hrs. Bus: (403) 237 - 8700

Scale 1:240 (5"=100') Metric

Well Name: APACHE PARAMOUNT NOGHA B-23  
Location: 66 deg 32' 05.292" N, 125 deg 49' 33.237" W  
Licence Number: 1998  
Spud Date: 04-02-09-1700  
Surface Coordinates: 66 deg 32' 05.292" N, 125 deg 49' 33.237" W

Region: Undefined

Drilling Completed: 04-03-13-2130

Bottom Hole Same as above.

Coordinates:

Ground Elevation (m): 311.27m

K.B. Elevation (m): 315.75m

Logged Interval (m): TD

To: Surface Total Depth (m): 1476.0m

Formation: Primary: Mount Clark Sandstone's, TD in Proterozoic.

Type of Drilling Fluid: Main Hole: Mineral Based Invert

Printed by WellSight Log Viewer from WellSight Systems 1-800-447-1534 www.WellSight.com

## OPERATOR

Company: APACHE CANADA LTD.  
Address: 1000, 700 - 9th Ave. SW.  
Calgary AB T2P 3V4  
Canada

## GEOLOGIST

Name: Robert Reid B.Sc.  
Company: Belloy Petroleum Consulting Ltd.  
Address: Suite 102, 902 - 9th Avenue S.E.  
Calgary, Alberta T2G 0S4  
403-237-8700 / 403-861-9339

## Wireline Logs

Open Hole Logs: Schlumberger  
Run #1: PEX / AIT / LDT / GR  
Run #3: VSP

Run #2: DSI / EMS / GR

## Comments

APACHE SPUD: 2004-02-09, 17:00  
U.W.I.#: 300B236640125450

AFE# : NT-04-0210

Surv'd Grd: 311.27m, KB to Ground: 4.48m, KB = 315.75m

Gas Logging with "Global Link" Wireless

PGL

Drilling Fluids: 1 ) Water based Mud to 150 & Water to 615m. 2 ) Mineral Based Invert\_615m to TD.

## ROCK TYPES

Gysh  
Redsh  
Dkcht  
Anhy  
Bent

Brec  
Cht  
Clyst  
Coal  
Congl

Dol  
Gyp  
Igne  
Lmst  
Meta

Mrlst  
Salt  
Shale  
Shcol  
Shgy

Siltst  
Ss  
Till

## ACCESSORIES

MINERAL  
Anhy  
Arggrn  
Arg  
Bent  
Bit  
Brecfrag  
Calc  
Carb  
Chtdk  
Chtlt  
Dol  
Feldspar  
Ferrpel  
Ferr  
Glaue

Gyp  
Hvymn  
Kaol  
Marl  
Minxl  
Nodule  
Phos  
Pyr  
Salt  
Sandy  
Silt  
Sil  
Sulphur  
Tuff

FOSSIL  
Algae  
Amph  
Belm  
Bioclst  
Brach  
Bryozoa  
Cephal  
Coral  
Crin  
Echin  
Fish  
Foram  
Fossil  
Gastro  
Oolite

Ostra  
Pelec  
Pellet  
Pisolite  
Plant  
Strom

Mrlst  
Siltstrg  
Ssstrg

TEXTURE  
Boundst  
Chalky  
Cryxln  
Earthy  
Finexln  
Grainst  
Lithogr  
Microxin  
Mudst  
Packst  
Wackest

STRINGER  
Conglstr  
Anhy  
Arg  
Bent  
Coal  
Dol  
Gyp  
Ls

## OTHER SYMBOLS

POROSITY TYPE  
Earthy  
Fenest  
Fracture  
Inter  
Moldic  
Organic  
Pinpoint

Vuggy  
SORTING  
Well  
Moderate  
Poor

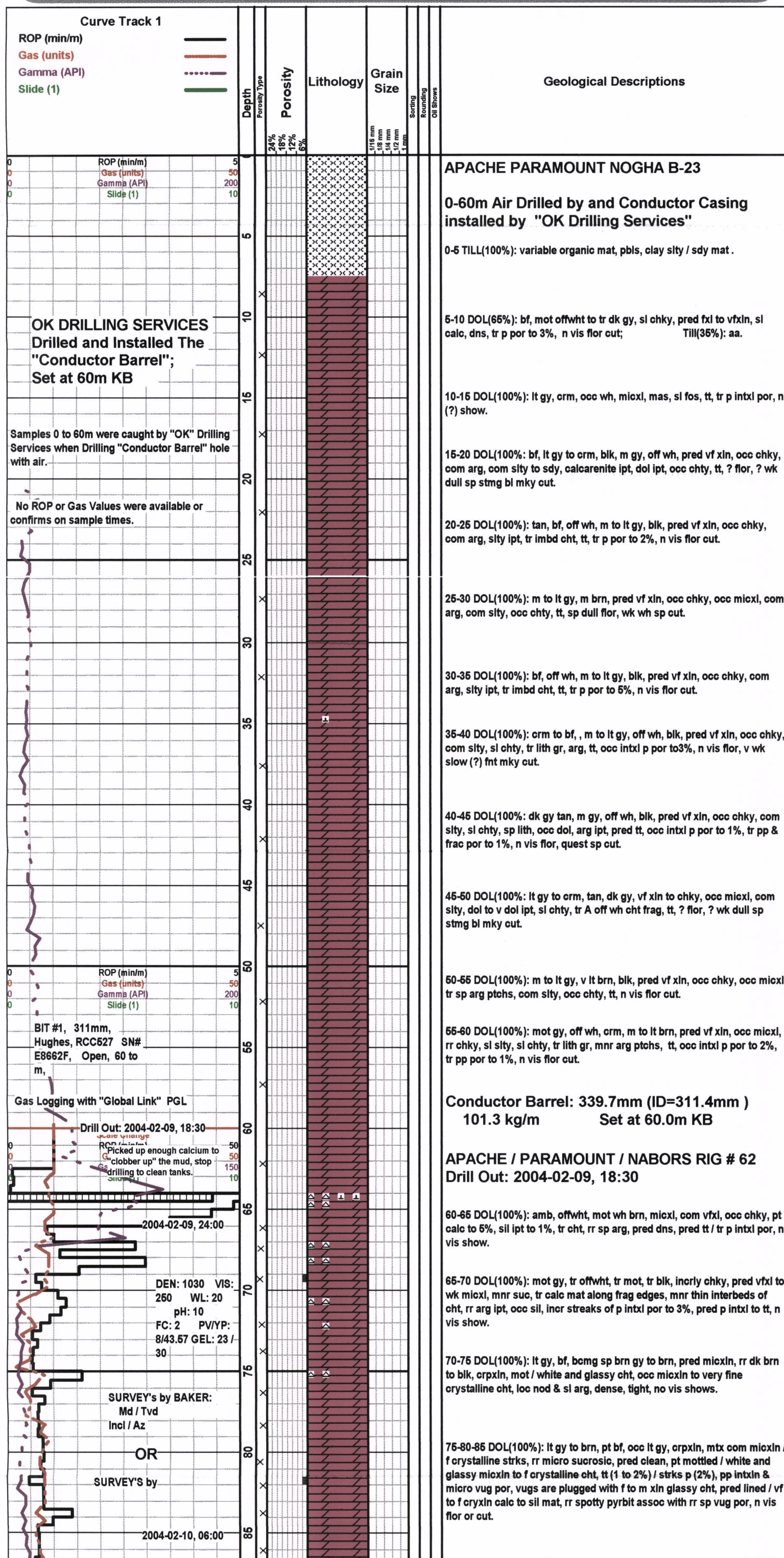
ROUNDING  
Rounded  
Subrnd  
Subang  
Angular

Spotted  
Ques  
Dead

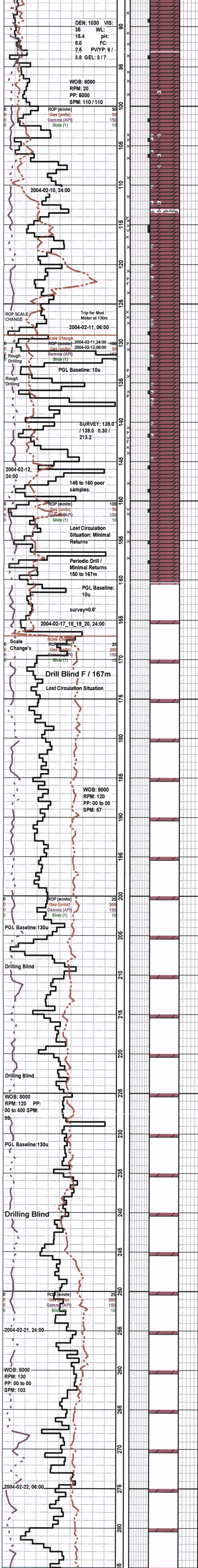
EVENTS  
Photo  
Rft  
Sidewall

INTERVALS  
Core  
Dst

OIL SHOWS  
Even







85-90 DOL(100%): off wh, lt gy wh, tan ipot, pred vf xln, sdy ipt, arg ipt, sp calc, tr scat cht frags, tt / strks p intxl por, ? sp v lt o stn (dd bit flks), n flor, n real vis cut.

90-95 DOL(100%): off wh, bf, m to lt gy, v lt tan, pred vf xln, ooc chky, ooc micxl, com arg, com slty, ooc chty, tt, n vis flor cut.

95-100 DOL(100%): off wh, lt gy to crm, tan, dk gy, vf xln to chky, ooc micxl, com slty, calc to v calc ipt, sl chty, tr A off wh cht frag, tt, ? flor, ? wk dull sp stmg bl mky cut.

100-105 DOL(100%): crm, ooc wh, micxl, pred as strg mat, sl fos, tt, tr p intxl por, n (?) show.

105-110 DOL(100%): 45 to 50% offwht to amb, wh to lt gy wh, tr trnsi to bri wh, pred micxl to ooc crpxl, ooc vf xln, tr clir to trnsi / crpxl sbhedral xls, pred cin, tr cht, rr blk dd bit flk, tt to tr p intxln por to 2%, n vis flor cut.

110-115 DOL(100%): DOL(100%): off wh, bf, m to lt gy, v lt tan, pred vf xln, sdy ipt, arg ipt, sp calc, tt to fr por, mnr sp v lt o stn, imm bri gn mky wh halo cut; CHT(tr): wh, wh, tan, spkl, sl mot, com A crpxl shards, ooc slty, sp calc, tt to p por, rr sp tan pet stn, imm sp bri flor cut.

115-120 DOL(100%): 60% offwht & bri wh, yel amb, tr lt gy wh, vf xln to micxln, mnr suc, tr f xln, tr subhedral calc xln rhombs, cin, v sl sp arg ptchs, chty ipt, tr wh sbhrd calc specs, strks, p intxl por to 2%, tr suc (vug)por to 1%, mnr frac por less than 1%, n vis flor cut.

120-125 DOL(100%): op wh to trnsi & bri wh, vf xln to micxln, tr chky to suc, mot ipt / wh calc & cht frags, pred tt, tr p developed pp por to 1%, tr frac por to less than 2% (?), n vis flor cut.

125-130 DOL(100%): off wh to amber, tr lt gy to crm, rr tan, pred vf xln to micxl, tr calc ptchs, chty ipt, tt, ? flor, n vis cut.

Trip for Plugged Mud Motor at 130m, Clean Up of Complete Mud System, Wait for Baker Parts, RIH different Mud Motor.

130-135 DOL(100%): mot wh to ooc wh gy, tr amber, tr tan, com vfr xln, ooc micxl to crpxl, tr scat chky mat, ooc inbd sd or slt / mnr cht, v p calcarenite ipt, rr arg spots, hd, p intxl por, rr pp por, n vis show.

135-140 DOL(100%): off wh to amb, tr tan to op, tr mot gy, tr crm, pred vf to f xln, ooc micxl, rr suc, rr slty (?), sl scat chty ptches, rr lith gr (?), mnr sp arg, tt, ooc intxl p por to 4%, tr pp por to 1%, tr suc por to 2%, n vis flor cut.

140-145: DOL(100%): off wh to tan, com orange - to limonitic (10 to 15%), opaque, tr lt gy, tr buff, pred vf to U m xln / vf to f xln matrix mat, ooc scat m to c xln, ooc suc frags to 3%, locally sl chty or wk arg, rr carb specks (?), dense, tt (3 to 4%) intxln & pp with a few strks (4 to 6%) of micro vug por, vugs lined / m to f xln dol or plugged / wh and glassy vf to f euhedral dol xtls, tr frac por (1 to 2%), mnr sp calc ptchs & frag edges grdgd to dolo ls (2 to 3%), no vis fluor or cut.

145-150 DOL(100%): off wh, bf, m to lt gy, v lt tan, pred vf xln, ooc chky, ooc micxl, com arg, com slty, ooc chty, tt, tr intxln por in vf xln frags, n vis flor cut.

150-155 DOL(100%): off wh, bf, m to lt gy, v lt tan, amb, tr dk gy pred vf xln to micxl, tr calc ptchs, mnr chty to sl slty ipt, tt, ? flor, n vis cut.

155-160 DOL(100%): off wh, lt gy, bf, lt brn gy to v lt brn, pred vf to f xln, , rr mot / white and glassy cht, ooc micxln, loc nod & sl arg, dns, pred tt, tr poor intxln por to 5%, no vis shows.

160-167 No Sample, No Returns, Lost Circulation.

167-170 No Sample in a Lost Circulation Situation, NO RETURNS

Drill Ahead Blind; START:2004-02-21, 01:00

170-175 No Sample; Lost Circulation, No Returns.

175-180 No Sample; Lost Circulation, No Returns.

180-185 No Sample; Lost Circulation, No Returns.

185-190 No Sample; Lost Circulation, No Returns.

190-195 No Sample; Lost Circulation, No Returns.

195-200 No Sample; Lost Circulation, No Returns.

200-205 No Sample; Lost Circulation, No Returns.

205-210 No Sample; Lost Circulation, No Returns.

210-215 No Sample; Lost Circulation, No Returns.

215-220 No Sample; Lost Circulation, No Returns.

220-225 No Sample; Lost Circulation, No Returns.

225-230 No Sample; Lost Circulation, No Returns.

230-235 No Sample; Lost Circulation, No Returns.

235-240 No Sample; Lost Circulation, No Returns.

240-245 No Sample; Lost Circulation, No Returns.

245-250 No Sample; Lost Circulation, No Returns.

250-255 No Sample; Lost Circulation, No Returns.

255-260 No Sample; Lost Circulation, No Returns.

260-265 No Sample; Lost Circulation, No Returns.

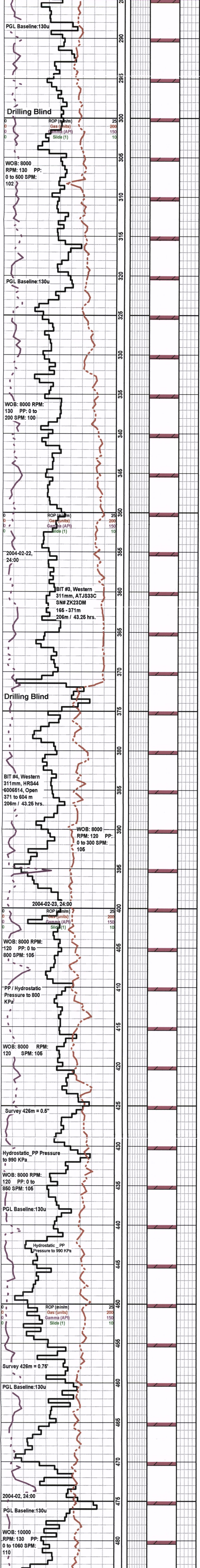
265-270 No Sample; Lost Circulation, No Returns.

270-275 No Sample; Lost Circulation, No Returns.

275-280 No Sample; Lost Circulation, No Returns.

280-285 No Sample; Lost Circulation, No Returns.





285-290 No Sample; Lost Circulation, No Returns.

290-295 No Sample; Lost Circulation, No Returns.

295-300 No Sample; Lost Circulation, No Returns.

300-305 No Sample; Lost Circulation, No Returns.

305-310 No Sample; Lost Circulation, No Returns.

310-315 No Sample; Lost Circulation, No Returns.

315-320 No Sample; Lost Circulation, No Returns.

320-325 No Sample; Lost Circulation, No Returns.

325-330 No Sample; Lost Circulation, No Returns.

330-335 No Sample; Lost Circulation, No Returns.

335-340 No Sample; Lost Circulation, No Returns.

340-345 No Sample; Lost Circulation, No Returns.

345-350 No Sample; Lost Circulation, No Returns.

350-355 No Sample; Lost Circulation, No Returns.

355-360 No Sample; Lost Circulation, No Returns.

360-365 No Sample; Lost Circulation, No Returns.

365-370 No Sample; Lost Circulation, No Returns.

370-375 No Sample; Lost Circulation, No Returns.

375-380 No Sample; Lost Circulation, No Returns.

380-385 No Sample; Lost Circulation, No Returns.

385-390 No Sample; Lost Circulation, No Returns.

390-395 No Sample; Lost Circulation, No Returns.

395-400 No Sample; Lost Circulation, No Returns.

Pump 10m3 LCM Pill, Wiper Trip to 160m.

400-405 No Sample; Lost Circulation, No Returns.

405-410 No Sample; Lost Circulation, No Returns.

410-415 No Sample; Lost Circulation, No Returns.

415-420 No Sample; Lost Circulation, No Returns.

420-425 No Sample; Lost Circulation, No Returns.

Pump Heavy Sweep ( VIS: 220 ) & Wiper Trip to 160m.

425-430 No Sample; Lost Circulation, No Returns.

430-435 No Sample; Lost Circulation, No Returns.

435-440 No Sample; Lost Circulation, No Returns.

440-445 No Sample; Lost Circulation, No Returns.

445-450 No Sample; Lost Circulation, No Returns.

450-455 No Sample; Lost Circulation, No Returns.

455-460 No Sample; Lost Circulation, No Returns.

460-465 No Sample; Lost Circulation, No Returns.

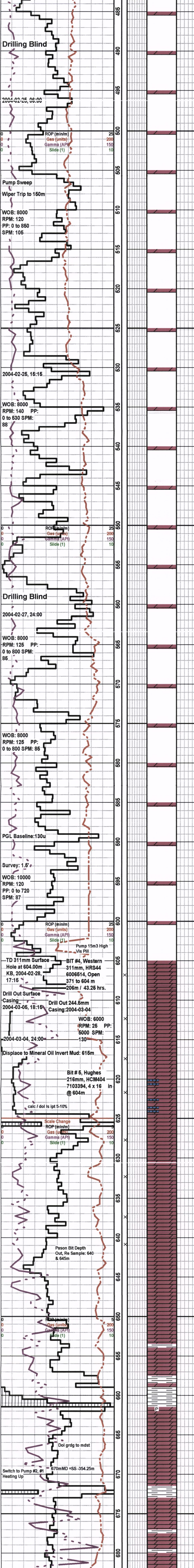
465-470 No Sample; Lost Circulation, No Returns.

470-475 No Sample; Lost Circulation, No Returns.

475-480 No Sample; Lost Circulation, No Returns.

480-490 No Sample; Lost Circulation, No Returns.





490-495 No Sample; Lost Circulation, No Returns.

495-500 No Sample; Lost Circulation, No Returns.

500-505 No Sample; Lost Circulation, No Returns.

505-510 No Sample; Lost Circulation, No Returns.

510-515 No Sample; Lost Circulation, No Returns.

515-520 No Sample; Lost Circulation, No Returns.

520-525 No Sample; Lost Circulation, No Returns.

525-530 No Sample; Lost Circulation, No Returns.

530-535 No Sample; Lost Circulation, No Returns.

535-540 No Sample; Lost Circulation, No Returns.

PROG TOP\_Franklin Mtn - Cyclic: 538

540-545 No Sample; Lost Circulation, No Returns.

545-550 No Sample; Lost Circulation, No Returns.

550-555 No Sample; Lost Circulation, No Returns.

555-560 No Sample; Lost Circulation, No Returns.

560-565 No Sample; Lost Circulation, No Returns.

565-570 No Sample; Lost Circulation, No Returns.

570-575 No Sample; Lost Circulation, No Returns.

575-580 No Sample; Lost Circulation, No Returns.

580-585 No Sample; Lost Circulation, No Returns.

585-590 No Sample; Lost Circulation, No Returns.

590-595 No Sample; Lost Circulation, No Returns.

595-600 No Sample; Lost Circulation, No Returns.

600-604 No Sample; Lost Circulation, No Returns, Drill Blind to Surface Casing Point of 604.0m KB.

2004-03-01; CASING: Ran 43 JTS of 244.5mm, 59.53 kg/m, L80, RNG 3, LT&C, BRD, IPSCO CASING. Equipped with WEATHERFORD Float Guide and Float Collar T / A TD of 604.0m KB. RAN 1, 2 CENT in middle of 1st Joint, 2 - 9 F / 600 to 300m. RAN 6 Cement Baskets, F / 279 to 110m

604-605 CMT (65%): lt gy, spkl; DOL(35%): off wh crm, chky ipt, pred vf xln, p intxl por, n vis show.

605-615 DOL(95%): crm wh to wh bf, ooc lt tan, vf xln, tr xln chky, tr micxl, wkst ipt, p intxl por, n vis show; MDST(5%): blk, dns, com sft, calc ipt, blkly.

615-620 DOL(100%): bf, off wh, dull, tr wh micxl tt ls, arg ipt, rr slty strg, p intxl por to 5%, n vis show.

620-625 DOL(100%): tan wh, lt gy, vf xln, calc ipt, 5-10% grdg to dolc ls, ptchy arg strks, dns / tr p intxl por, n show;

625-630 DOL(100%): bf, off wh, dull to rthy, pred vf to f xln, p por, n show.

630-635 DOL(100%): bf, off wh, dull amber, aa, n vis flr cut.

635-640 DOL(100%): off wh, tan, tr lt yel, vf xln, com mdst frags & strks, sil ipt, mnr drsy qtz, ooc c euhed calc xls, tr p intxl por, tr frac por, rr pp por to 1%, n vis flr, ? sp blmg wh cut.

640-645 DOL(100%): bf, off wh, dull amber, vf to f xln, mnr micxl, mnr scat nodr cht, n vis stn, p intxl por, n vis pp or vug por, n vis flr, n show.

645-650 DOL(100%): bf, off wh, dull amber, similar to above.

650-655 DOL(100%): bf, off wh, dull amber, pred vf xln, ooc chky, rr slty, rr chty, tr lith gr (?), tr arg ptchs, p intxl p por to 4%, n vis flr, quest v wk slow frnt mky cut.

655-660 DOL(100%): bf, off wh, dull amber, vf to f xln, p intxl por, tr shy mdst lams, n vis flr cut.

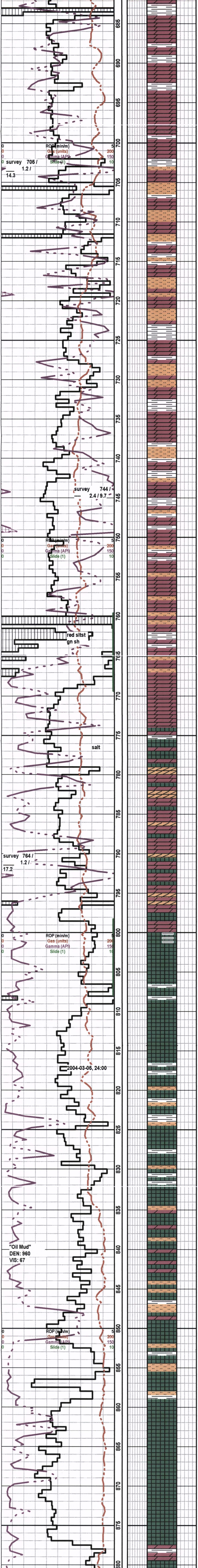
660-665 DOL(100%): tr pyr, ooc calc lams, pred vf xln, ooc chky, ooc calc rims on dol frags, pt grdg to dolc mdst, pred tt, ooc intxl p por to 3%, n vis flr, quest even cut.

665-675 DOL(95%): bf, lt gy, crpxl to micxl, mottled / ooc bf wh & glassy mtx & ooc vf crystalline anhy, loc lam argillaceous ptchs, tight / tr scat intxl por to 5%, n vis shows, pt grdg to SHALE(5%): lt gray, part gray to green, pt blk, sbfis, dolc, rr scat mx pyrite, mnr slty strks, rr glauc.

675-680 DOL(90%): bf, lt gy, off wh, vf xln to micxl, mottled ipt, sl arg, sl anhy, ooc shy to mdst strks & ptchs, p intxl poor, rr sp pp por less than 1%, n vis show; MDST / SH(10%): lt gy, blk, red, dk gy, dns, mas, grdg from dol.

680-685 DOL(95%): bf, lt gy, crpxl to micxl, mottled / ooc bf wh & glassy mtx & ooc vf crystalline anhy, loc laminated arg ptchs, pred tt, tr scat intxl por to 3%, n vis shows; MDST and SHALE(5%): lt gy, pt gn gy intxl por to vcol(reddish), blk, sbfis, dolc, slty ipt, mnr calc rims on frags.





685-690 DOL(90%): off wh, bf, lt gy, vf to f xln, tr micxl, mottled ipt, occ arg, p intxl por, n vis show; MDST / SH(10%): lt gn, blk, red, dk gy, dns, mas.

690-695 DOL(90%): 50% offwht, 50% mot tan & wh, vf to fnymicxln, tr chky to mnr suc, arg ipt, mnr lse pyr, tt, n vis effective por, quest flor, n vis cut; SH(10%): vcol, pt micmica, sbfis to fis.

695-700 DOL(90%): aa, n vis show; SH(10%): dk gy, occ vcol, arg, dolc, mnr calc, pred plty.

700-705 DOL(95%): bf, lt brn, lt gy, vf to f xln, wackest ipt, tr slty, n vis strn, pred tt intxl por, tr sp pp por, n vis flor cut; SH(5%): red, dk gy, fis ipt, pt micmica, com intbd ls, slty ipt, arg ipt, com pyr, mod hard.

Saline River - Upper Clastics: 698 m KB

705-710 DOL(50%): off wh, lt gy, v lt tan, pred vf xln, occ chky, occ micxl, tr anhy, sl arg, tt, n vis flor cut; SH(25%): red, dk gy, dolc ipt, slty ipt, w ind, plty ipt; SLTST(45%): red, lt gy brn, lt greenish gy, rthy, pt fri, sdv ipt, calc, dolc, pyr, grdg to vf ss, tt, n show.

710-715 SH(50%): red, dk gy, fis ipt, pt micmica, com intbd ls, slty ipt, arg ipt, com pyr, mod hard; DOL(50%): off wh, amber, lt gy wh, sl arg, sl anhy, p por; SH(tr): vcol, red, lt to m greenish gn, sl arg, dolc, calc ipt, pt micmica, sbfis to fis.

715-720 SH(50%): red, dk gy, fis ipt, pt micmica, com intbd ls, slty ipt, arg ipt, com pyr, mod hard; DOL(50%): off wh, amber, lt gy wh, sl arg, sl anhy, p por; SH(tr): vcol, red, lt to m greenish gn, sl arg, dolc, calc ipt, pt micmica, sbfis to fis.

720-725 SH(35%): vcol, red, lt to m greenish gn, sl arg, dolc, calc ipt, pt micmica, sbfis to fis; SLTST(35%): gy, vcol, anhy to dol, qtzs ipt, tt; DOL(25%): off wh, amber, lt gy wh, sl arg, sl anhy, p por; SS(5%): lt gy, rr vcol, slty to L f gr, pt qtzs, sl chty, tt to tr p por, n vis flor cut.

725-735 DOL(75%): bf, lt brn, vf xln, wackest ipt, pckst ipt, occ slty, occ calc, pred dns and tt, tr p intxl / tr vug por, n show; SH(20%): red, vcol, arg to clayey ipt, micmica, plty; SLTST(5%): red, lt gy, vcol, slty to Lv f gr, pt qtzs, sl anhy, sl chty, dol & calc omt, tt / tr p por, n vis flor cut.

735-740 SLTST(60%): vcol, red, anhy to dol, qtzs ipt, tt; SH(30%): dk gy, blk, com slty, tr blk A cht, blkly; DOL(10%): bf, lt brn, vf xln, wackest ipt, pckst ipt, occ slty, occ calc, pred dns and tt, tr p intxl / tr vug por, n vis show.

740-750 DOL(50%): mot gy, crm, m to lt brn, pred vf xln, occ micxl, occ chky, com slty, sl chty, tr lith gr, arg, tt, occ intxl p por to 4%, tr pp por to 1%, n vis flor cut; SH(25%): red, lt gn, dk gy, dllo to sl calc ipt, rr pyr, hd, blkly; SLTST(25%): red, gy, vcol, anhy to dol, qtzs ipt, tt.

750-755 SH(50%): blk, pt slty, sl carb, blkly to sbfis, occ plty; SLTST(30%): red, gy, vcol, anhy to dol, qtzs ipt, tt; DOL(20%): bf, lt brn, vf xln, wackest ipt, pckst ipt, occ slty, occ calc, pred dns and tt, tr p intxl / tr vug por, n vis show.

755-765 DOL(75%): mot gy, crm, m to lt brn, pred vf xln, occ micxl, occ chky, com slty, sl chty, tr lith gr, arg, tt, occ intxl p por to 4%, tr pp por to 1%, n vis flor cut; SH(20%): red, calc ipt, tr pyr, hd, cvg ipt, blkly; SLTST(5%): red, gy, vcol, anhy to dol, arg ipt, tt.

765-775 DOL(85%): bf, lt brn, vf to f xln, occ micxl, wackest ipt, pckst ipt, occ slty, occ calc, dns tr p intxl por, n vis show; SH(10%): red, calc ipt, tr pyr, hd, cvg ipt, blkly; SLTST(5%): red, gy, vcol, anhy to dol, arg ipt, tt.

Saline River - Upper Salt: 774.0 m KB

775-785 DOL(40%): mot wh, offwht, com tan, vfxl, pt calc to 6% calc frags, rr sil gr, arg to v arg, pred dns, p por, n vis show; SH(40%): vcol (red), dk gy, fis ipt, pt micmica, dolc to sl calc, arg ipt, mod hard; SA(20%): clr, red to wh, occ lt amber, pred mas.

785-795 DOL(40%): mot wh, offwht, com tan, vfxl, pt calc to 6% calc frags, rr sil gr, arg to v arg, pred dns, p por, n vis show; SH(40%): vcol (red), dk gy, fis ipt, pt micmica, dolc to sl calc, arg ipt, mod hard; SA(20%): clr, red to wh, occ lt amber, pred mas.

795-800 SALT(90%): wh, trnsi, op, vcol (yel) mas, dns; ANHY(5%): wh, off wh, sl suc, com dolc, mas, tr anhy eyes imbd in salt frags; DOL(5%): off wh, amber, lt gy wh, sl arg, sl anhy, p por.

800-810 SALT(95%): tan to off wh, mas, com intbd sh; SH(5%): blk, vcol, plty.

810-815 SALT(90%): wh, red pink, tr trnsi, vcol (yel) mas, dns; SH(5%): blk, vcol, plty.

815-820 SA(100%): wh, trnsi, op, vcol (yel) mas, dns.

820-825 SALT(60%): wh, red pink, vcol (yel) mas, dns; SLTST(20%): red to pink, granular to gritty, p ind, p por, com dolc, occ wk calc, sl anhy, anhy filling pore throats, n vis effective por, n show; SH(20%): blk, vcol, plty.

825-830 SA(100%): clr, trnsi / sitst, tr calc pths, tr tan ls strgs; SLTST(tr): lt gy, dk gy, dolc ipt, tt; SH(tr): m gy, occ lt gn gy, rr red, pres plty.

830-835 SA(100%): clr, trnsi / sitst, tr calc pths, tr tan ls strgs; SLTST(tr): lt gy, dk gy, dolc ipt, tt; SH: red, vcol, plty.

835-845 DOL(40%): offwht, 50% mot tan & wh, vf xln, to micxln, tr chky to mnr suc, arg ipt, n vis effective por, ? flor, n cut; SA(40%): clr, trnsi / sitst, tr calc pths, tr tan ls strgs; SLTST(10%): lt gy, dk gy, dolc ipt, tt; SH(10%): red, vcol, plty.

845-855 SA(100%): clr, trnsi, red; SLTST(tr): lt gy, dk gy, dolc ipt, tt; SH(tr): m gy, occ lt gn gy, rr red, pres plty.

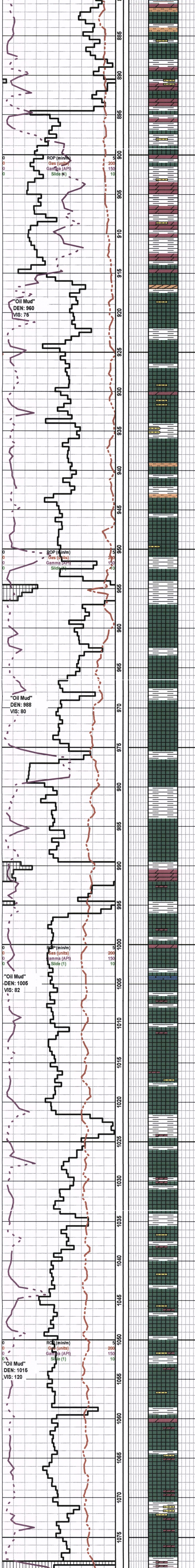
855-860 SA(100%): clr, trnsi, red, massive, splintery; SLTST(tr): lt gy, dk gy, dolc ipt, tt; SH(tr): red, vcol, plty.

860-865: SALT(100%): tan, granular, abnt sh ptgs, granular.

870-875 SH(55%): m to dk gy, aa; SALT(45%): orng, wh, mot red, anhy ipt,

875-880 SH(55%): m to dk gy, blk ipt, occ gritty, plty to blkly; SALT(45%): orng, wh, mot red, anhy ipt,





880-885 SH(56%): m to dk gy, aa; SALT(46%): orng, wh, mot red, anhy ipt, SLTST(tr): red, lt to m gy, dolc, sdy ipt, sl anhy, tt.

885-890 SALT(80%): aa SH(20%): aa.

890-895 SH(55%): m to dk gy, aa; SALT(45%): orng, wh, mot red, anhy ipt, SLTST(tr): red, lt to m gy, dolc, sdy ipt, sl anhy, tt.

Saline River - Shale: 894.5 mKB

895-905 SH(65%): m to dk gy, p ind, sl arg, pred blkly; SALT(35%): vool, lt gy, off wh, mas, occ intbd sh lams.

905-910 SH(65%): m to dk gy, p ind, sl arg, pred blkly; SALT(35%): vool, lt gy, off wh, mas, occ intbd sh lams.

910-915 SALT(70%): aa; SH(20%): aa; SLTST(5%): aa.

Saline River - Lower Salt: 915m KB

915-920 SH(65%): m to dk gy, p ind, sl arg, pred blkly; SALT(35%): vool, lt gy, off wh, massive to splintery / intbd sh; ANHY(tr): wh, vool, sl calc, tt.

920-925 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; ANHY(tr): wh, vool, sl calc, tt.

925-930 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; ANHY(tr): wh, vool, sl calc, tt.

930-935 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; ANHY(tr): wh, vool, sl calc, tt.

935-940 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; occ sltst strg mat; ANHY(tr): wh, vool, sl calc, tt.

940-950 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; occ sltst strg mat; ANHY(tr): wh, vool, sl calc, tt.

950-960 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; occ sltst strg mat; ANHY(tr): wh, vool, sl calc, tt.

960-965 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; occ sltst strg mat; ANHY(tr): wh, vool, sl calc, tt.

965-975 SH(65%): m to dk gy, blkly, p ind, mdst ipt; SALT(35%): vool, lt gy, off wh, pred massive, intbd / sh; occ sltst strg mat; ANHY(tr): wh, vool, sl calc, tt.

975-980: SALT(60%): wh, vool, massive, com intbd / sh; SH(30%): blk, vool ( m red to lt gn), plyt ipt, occ blkly; SLTST(10%): vool, dolc ipt, occ calc specks, occ arg, tt.

980-985: SALT(60%): wh, vool, mas, com intbd / sh; SH(30%): blk, vool ( m red to lt gn), plyt ipt, occ blkly; SLTST(10%): vool, dolc ipt, occ calc specks, occ arg, tt.

985-990: SALT(60%): wh, vool, massive, com intbd / sh; SH(30%): blk, vool ( m red to lt gn), plyt ipt, occ blkly; SLTST(10%): vool, dolc ipt, occ calc specks, occ arg, tt.

990-995 SALT(60%): wh, vool, mas, com intbd / sh; SH(30%): blk, vool ( m red to lt gn), plyt ipt, occ blkly; SLTST(10%): vool, dolc ipt, occ calc specks, occ arg, tt.

995-1000 SALT(60%): wh, vool, mas, com intbd / sh; SH(30%): blk, vool ( m red to lt gn), plyt ipt, occ blkly; SLTST(10%): vool, dolc ipt, occ calc specks, occ arg, tt.

1000-1005 SALT(60%): wh, vool, mas, com intbd / sh; SH(30%): blk, vool ( m red to lt gn), plyt ipt, occ blkly; SLTST(10%): vool, dolc ipt, occ calc specks, occ arg, tt.

1005-1010 SALT(100%): wh, tan, intbd / sh, tr anhy mnut lens.

1010-1020 SALT(70%): wh, tan, intbd / sh, chty ipt, tr anhy mnut lens; SH(25%): dk gy, blk, m to lt gy, tr vool, com intbd salt & dol, slty ipt, arg ipt, mod hard to p ind, mdst ipt; DOL(5%): bf, off wh, amber, lt gy wh, sl arg, sl anhy, p por.

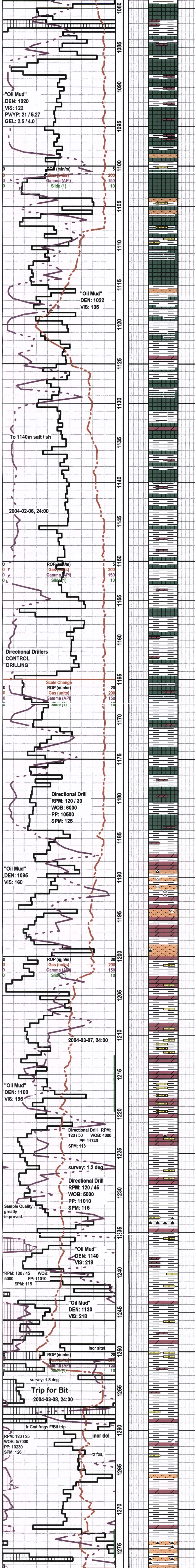
1020-1030 SALT(70%): wh, tan, intbd / sh, chty ipt, tr anhy mnut lens; SH(25%): dk gy, blk, m to lt gy, tr vool, com intbd salt & dol, slty ipt, arg ipt, mod hard to p ind, mdst ipt; DOL(5%): bf, off wh, amber, lt gy wh, sl arg, sl anhy, p por.

1030-1040 SALT(70%): wh, tan, intbd / sh, chty ipt, tr anhy mnut lens; SH(25%): dk gy, blk, m to lt gy, tr vool, com intbd salt & dol, slty ipt, arg ipt, mod hard to p ind, mdst ipt; DOL(5%): bf, off wh, amber, lt gy wh, sl arg, sl anhy, p por.

1040-1060 SALT(75%): clr, trnsi, tr scat iron stain, massive; MDST(25%): lt gy, gritty, shy ipt, slty ipt, p ind, dolc, blkly.

1060-1080 SALT(70%): wh, tan, intbd / sh, chty ipt, tr anhy mnut lens; SH(25%): dk gy, blk, m to lt gy, tr vool, com intbd salt & dol, slty ipt, arg ipt, mod hard to p ind, mdst ipt; DOL(5%): bf, off wh, amber, lt gy wh, sl arg, sl anhy, p por.





1080-1100 SALT(70%): wh, tan, intbd / sh, chty ipt, tr anhy mnut lens;  
SH(25%): dk gy, blk, m to  
lt gy, tr vool, com intbd salt & dol, slty ipt, arg ipt, mod hard to p ind, mdst  
ipt;  
DOL(5%): bf, off wh, amber, lt gy wh, sl arg, sl anhy, p  
por.

1100-1110 SALT(60%): bf, wh, tr yel to orng, mas, dns, sft;  
SLTST(20%): blk to dk gy, granular to gritty, p ind, p por, com dolc, ooc  
wk calc, sl anhy, anhy filling pore throats, n vis effective por, n show;  
SH(20%): blk, vool, com intbd salt & dol,  
chty ipy, plty.

1110-1125 SALT(60%): bf, wh, tr yel to orng, mas, dns, sft;  
SLTST(20%): blk to dk gy, granular to gritty, p ind, p por, com dolc, ooc  
wk calc, sl anhy, anhy filling pore throats, n vis effective por, n show;  
SH(20%): blk, vool, com intbd salt & dol,  
chty ipy, plty.

1125-1130 SALT(76%): clr, trnsI, tr scat iron stain, massive;  
MDST(25%): lt gy, gritty, shy ipt, slty ipt, p ind, dolc, blkly.

1130-1135 SALT(96%): dull wh, red stn wh, massive, suc ipt; SH(5%):  
aa, blkly.

1135-1140 SALT(96%): tan to wh, tr vool, massive; SH(5%): lt  
to m gy, ooc blk, p ind, as mdst ipt, plty to blkly.

1140-1145 SH(96%): m gy, blk, dolc ipt, tr intbd sh, pred plty;  
SALT(5%): wh, tan, sl shy, massive.

1145-1150 SALT(96%): tan, off wh, massive; SH(5%): m  
gy gn to blk when wet / intbd salt, m gy when dry, pt slty & gritty, p ind, pt  
as shy dol.

1150-1165 SALT(60%): bf, wh, tr yel to orng, mas, dns, sft;  
SLTST(20%): blk to dk gy, granular to gritty, p ind, p por, com dolc, ooc  
wk calc, sl anhy, anhy filling pore throats, n vis effective por, n show;  
SH(20%): blk, vool, com intbd salt & dol,  
chty ipt, plty.

1165-1180 SALT(60%): bf, wh, tr yel to orng, mas, dns, sft;  
SLTST(20%): blk to dk gy, granular to gritty, p ind, p por, com dolc, ooc  
wk calc, sl anhy, anhy filling pore throats, n vis effective por, n show;  
SH(20%): blk, vool, com intbd salt & dol,  
, plty.

1180-1185 SALT(50%): tan, off wh, massive; SH(50%): m  
gy gn to blk when wet / intbd salt, m gy when dry, pt slty & gritty, p ind, pt  
as shy dol.

## Mount Cap-Upper Shale 1184 m KB

1185-1200 SALT(60%): bf, wh, tr yel to orng, mas, dns, sft;  
SLTST(20%): dk gy, vool ipt, red to pinkish, granular to gritty, p ind, p  
por, com dolc, ooc wk calc, sl anhy, anhy filling pore throats, n vis  
effective por, n show;  
SH(20%): blk, vool, com  
intbd salt & dol, chty ipy, plty.

1200-1210 SH(66%): m to dk gy, com micmica, mnr ? fos, com grgd to  
muddy dol, slty / rr slt strks, sbfis (?) to pred blkly; DOL(25%): lt gy, tan,  
dk gy, vf xln to chky, ooc micxl, com slty, dol calc to v dol calc ipt, sl  
chty, tr A off wh cht frag, tt, n flor cut; SLTST(10%): lt gy, spkl, lt gn, calc  
ipt, tt, n show.

1210-1220 SH(70%): m to dk gy, blk, dol ipt, sl calc, w ind, blkly;  
DOL(25%): lt gy, tan, dk gy, vf xln to chky, ooc micxl, com slty, dol calc to  
v dol calc ipt, sl chty, tr A off wh cht frag, tt, n flor cut; SLTST(5%): lt  
gy, spkl, rr vool, dolc, wk calc ipt, tt, n show.

## Mt. Cap-Chert: 1223.0 m KB

1220-1230 SH(70%): m to dk gy, blk, dol ipt, sl calc, w ind, blkly;  
DOL(25%): lt gy, tan, dk gy, vf xln to chky, ooc micxl, com slty, sl chty, tr  
A off wh cht frag, tt, n flor cut; SLTST(5%): lt gy, spkl, rr  
vool, dolc, wk calc ipt, tt, n show.

1230-1235 SH(70%): m to dk gy, blk, dol ipt, sl calc, w ind, blkly;  
DOL(25%): lt gy, tan, dk gy, vf xln to chky, ooc micxl, com slty, dol calc to  
v dol calc ipt, sl chty, tr A dk blk brn, & rr off wh cht frag, tt, n flor cut;  
SLTST(5%): lt gy, spkl, rr vool,  
dolc, wk calc ipt, rr sand grains, tt, n vis show.

1235-1245 SH(90%): m to dk gy, blk, dk blk gn, com silky luster, dol ipt, sl  
calc, w ind, com plty to ooc blkly; DOL(10%): lt gy, brn to  
tan, chky wh & dull, dk gy, vf xln to chky, ooc micxl, com slty, sl chty,  
only a tr to mnr A brn cht frag, tr p intxl por in xln frags to 3#, n flor cut;  
SLTST(tr): lt gy, spkl wh reddish, dolc, wk calc on fragment  
edges, n vis por, n vis show.

1245-1250 SH(60%): m to dk gy, blk, ooc dk to m blk gn, v dol ipt, rr calc,  
pred w ind, com plty; DOL(10%): pred dk brn, dk  
gy, vf xln to chky, ooc micxl, com sbhed dol xtis, mnr r wh mnut cht  
frags, mnr slty, pred p intxl por, n flor cut;  
SLTST(10%): lt gy, spkl, rr vool, dolc, wk calc ipt, n vis sand  
grains, as a sdy dolc ls ipt, pred tt, n vis show.

1250-1255 SH(90%): aa;  
DOL(5%): dk brn, brownish gy, pred micxl, com f xln, rthy and vf grnd xln,  
sl arg, dolc and tr calc mtX, ? r anhy, tt / tr p por <5%, no show;  
SLTST(5%): aa, tt.

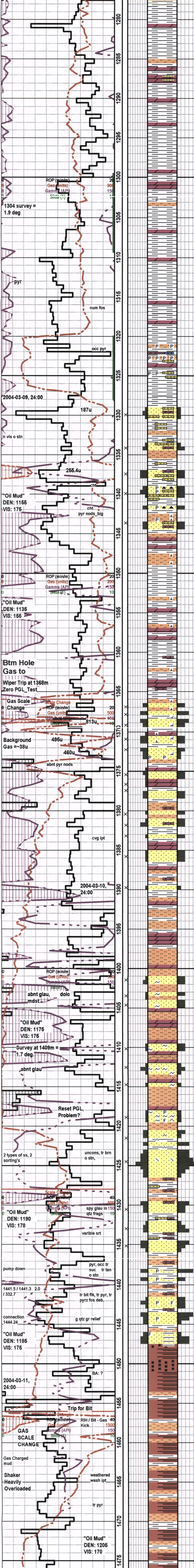
1255-1260 SH(45%): gy brn, greenish gy, 60% vit lstr, com rthy;  
DOL(45%): brn to tan, brownish gy, vf to f xln, moclxl, sl slty, mnr calc, tr  
arg, tt / tr p vug & intxl por, no show; SLTST(10%): lt gy, rr lt brn,  
tr grading to vf dol ss, tr arg, ? bitns, rr calc, pred blkly, tt, n show.

1260-1265 SH(75%): aa; DOL(15%): lt wh gy, ooc tan brn, vf to xln, tr  
chky to grainy, ooc rthy, ooc v wk calc, p por, n cut; SLTST(10%): lt gy,  
tr gy brn, mnr greenish gy, rthy, pt frt, sdy ipt, calc to dolc, tt, n show.

1265-1270 SH(45%): gy brn, greenish gy, 50% vit lstr, com rthy;  
DOL(45%): brn to tan, brownish gy, vf to f xln, moclxl, sl slty, mnr calc, tr  
arg, tt / tr p vug & intxl por, no show; SLTST(10%): lt gy, rr lt brn,  
tr grading to vf dol ss, tr arg, ? bitns, rr calc, pred blkly, tt, n show.

1270-1280 SH(70%): blk, carb, pt micmica, fis to blkly, cvg ipt(?);  
SLTST(25%): lt gy, spkl, rr vool, dolc, wk calc ipt, rr sand grains, tt, n vis





show; DOL(6%): m to lt gy, v it  
brn, blk, pred vf xln, occ chky, occ micxl, com arg, com slty, occ chty, tt,  
n vis flor cut.

1280-1290 SH(80%): blk, carb, pt micmica, sbfss to fis;  
DOL(10%): lt gy to crm, m gy, pred vf xln, com chky, calc ipt, pt grdg to  
dolo ls, mnr cht, tt, ? flor, n vis cut; SLTST(10%): lt gy,  
spkl, rr vool, dolo, wk calc ipt, rr sand grains, tt, n vis show.

1290-1300 SH(75%): dk to m gy, com gy blk, tr m blk gn, com sbvit lstr,  
occ micmica; DOL(15%): aa, tt, n show; SLTST(10%): lt gy,  
spkl, rr vool, dolo, wk calc ipt, rr sand grains, tt, n vis show.

**Mt. Cap - Lower: 1300m KB**

1300-1305 SH(100%): dk to m gy, com gy blk, tr m blk gn, com sbvit lstr,  
occ micmica, com plty, ooc sbfss; SLTST(tr): lt gy, blkly,  
tr sdy, tr imbd sd gr, dolo, tt; DOL(tr): off wh, op, pred as strg  
mat, com as dolo mdst, sl calc, n vis por, n show.

1305-1310 SH(100%): aa DOL(tr): off wh, op, pred as strg mat,  
com as dolo mdst, sl calc, n vis por, n show; SLTST(tr): lt gy, fri,  
spkl wk cons, dolo, wk calc ipt, tt, n show.

1310-1315 SH(100%): blk, dk gy, aa.

1315-1320 SH(70%): aa; DOL(20%): lt wh gy, ooc tan brn, vf to xln, tr  
chky to grainy, ooc rthy, ooc v wk calc, p por, n out; SLTST(10%): lt gy,  
tr gy brn, mnr greenish gy, rthy, pt fri, sdy ipt, calc to dolo, tt, n show.

1320-1330 SH(80%): gy brn, greenish gy, 50% vit lstr, com rthy;  
DOL(10%): brn to tan, brownish gy, vf to f xln, mxln, sl sity, mnr calc, tt /  
tr p intxl por, no show; SLTST(10%): lt gy, rr lt brn, tr  
grading to vf dol ss, tr arg, ? bitns, rr calc, pred blkly, tt, n show.

1330-1335 SH(75%): dk gy to brn, blkly, v calc, bitns, tr pyr; SS(15%):  
m gy, reddish gy, rthy, vf grnd, pred r, w srt, dolo / tr calc cmt, tr anhy (?),  
tt-p intgran por <5%, no flor ? cut; DOL(10%): lt to m brn, gy brn,  
crpxl-mxln, sl sity, calc, arg, tt-p vug & intxl por, no show.

1335-1340 SH(85%): m to dk gy blk, ooc vool, pt micmica, aa, plty;  
SS(15%): red blkly, m gy, tan, lt gy, vf to f gr, com slty, wk qtzs, r to a, w  
srt, dolo to sp calc, sp arg, wk cons to fri, cons, p to tr fr por to 8%, no  
effective por, imm fr dull sp cut; DOL / SLTST(15%): aa, tt, n  
show.

1340-1345 SH(80%): gy to blk, plty to blkly; SS(10%): lt brn, lt  
gy, vf to f gr, qtzs, r, w srt, calc to dol, sp arg, wk cons, p to rr fr por to  
8%, slow ? sp flor cut; SLTST(10%): lt gy, spkl, rr vool, dolo,  
wk calc ipt, rr sand grains, tt, n vis show; CHT(5%): wh, brn tan, spkl, sl  
mot, com A crpxl shards, ooc sity, sp calc, tt sp tan pet stn, imm slow flor  
cut.

1345-1350 SH(70%): dk gy, tr vool, wk dolo, plty yo blkly; SLTST(25%): dk  
to lt gy, mot brn ipt, lt gy, dolo, fri, n vis por;  
DOL(5%): brn, variable gy, chky, ooc micxl, pt as dolo mdst, ? por, n show.

1350-1355-1357.5 SH(70%): dk gy, tr vool, wk dolo, plty yo blkly;  
SLTST(25%): lt gy, mot tan to wh ipt, dolo, fri, n vis por, n cut;  
DOL(5%): variable gy, chky, pt as dolo mdst, ? por, n show.

1357.5-1360 SH(80%): 95% lt gn, 5% lt gn gy to m dk gy, com plty;  
DOL(20%): lt gy, tr lt brn, pt as dolo mdst, sft, pt hd, w ind, pt micxl, tt, n  
show; SLTST(10%): wh gy, sft, com calc, pt as sity mdst, tt.

1360-1365 DOL(40%): lt gy, tr lt brn, pt as dolo mdst, sft, pt hd, w ind, pt micxl, tt, n  
show; SH(30%): pred lt to m gn, com lt gn gy to m dk gy, dolo ipt, com plty;  
SLTST(30%): lt gy, spkl, rr vool, dolo, wk calc ipt to locally v calc, tt, n show.

1365-1367.5 DOL(30%): lt gy, tr lt brn, pt as dolo mdst, sft, tt, n show; SH(25%): lt to dk  
gn, com sbvit luster, plty; SLTST(25%): lt gy to dirty wh, calc, com as dolo mdst, sft,  
n or quest por, n show; SS(50%): lt gy, tan, lt to m gy brn, U vf to U f gr, tr  
m gr, r qtzs, w srt, rr sil cmt, pred dolo to calc cmt, ipt sdy mby, ipt dolo mby, tr arg grs,  
pred g intgran por to 8%, fr to g even cut.

1367.5-1370 SLTST(50%): lt gy, gritty slty, com sdy grdg to vf gr ss, dolo, fri to v wk  
cons, ? por, n show; SS(45%): lt gy, f to m gr, qtzs, r, w srt, pt cons, pt wk cons,  
tr sp o stn frags, g intgran por to 10%, n vis flor, fr to g even mky cut; ;  
SH(5%): dk blk gn gy, aa.

**Mt. Cap\_ Clastics Zone\*: 1366.5**

1370-1372.5 SS(50%): lt gy, tr tan, pref f gr, qtzs, r, w srt, com dolo to calc cmt, rr sil cmt,  
sp o stn, g por to 7%, show aa; DOL(50%): m gy, tr lt brn, crpxl, ooc micxl, wackest ipt,  
pckst ipt, mnr sity, ooc calc, pred dns and tt, tr p intxl / tr vug por, n vis show.

1372.5-1375 DOL(40%): dk gy, crpxl, ooc micxl to vf xln, wackest ipt, pckst ipt, ooc sity,  
occ calc, pred dns and tt, tr p intxl por, n vis show; SS(50%): dk gy, f to m gr, fros qtz,  
tr clr qtz, r, pred w srt, wk cons to fri, dolo to calc cmt, sil cmt, ooc mod high relief cgl  
frags to 3%, rr pyr, com g por, pred g intgran por to 8% / ? strks to 10%, ? sp gn flor,  
imm dull even bl mky cut; SLTST(15%): aa, pt as dolo mdst, SH(5%): dk blk gy, aa, cvg  
ipt.

1375-1377.5 SS(40%): aa, 50% fri, 50% wk cons, v dolo, fr qtz gr relief / tr g por, com p  
intgran por to 6%, tr ? slow stmg flor, p sp halo cut; DOL(40%): dk gy, pred micxl to  
crpxl, ooc vf xln, sity ipt, sp calc, tt, n show; SLTST(20%): dk to lt gy, com sd & lith  
incl, dolo, p por, n show.

1377.5-1382.5 DOL(65%): brn, variable gy, chky, ooc micxl, pt as dolo mdst, ? por, n  
show; SLTST(20%): lt to m gy, blk gy, v dolo, pt as dolo mdst, tt; SS(10%): lt brn, lt gy,  
vf to f gr, qtzs, r, w srt, calc to dol, sp arg, wk cons, p to rr fr por to 7%, slow ? sp flor  
cut; SH(10%): gy to blk, plty to blkly.

1382.5-1390 DOL(65%): variable gy, micxl, pt as dolo mdst, ? por, n show; SLTST(15%):  
vool, dol mby ipt, dolo / mnr sil cmt, fri, p por, n show; SH(15%): m gy, lt gn, tr vool,  
ipt micmica, sbfss;  
SS(5%): lt gy, tan, lt to m gy brn, Lf to U f gr, tr  
m gr, a to r qtzs, w srt, rr sil, ipt sdy mby, ipt dolo mby, tr arg grs, p por to 6%, ? even cut;

1390-1395 DOL(45%): brn, variable gy, chky, ooc micxl, com as dolo mdst, ? por, n show.  
SH(45%): gy to blk, plty; SH(10%): blk, gritty, pred blkly.

1395-1400 DOL(50%): brn, blk, micxl, pt as dolo mdst, ? por, n show; SLTST(40%): lt brn,  
vool, gy wh, dol mby ipt, dolo, fr, sft, p intgran por, n show; SH(10%): m gy, tr lt gn,  
wxy ipt, ipt micmica, sbfss to plty.

1400-1405 DOL(45%): brn, tan, gy, vf xln, com micxl, pred as dolo mdst, pred dns, mnr  
euhed dolo & calc frags, tr p intxl por, n show; SLTST(35%): lt gy, vool ipt, tan  
gy, pt vf gr qtzs, sil, mnr sp calc, tr sdy dolo frag, tt, n show;  
SS(30%): lt gy, pred f / tr m gr, qtzs, r, w srt, wk calc to v dol cmt, tr imbd  
glau, clayey ipt, wk cons to v fri, infer g por in fri, n vis flor, quest sp cut.

1410-1415 SLTST(65%): lt gy, ipt, tan gy, pt vf gr qtzs, mnr sp calc cmt, dolo cmt, trsdy  
dolo frag, tt, n show; DOL(35%): brn, variable gy, chky,  
pred micxl, ooc vf xln, pt as dolo mdst, ? por, n show.

1415-1420 SLTST(50%): lt gy, tan gy, pt vf gr qtzs, sil, mnr sp calc, tr sdy dolo frag, tr gn  
sh frags, tt, n show; SS(30%): lt gy, pred f / tr m gr, qtzs, r,  
w srt, wk calc to v dol cmt, abnt imbd glau, clayey ipt, less than 1% pyr nodes, wk cons to  
v fri, infer g por in fri, n vis flor, quest sp cut; DOL(20%): brn, tan, vf xln, pred as  
dolo mdst, pred dns, mnr euhed dolo & calc frags, tr p intxl por, tr frac por, n show.

1420-1425 SS(80%): opaque, off wh frosted, lt gy, tan, qtzs, 85% uncons as pbils thus U  
m to v c gr, R & pred w srt, 15% fri to wk cons thus f to m gr, r to a, w srt, dolo / tr calc  
cmt, rr sil cmt, mod high relief qtz in wk cons frags, tr lt brn o stn to 15%, infer g por in  
uncons, 6 to 9% intgran por in fri & wk cons frags, ? sp gn flor, dull slow even mky cut;  
SLTST(10%): lt gy, pt as dolo mdst; SH(10%): m gn, dk blk gn.

**Mt. Clarke\_ "A" Zone\*: 1420.5 m KB**

1425-1430 SS(50%): lt gy, trnsi, tan, f to m gr, r, pred w srt, wk cons to sl fri, sil cmt, sp v  
wk sil ovgtth, ooc mod high relief qtz frags to 3%, com p por, tr g intgran por to 8%, ?  
strks to 10%, ? sp gn flor, imm wk mky cut; SLTST(30%): lt gy, spkl ipt, tr calc to pt dol  
frag, pt as dolo mdst (?), p por, n vis show; SH(20%): m glassy gn, plty.

1430-1435 SS(60%): lt gy, trnsi, op, pred f to L c gr, 100% qtzs, R to r / com a,  
variable srt, pred p srt, 80% wk cons, 20% lse, ooc mod wk sil ovgtth, 1 to 2% pyr nodes  
that are Um to U v in size, rr imbd pyr, ooc g qtz gr relief, tr sp v lt brn o stn, variable  
por to 10%, ? sp gn flor, v slow even halo mky cut; SLTST(10%): wh, lt gy, sft,  
chky ipt, dolo, tt; SH(10%): gn, blk, plty.

1435-1440 SS(80%): lt gy, clr, trnsi, op, pred f to L c gr, 100% qtzs, R to r / com a,  
variable srt, pred p srt, 80% wk cons, 20% lse, ooc mod wk sil ovgtth, 1 to 2% pyr nodes  
that are Um to U v in size, rr imbd pyr, ooc g qtz gr relief, tr sp v lt brn o stn, variable  
por to 10%, ? sp gn flor, v slow even halo mky cut; SLTST(10%): wh, lt gy, sft,  
chky ipt, dolo, tt; SH(10%): gn, blk, plty.

1440-1442.5 SS(70%): off wh, trnsi, op, pred f to m gr, 100% qtzs, r to a, w srt, 1 to 2%  
pyr pred as c to L v c nodules / rare pryz spherical fos frags, pred wk cons / tr lse, com g  
qtz gr relief, tr sp v lt brn o stn, again variable por to 10%, ? sp gn flor, again v slow  
even halo mky cut; SLTST(20%): wh, lt gy, hd to mod sft, sl dolo, tt; SH / DOL(10%):  
vool, blkly.

1442.5-1445 SS(45%): lt gy, tr tan / o stn, qtzs, r to a, w srt, com wk sil  
ovgtth, com qtz gr relief, 1 to 2% pyr pred as c to L v c nodules / rare pryz  
spherical fos frags, tr sp v lt brn o stn, wk cons, ooc g intgran to 8%, ? sp  
gn flor, v slow even halo mky cut; SLTST(35%): wh, lt gy, sft, dolo mdst  
ipt, tt, n effective por; SH(10%): lt gy, trnsi, clr, f to m gr, 100% qtzs, R to  
a, uncons, infer g to vg intgran por, ? sp gn flor, dull slow cut; SH(10%):  
blk, com intbd dolo mdst / ss grs.

**Proterozoic: 1447.5 m KB**

1445-1447 sample directly off shaker: SS(95%): lt gy, trnsi, op, stained  
red, Lm to U v c pbils, 100% qtzs, R to r, 100% uncons, infer g to vg  
intgran por, dull slow even mky cut masked by red stain; BA(5%): red,  
sft, com intbd sltst, well weathered.

1445-1447.5 BA(80%): red, sft, com intbd sltst & sh, weathered; SS(20%):  
aa, 100% uncons, g por, wk cut.

1447.5-1450 BA(100%): red, sft, com intbd sltst & sh, weathered, com  
erosional secondary material..

1450-1452.5 BA(100%): red, sft, com intbd sltst & sh, weathered.

1452.5-1455 SLTST(40%): red, lt gy, bent ipt, sl arg, tr intbd ss & dol  
frags, tr intbd sh, tt; SH(30%): red, sft,  
well weathered, blkly; DOL(25%): orng, red, micxl to  
crpxl, arg ipt, hd, n vis por, n vis show;  
LS(5%): red, orge, pred vf xln, r r chty, tt / tr p por, n



**TD: 1476.0m**  
**2004-03-13, 21:30**

## "Oil Mud" at Logging

1455-1465 DOL(45%): m steely gy, dk gy, vcol, occ v lt bl gy, micxln, sl calc, blk, tt; SLTST(45%): vcol, pred gy, red, sl calc, tr diss pyr, tt; LS(5%) red to gy, sl dolomitized ipt, micxln, sl slty, pred tt / tr p fracture & vuggy por, n vis flr or cut; SH(5%) m gy, fis, pt as dolc mdst, micmica ipt, lt gy, slty ipt, blk.

1465-1476 DOL(65%): m to dk gy, micxl, ptch p intxl por, no stn or show;  
SLTST(30%): m gy, tr  
vcol, arg, rr sdy, pred dolc / tr calc, tt;  
SH(5%): dk gy, pt tabular, pt bkly.

**TOTAL DEPTH DRILLERS: 1476.0m MD, 2004-03-13, 21:30**  
**TOTAL DEPTH LOGGERS: 1475.0m MD, 2004-03-15, 01:00**