ATOKA
COAL LABS
Englewood, Colorado
1-800-853-5113
FAX 303-617-8956

FORMATION EVALUATION LOG

SCALE: 1:240 (1"=20', 5" = 100')

COMPANY: Heartland Oil and Gas, Inc
WELL: Georg 15-12
FIELD: Wildcat
COUNTY: Nemaha **STATE:** KS

API #: 15-131-20, 184-00-00
LOCATION: 580 fsl 1980 fel
Sec 12 Twp 3S Rge 14E

ELEV GL: 1288 ft
ELEV KB: 1296 ft
Log Measured from: KB

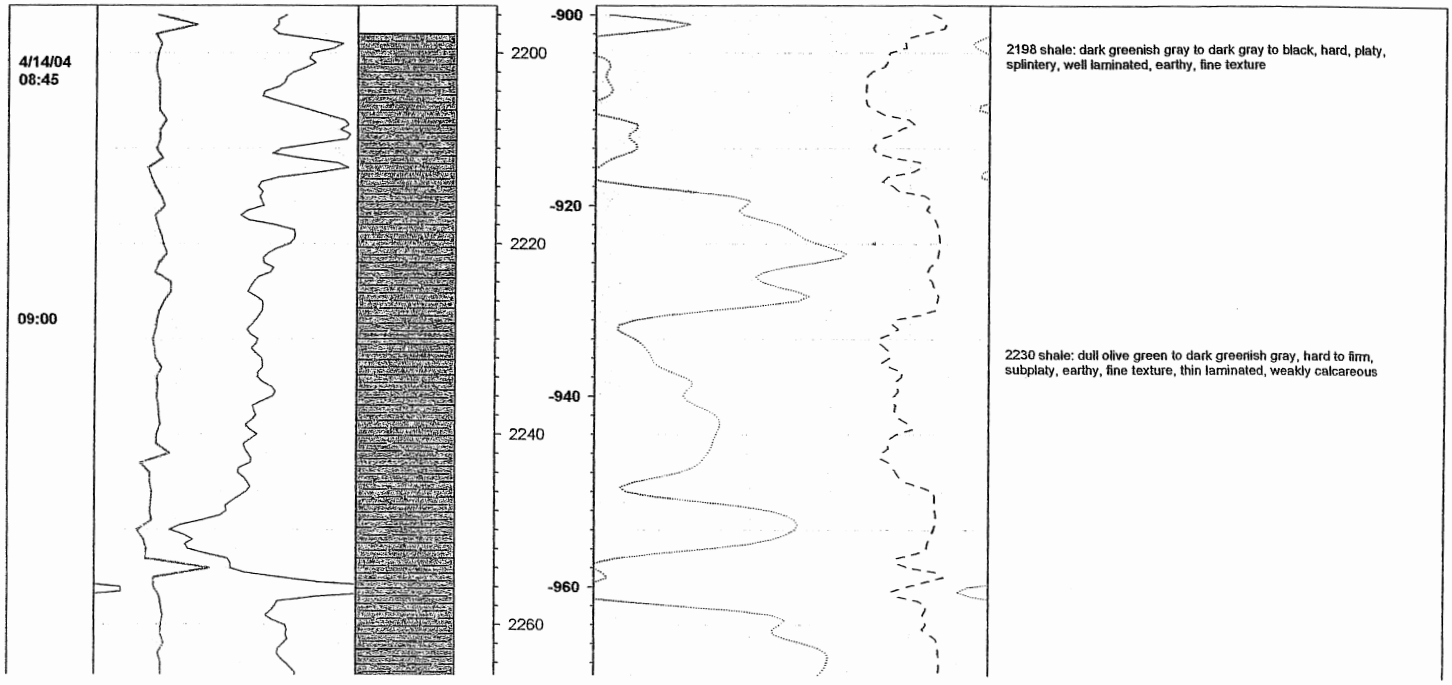
Spud Date	April 12, 2004
Surface Casing	12 1/2" to 265
Hole Size	7 7/8
Total Depth	4182 ft
Logging Dates	April 14 - 24, 2004
Interval Logged	2196 - 4182 ft
Drilling Fluid	native mud, bentonite gel
Mud Pumps	Skytop-Brewster 6x14
Drilling Contractor	Gulick Drilling, Inc.
Rig Pusher	Ron Gulick
Company Geologist	Bill Hayworth
Company Engineer	Layle Robb
Logging Geologist	Chris Ryan

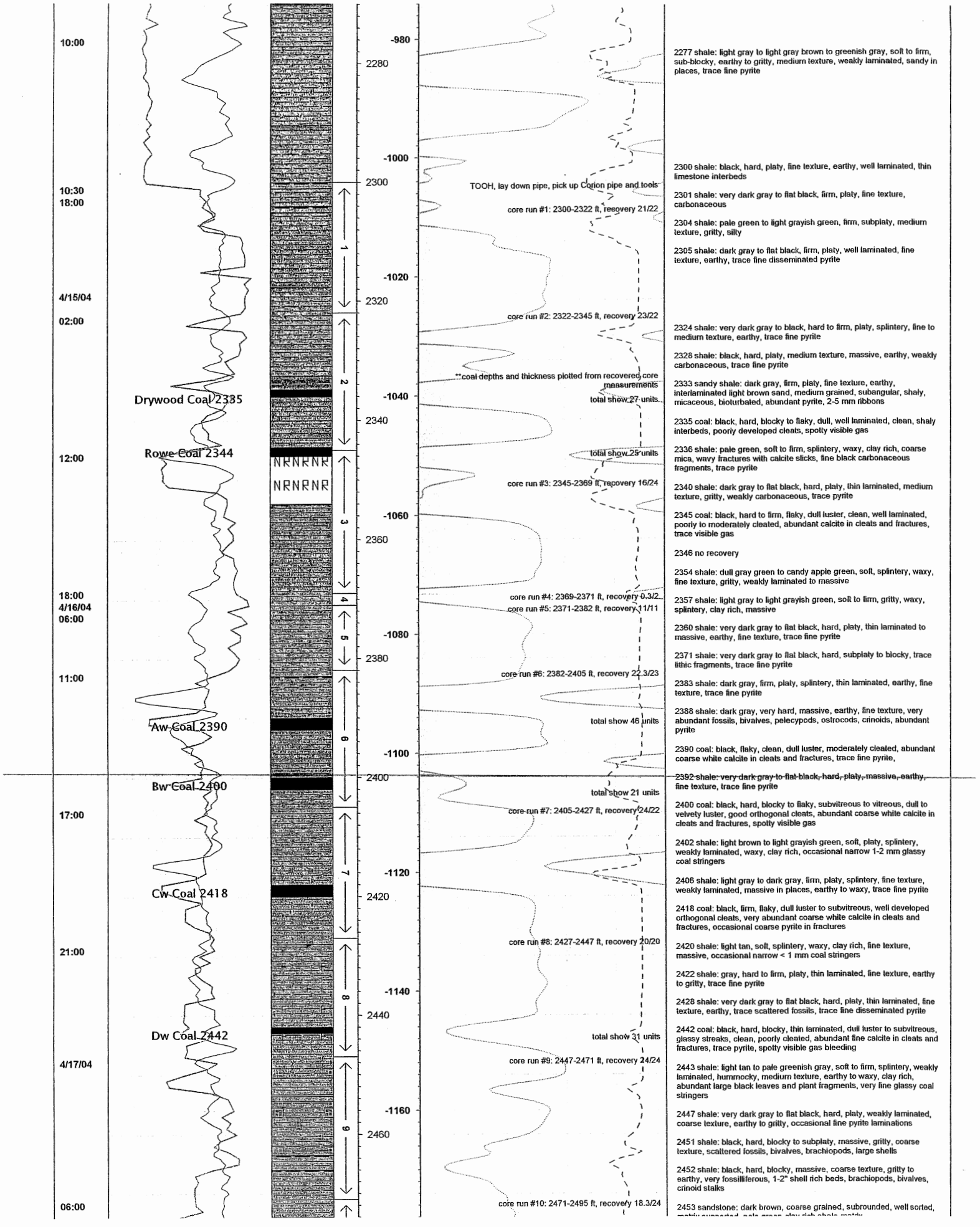
RECEIVED
KANSAS CORPORATION COMMISSION
SEP 29 2004
CONSERVATION DIVISION
WICHITA, KS

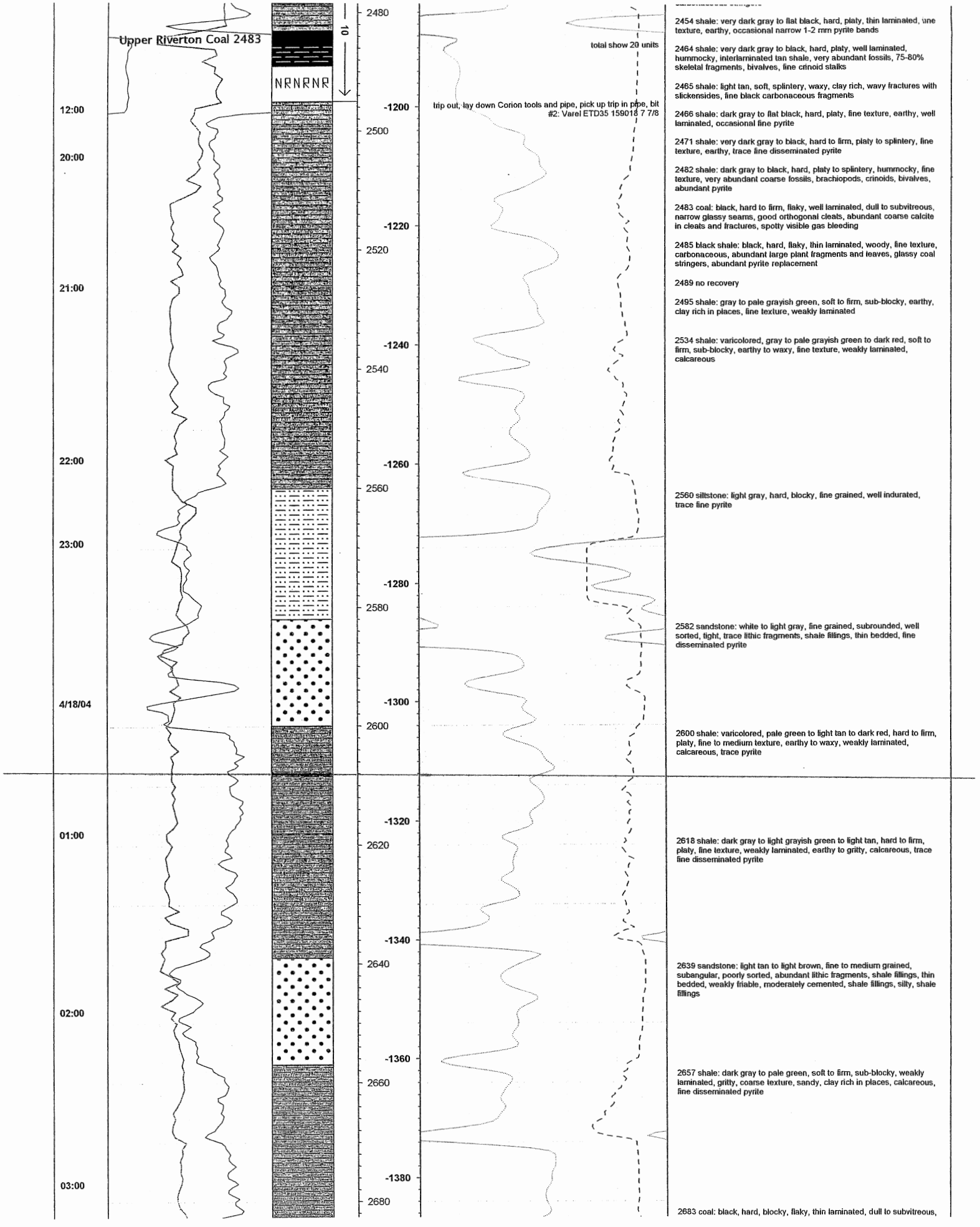
LEGEND

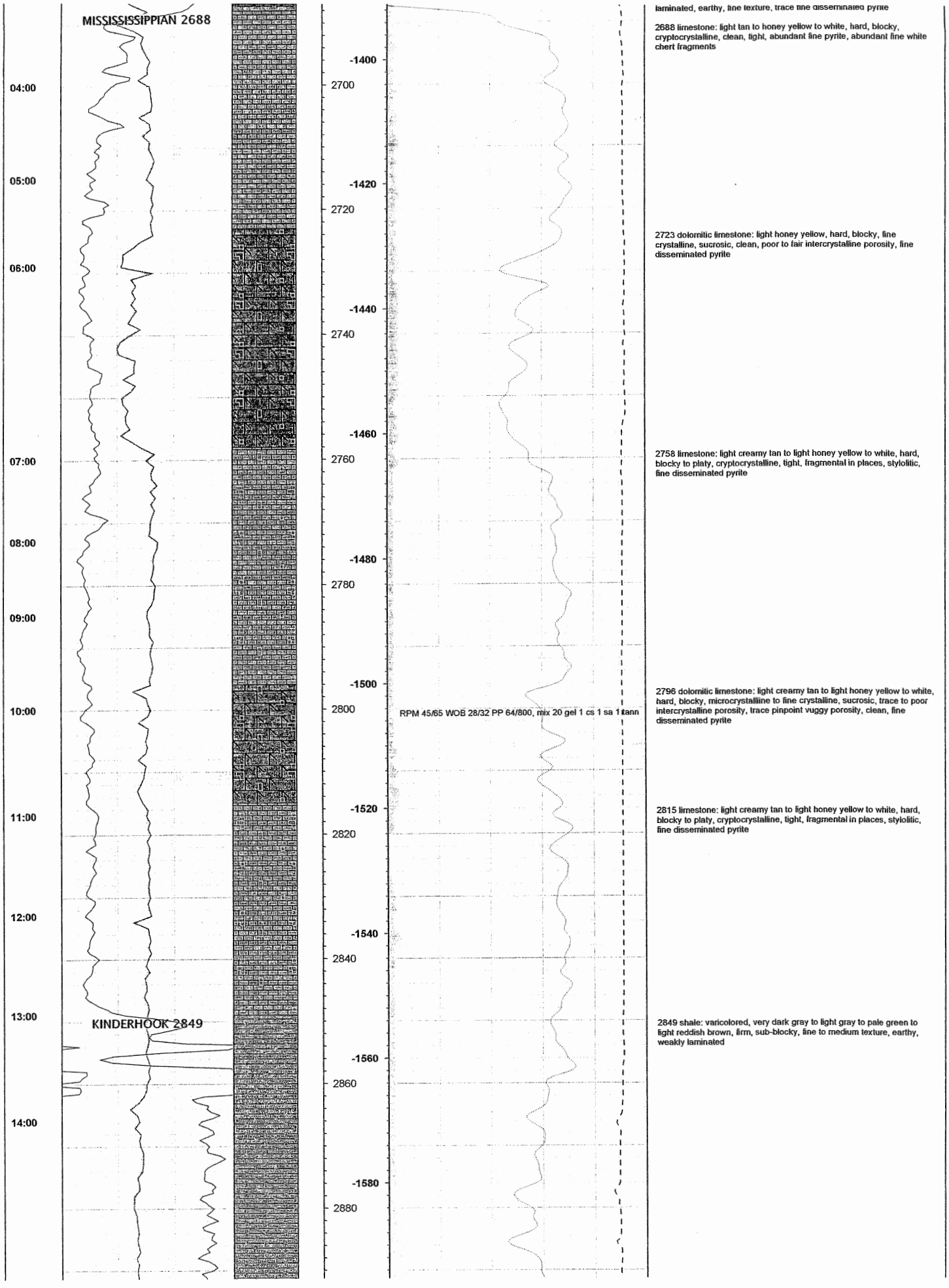
LIMESTONE, BRECCIA, FOSSILS, SHALE, SILTY SHALE, SAND, BLACK SHALE, GLAUCONITE, DOLOMITE, COAL, OOLITIC LIMESTONE, CHERT, PYRITE, LIMEY SHALE, SILTSTONE, SANDY SILT, CLAY, BENTONITE

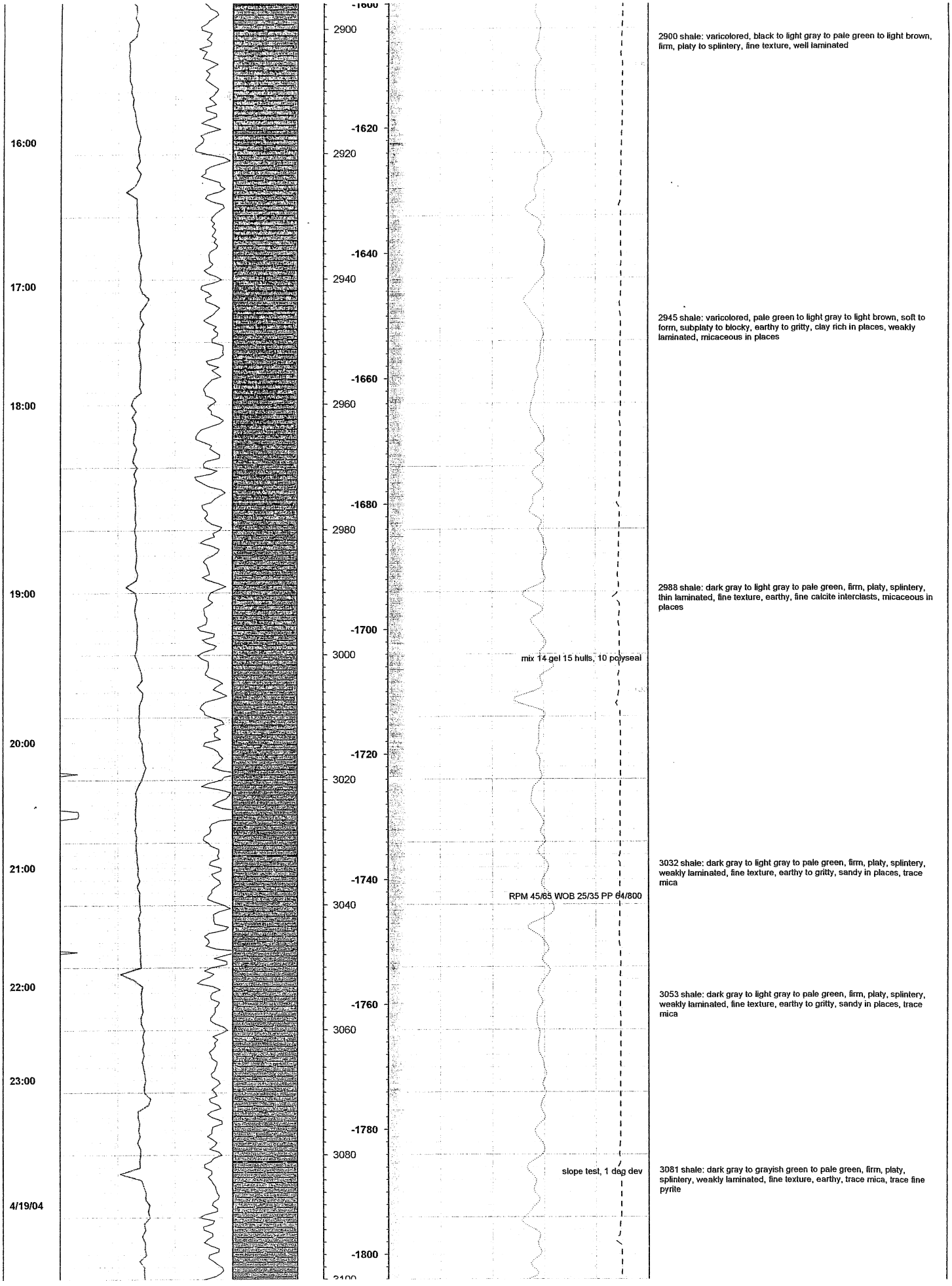
DATE/TIME | PEN. RATE (MIN/FT) 0.1–100 | GAMMA RAY (API UNITS) 0–150 | LITHOLOGY | CORE | DEPTH (FT) | ELEVATION (FT) | TOTAL GAS (UNITS) 0–100 | BULK DENSITY (g/cc) 2–3 | Caliper (in) 16–8 | LITHOLOGIC DESCRIPTION

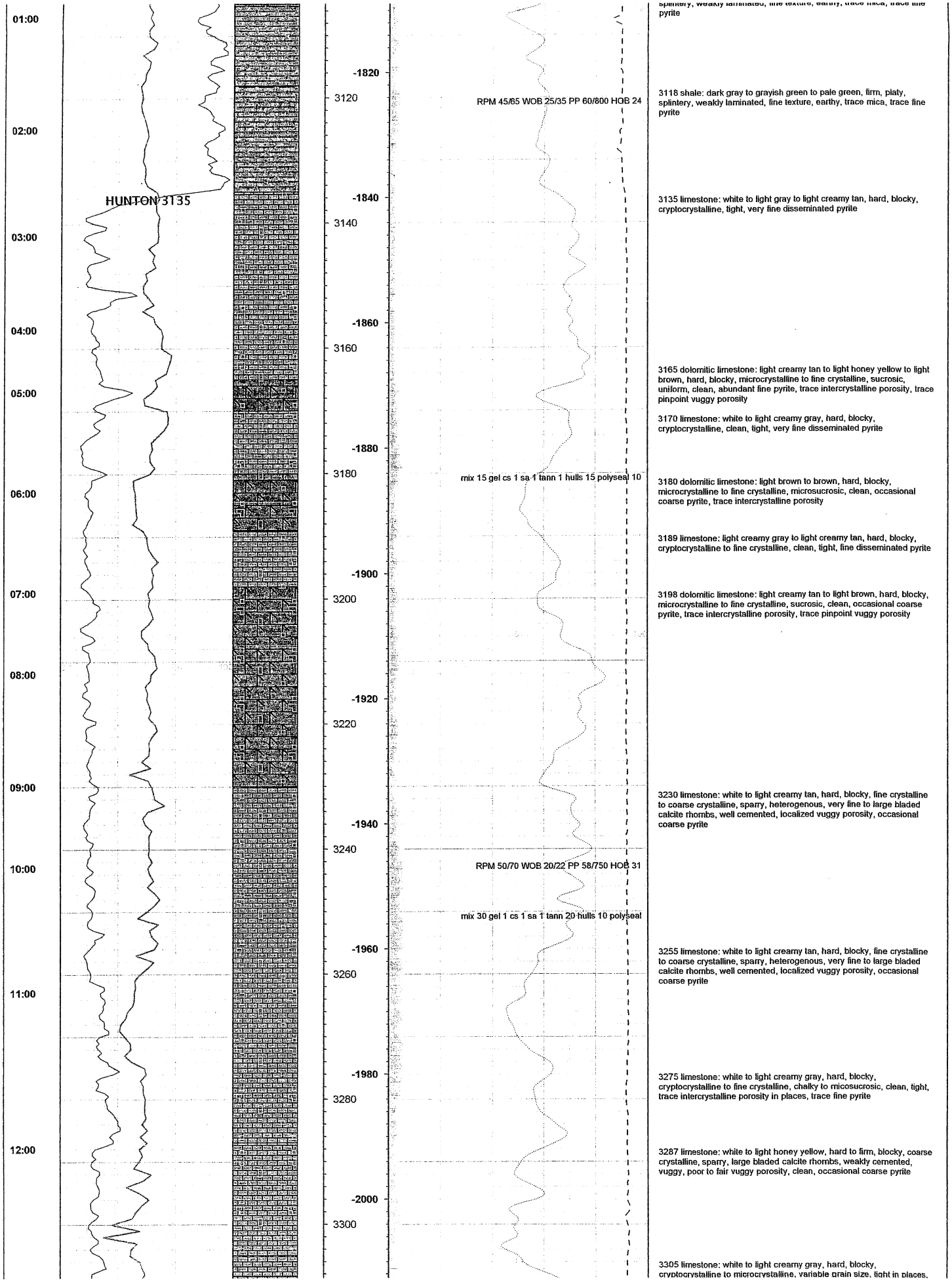


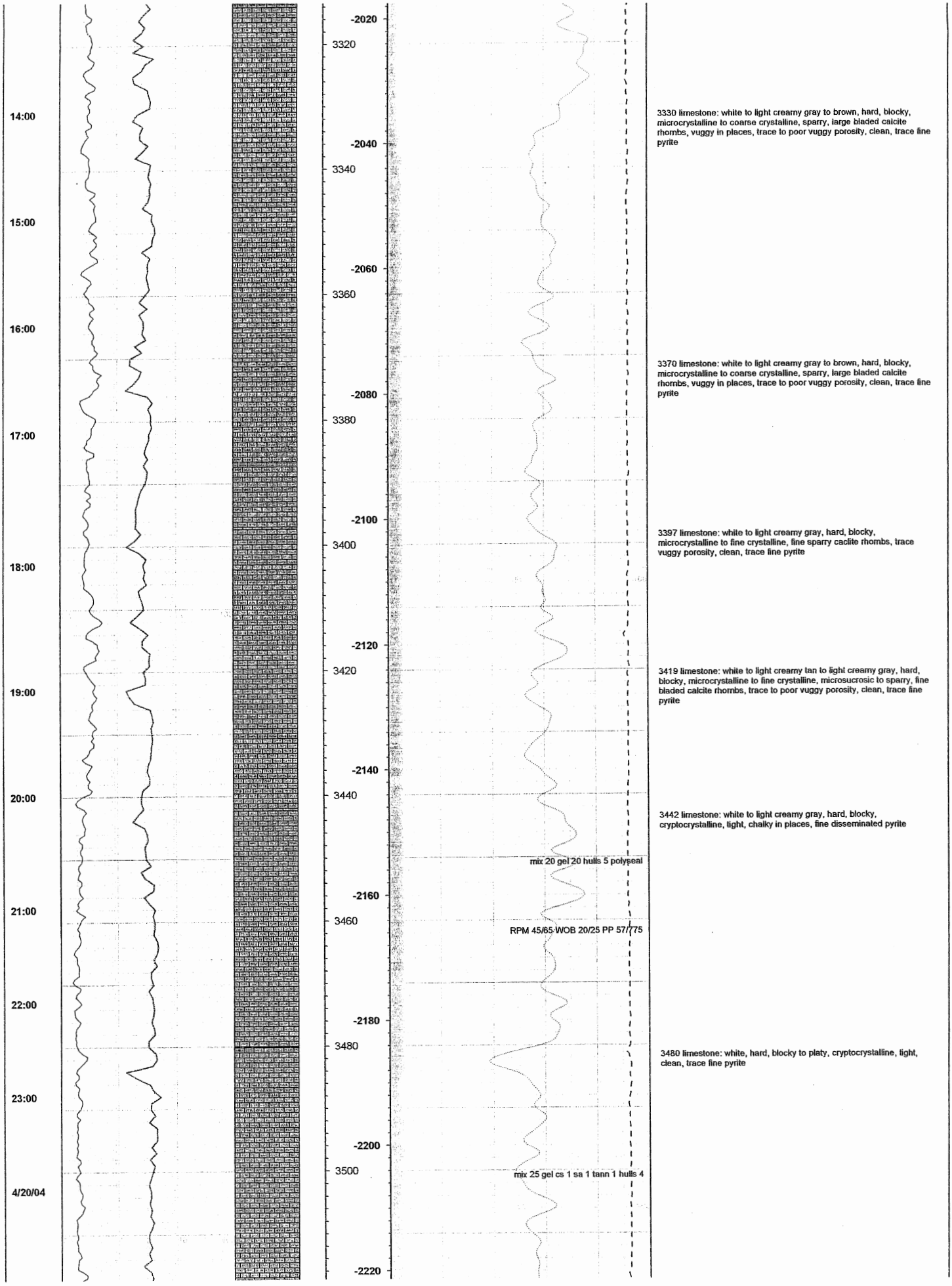

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Drywood Coal 2335
Rowe Coal 2344
Aw Coal 2390
Bw Coal 2400
Cw Coal 2418
Dw Coal 2442
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2280
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TOOH, lay down pipe, pick up Corion pipe and tools
core run #1: 2300-2322 ft, recovery 21/22
core run #2: 2322-2345 ft, recovery 23/22
**coal depths and thickness plotted from recovered core measurements
total show 27 units
total show 25 units
core run #3: 2345-2369 ft, recovery 16/24
core run #4: 2369-2371 ft, recovery 0.3/2
core run #5: 2371-2382 ft, recovery 11/11
core run #6: 2382-2405 ft, recovery 22.3/23
total show 46 units
total show 21 units
core run #7: 2405-2427 ft, recovery 24/22
core run #8: 2427-2447 ft, recovery 20/20
total show 31 units
core run #9: 2447-2471 ft, recovery 24/24
core run #10: 2471-2495 ft, recovery 18.3/24
2277 shale: light gray to light gray brown to greenish gray, soft to firm, sub-blocky, earthy to gritty, medium texture, weakly laminated, sandy in places, trace fine pyrite
2300 shale: black, hard, platy, fine texture, earthy, well laminated, thin limestone interbeds
2301 shale: very dark gray to flat black, firm, platy, fine texture, carbonaceous
2304 shale: pale green to light grayish green, firm, subplaty, medium texture, gritty, silty
2305 shale: dark gray to flat black, firm, platy, well laminated, fine texture, earthy, trace fine disseminated pyrite
2324 shale: very dark gray to black, hard to firm, platy, splintery, fine to medium texture, earthy, trace fine pyrite
2328 shale: black, hard, platy, medium texture, massive, earthy, weakly carbonaceous, trace fine pyrite
2333 sandy shale: dark gray, firm, platy, fine texture, earthy, interlaminated light brown sand, medium grained, subangular, shaly, micaceous, bioturbated, abundant pyrite, 2-5 mm ribbons
2335 coal: black, hard, blocky to flaky, dull, well laminated, clean, shaly interbeds, poorly developed cleats, spotty visible gas
2336 shale: pale green, soft to firm, splintery, waxy, clay rich, coarse mica, wavy fractures with calcite slicks, fine black carbonaceous fragments, trace pyrite
2340 shale: dark gray to flat black, hard, platy, thin laminated, medium texture, gritty, weakly carbonaceous, trace pyrite
2345 coal: black, hard to firm, flaky, dull luster, clean, well laminated, poorly to moderately cleated, abundant calcite in cleats and fractures, trace visible gas
2346 no recovery
2354 shale: dull gray green to candy apple green, soft, splintery, waxy, fine texture, gritty, weakly laminated to massive
2357 shale: light gray to light grayish green, soft to firm, gritty, waxy, splintery, clay rich, massive
2360 shale: very dark gray to flat black, hard, platy, thin laminated to massive, earthy, fine texture, trace fine pyrite
2371 shale: very dark gray to flat black, hard, subplaty to blocky, trace lithic fragments, trace fine pyrite
2383 shale: dark gray, firm, platy, splintery, thin laminated, earthy, fine texture, trace fine pyrite
2388 shale: dark gray, very hard, massive, earthy, fine texture, very abundant fossils, bivalves, pelecypods, ostrocods, crinoids, abundant pyrite
2390 coal: black, flaky, clean, dull luster, moderately cleated, abundant coarse white calcite in cleats and fractures, trace fine pyrite,
2392 shale: very dark gray to flat black, hard, platy, massive, earthy, fine texture, trace fine pyrite
2400 coal: black, hard, blocky to flaky, subvitreous to vitreous, dull to velvety luster, good orthogonal cleats, abundant coarse white calcite in cleats and fractures, spotty visible gas
2402 shale: light brown to light grayish green, soft, platy, splintery, weakly laminated, waxy, clay rich, occasional narrow 1-2 mm glassy coal stringers
2406 shale: light gray to dark gray, firm, platy, splintery, fine texture, weakly laminated, massive in places, earthy to waxy, trace fine pyrite
2418 coal: black, firm, flaky, dull luster to subvitreous, well developed orthogonal cleats, very abundant coarse white calcite in cleats and fractures, occasional coarse pyrite in fractures
2420 shale: light tan, soft, splintery, waxy, clay rich, fine texture, massive, occasional narrow < 1 mm coal stringers
2422 shale: gray, hard to firm, platy, thin laminated, fine texture, earthy to gritty, trace fine pyrite
2428 shale: very dark gray to flat black, hard, platy, thin laminated, fine texture, earthy, trace scattered fossils, trace fine disseminated pyrite
2442 coal: black, hard, blocky, thin laminated, dull luster to subvitreous, glassy streaks, clean, poorly cleated, abundant fine calcite in cleats and fractures, trace pyrite, spotty visible gas bleeding
2443 shale: light tan to pale greenish gray, soft to firm, splintery, weakly laminated, hummocky, medium texture, earthy to waxy, clay rich, abundant large black leaves and plant fragments, very fine glassy coal stringers
2447 shale: very dark gray to flat black, hard, platy, weakly laminated, coarse texture, earthy to gritty, occasional fine pyrite laminations
2451 shale: black, hard, blocky to subplaty, massive, gritty, coarse texture, scattered fossils, bivalves, brachiopods, large shells
2452 shale: black, hard, blocky, massive, coarse texture, gritty to earthy, very fossilliferous, 1-2" shell rich beds, brachiopods, bivalves, crinoid stalks
2453 sandstone: dark brown, coarse grained, subrounded, well sorted,

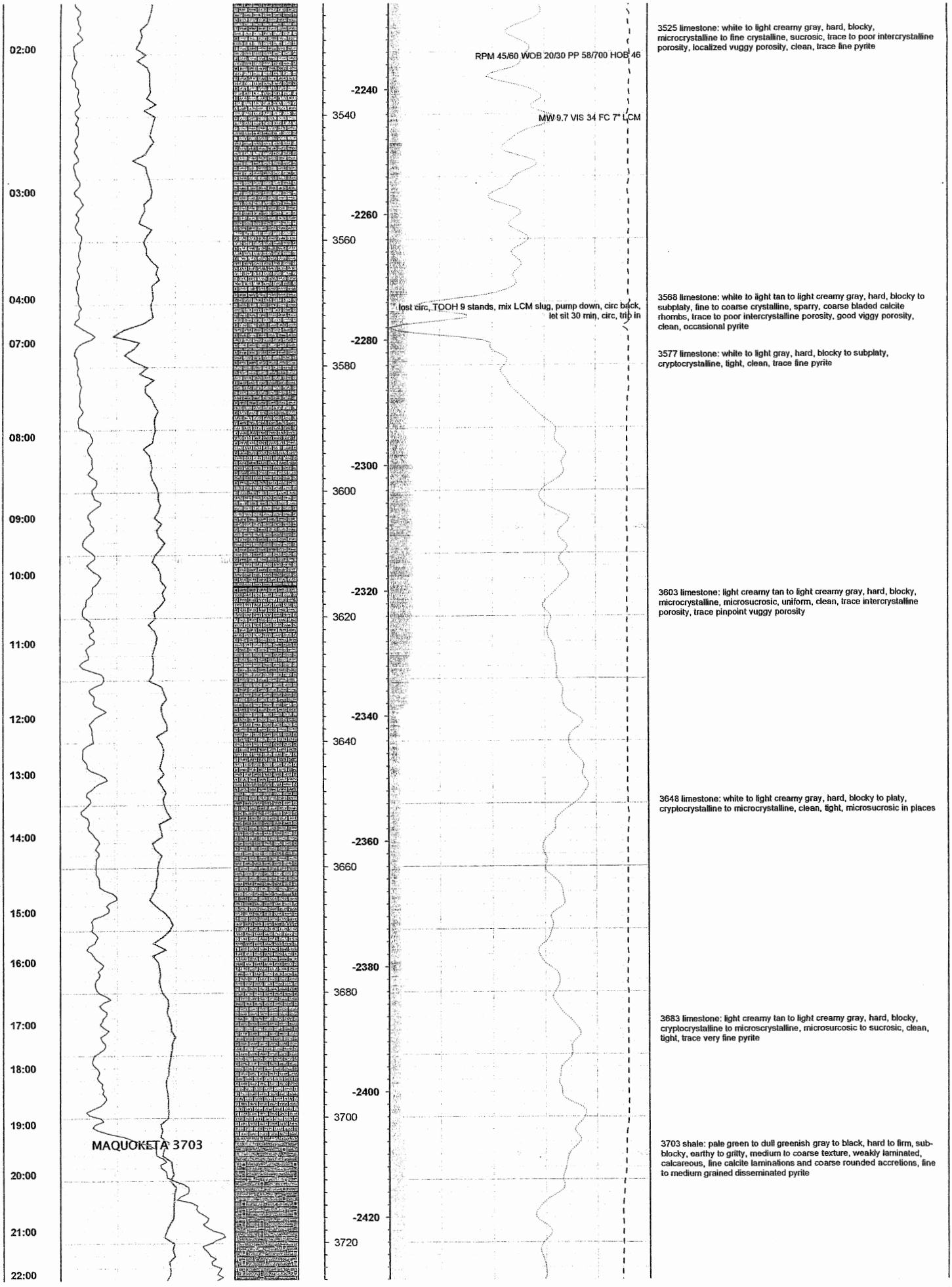

Upper Riverton Coal 2483
10
total show 20 units
trip out, lay down Corion tools and pipe, pick up trip in pipe, bit #2: Varel ETD35 159018 7 7/8
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2680
2454 shale: very dark gray to flat black, hard, platy, thin laminated, fine texture, earthy, occasional narrow 1-2 mm pyrite bands
2464 shale: very dark gray to black, hard, platy, well laminated, hummocky, interlaminated tan shale, very abundant fossils, 75-80% skeletal fragments, bivalves, fine crinoid stalks
2465 shale: light tan, soft, splintery, waxy, clay rich, wavy fractures with slickensides, fine black carbonaceous fragments
2466 shale: dark gray to flat black, hard, platy, fine texture, earthy, well laminated, occasional fine pyrite
2471 shale: very dark gray to black, hard to firm, platy to splintery, fine texture, earthy, trace fine disseminated pyrite
2482 shale: dark gray to black, hard, platy to splintery, hummocky, fine texture, very abundant coarse fossils, brachiopods, crinoids, bivalves, abundant pyrite
2483 coal: black, hard to firm, flaky, well laminated, dull to subvitreous, narrow glassy seams, good orthogonal cleats, abundant coarse calcite in cleats and fractures, spotty visible gas bleeding
2485 black shale: black, hard, flaky, thin laminated, woody, fine texture, carbonaceous, abundant large plant fragments and leaves, glassy coal stringers, abundant pyrite replacement
2489 no recovery
2495 shale: gray to pale grayish green, soft to firm, sub-blocky, earthy, clay rich in places, fine texture, weakly laminated
2534 shale: varicolored, gray to pale grayish green to dark red, soft to firm, sub-blocky, earthy to waxy, fine texture, weakly laminated, calcareous
2560 siltstone: light gray, hard, blocky, fine grained, well indurated, trace fine pyrite
2582 sandstone: white to light gray, fine grained, subrounded, well sorted, tight, trace lithic fragments, shale fillings, thin bedded, fine disseminated pyrite
2600 shale: varicolored, pale green to light tan to dark red, hard to firm, platy, fine to medium texture, earthy to waxy, weakly laminated, calcareous, trace pyrite
2618 shale: dark gray to light grayish green to light tan, hard to firm, platy, fine texture, weakly laminated, earthy to gritty, calcareous, trace fine disseminated pyrite
2639 sandstone: light tan to light brown, fine to medium grained, subangular, poorly sorted, abundant lithic fragments, shale fillings, thin bedded, weakly friable, moderately cemented, shale fillings, silty, shale fillings
2657 shale: dark gray to pale green, soft to firm, sub-blocky, weakly laminated, gritty, coarse texture, sandy, clay rich in places, calcareous, fine disseminated pyrite
2683 coal: black, hard, blocky, flaky, thin laminated, dull to subvitreous,

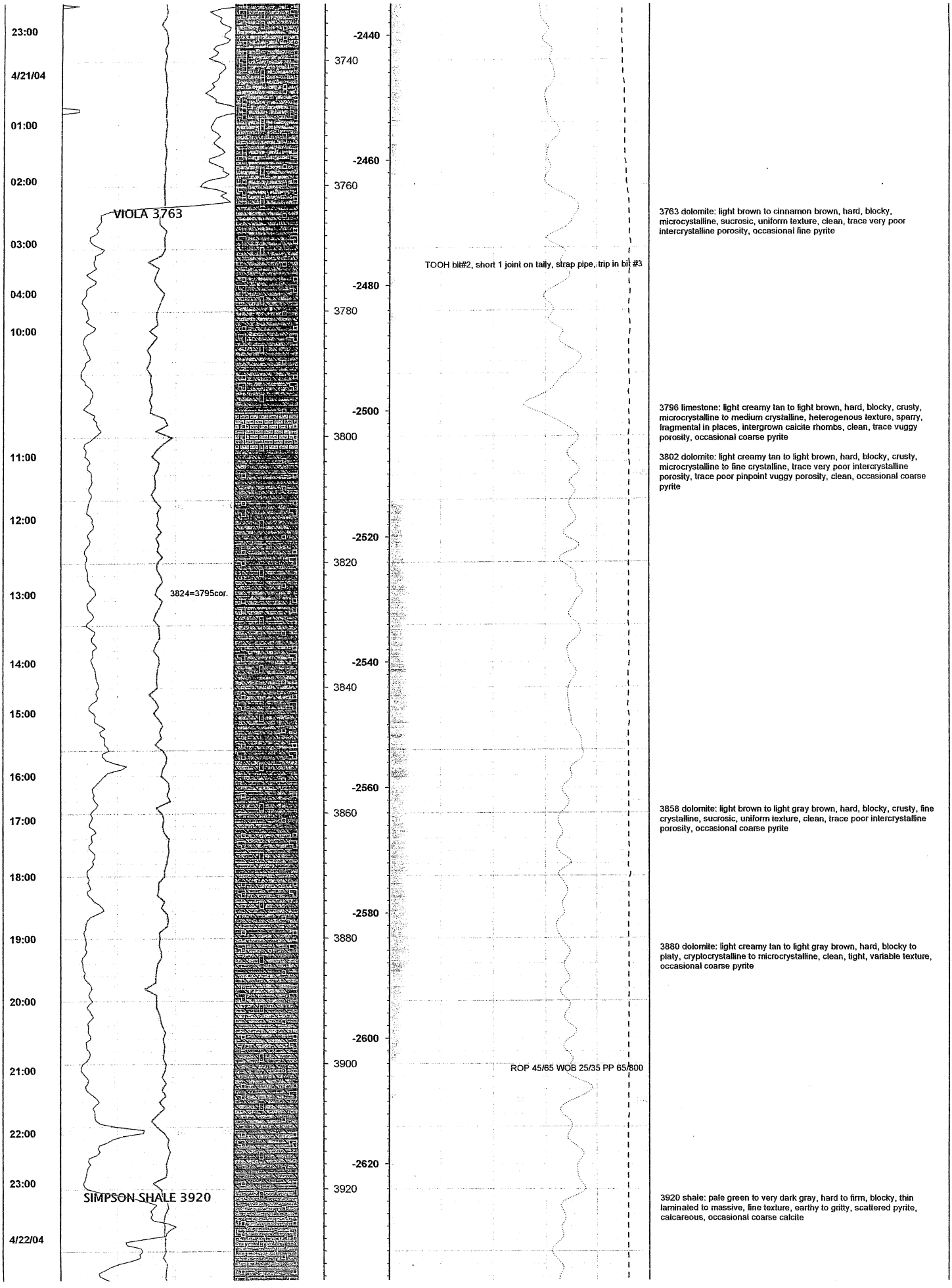

MISSISSISSIPPIAN 2688
KINDERHOOK 2849
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2880
RPM 45/65 WOB 28/32 PP 64/800, mix 20 gel 1 cs 1 sa 1 kann
laminated, earthy, fine texture, trace fine disseminated pyrite
2688 limestone: light tan to honey yellow to white, hard, blocky, cryptocrystalline, clean, tight, abundant fine pyrite, abundant fine white chert fragments
2723 dolomitic limestone: light honey yellow, hard, blocky, fine crystalline, sucrosic, clean, poor to fair intercrystalline porosity, fine disseminated pyrite
2758 limestone: light creamy tan to light honey yellow to white, hard, blocky to platy, cryptocrystalline, tight, fragmental in places, stylolitic, fine disseminated pyrite
2796 dolomitic limestone: light creamy tan to light honey yellow to white, hard, blocky, microcrystalliine to fine crystalline, sucrosic, trace to poor intercrystalline porosity, trace pinpoint vuggy porosity, clean, fine disseminated pyrite
2815 limestone: light creamy tan to light honey yellow to white, hard, blocky to platy, cryptocrystalline, tight, fragmental in places, stylolitic, fine disseminated pyrite
2849 shale: varicolored, very dark gray to light gray to pale green to light reddish brown, firm, sub-blocky, fine to medium texture, earthy, weakly laminated


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-1800
3100
mix 14 gel 15 hulls, 10 polyseal
RPM 45/65 WOB 25/35 PP 64/800
slope test, 1 deg dev
2900 shale: varicolored, black to light gray to pale green to light brown, firm, platy to splintery, fine texture, well laminated
2945 shale: varicolored, pale green to light gray to light brown, soft to form, subplaty to blocky, earthy to gritty, clay rich in places, weakly laminated, micaceous in places
2988 shale: dark gray to light gray to pale green, firm, platy, splintery, thin laminated, fine texture, earthy, fine calcite interclasts, micaceous in places
3032 shale: dark gray to light gray to pale green, firm, platy, splintery, weakly laminated, fine texture, earthy to gritty, sandy in places, trace mica
3053 shale: dark gray to light gray to pale green, firm, platy, splintery, weakly laminated, fine texture, earthy to gritty, sandy in places, trace mica
3081 shale: dark gray to grayish green to pale green, firm, platy, splintery, weakly laminated, fine texture, earthy, trace mica, trace fine pyrite


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HUNTON 3135
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-1920
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-1940
3240
-1960
3260
-1980
3280
-2000
3300
RPM 45/65 WOB 25/35 PP 60/800 HOB 24
mix 15 gel cs 1 sa 1 tann 1 hulls 15 polyseal 10
RPM 50/70 WOB 20/22 PP 58/750 HOB 31
mix 30 gel 1 cs 1 sa 1 tann 20 hulls 10 polyseal
splintery, weakly laminated, fine texture, earthy, trace mica, trace fine pyrite
3118 shale: dark gray to grayish green to pale green, firm, platy, splintery, weakly laminated, fine texture, earthy, trace mica, trace fine pyrite
3135 limestone: white to light gray to light creamy tan, hard, blocky, cryptocrystalline, tight, very fine disseminated pyrite
3165 dolomitic limestone: light creamy tan to light honey yellow to light brown, hard, blocky, microcrystalline to fine crystalline, sucrosic, uniform, clean, abundant fine pyrite, trace intercrystalline porosity, trace pinpoint vuggy porosity
3170 limestone: white to light creamy gray, hard, blocky, cryptocrystalline, clean, tight, very fine disseminated pyrite
3180 dolomitic limestone: light brown to brown, hard, blocky, microcrystalline to fine crystalline, microsucrosic, clean, occasional coarse pyrite, trace intercrystalline porosity
3189 limestone: light creamy gray to light creamy tan, hard, blocky, cryptocrystalline to fine crystalline, clean, tight, fine disseminated pyrite
3198 dolomitic limestone: light creamy tan to light brown, hard, blocky, microcrystalline to fine crystalline, sucrosic, clean, occasional coarse pyrite, trace intercrystalline porosity, trace pinpoint vuggy porosity
3230 limestone: white to light creamy tan, hard, blocky, fine crystalline to coarse crystalline, sparry, heterogenous, very fine to large bladed calcite rhombs, well cemented, localized vuggy porosity, occasional coarse pyrite
3255 limestone: white to light creamy tan, hard, blocky, fine crystalline to coarse crystalline, sparry, heterogenous, very fine to large bladed calcite rhombs, well cemented, localized vuggy porosity, occasional coarse pyrite
3275 limestone: white to light creamy gray, hard, blocky, cryptocrystalline to fine crystalline, chalky to micosucrosic, clean, tight, trace intercrystalline porosity in places, trace fine pyrite
3287 limestone: white to light honey yellow, hard to firm, blocky, coarse crystalline, sparry, large bladed calcite rhombs, weakly cemented, vuggy, poor to fair vuggy porosity, clean, occasional coarse pyrite
3305 limestone: white to light creamy gray, hard, blocky, cryptocrystalline to microcrystalline, variable grain size, tight in places,


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3330 limestone: white to light creamy gray to brown, hard, blocky, microcrystalline to coarse crystalline, sparry, large bladed calcite rhombs, vuggy in places, trace to poor vuggy porosity, clean, trace fine pyrite
3370 limestone: white to light creamy gray to brown, hard, blocky, microcrystalline to coarse crystalline, sparry, large bladed calcite rhombs, vuggy in places, trace to poor vuggy porosity, clean, trace fine pyrite
3397 limestone: white to light creamy gray, hard, blocky, microcrystalline to fine crystalline, fine sparry caclite rhombs, trace vuggy porosity, clean, trace fine pyrite
3419 limestone: white to light creamy tan to light creamy gray, hard, blocky, microcrystalline to fine crystalline, microsucrosic to sparry, fine bladed calcite rhombs, trace to poor vuggy porosity, clean, trace fine pyrite
3442 limestone: white to light creamy gray, hard, blocky, cryptocrystalline, light, chalky in places, fine disseminated pyrite
mix 20 gel 20 hulls 5 polyseal
RPM 45/65 WOB 20/25 PP 57/775
3480 limestone: white, hard, blocky to platy, cryptocrystalline, light, clean, trace fine pyrite
mix 25 gel cs 1 sa 1 tann 1 hulls 4


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3700
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RPM 45/60 WOB 20/30 PP 58/700 HOB 46
MW 9.7 VIS 34 FC 7" LCM
lost circ, TOOH 9 stands, mix LCM slug, pump down, circ back, let sit 30 min, circ, trip in
3525 limestone: white to light creamy gray, hard, blocky, microcrystalline to fine crystalline, sucrosic, trace to poor intercrystalline porosity, localized vuggy porosity, clean, trace fine pyrite
3568 limestone: white to light tan to light creamy gray, hard, blocky to subplaty, fine to coarse crystalline, sparry, coarse bladed calcite rhombs, trace to poor intercrystalline porosity, good viggy porosity, clean, occasional pyrite
3577 limestone: white to light gray, hard, blocky to subplaty, cryptocrystalline, tight, clean, trace fine pyrite
3603 limestone: light creamy tan to light creamy gray, hard, blocky, microcrystalline, microsucrosic, uniform, clean, trace intercrystalline porosity, trace pinpoint vuggy porosity
3648 limestone: white to light creamy gray, hard, blocky to platy, cryptocrystalline to microcrystalline, clean, tight, microsucrosic in places
3683 limestone: light creamy tan to light creamy gray, hard, blocky, cryptocrystalline to microcrystalline, microsurcosic to sucrosic, clean, tight, trace very fine pyrite
3703 shale: pale green to dull greenish gray to black, hard to firm, sub-blocky, earthy to gritty, medium to coarse texture, weakly laminated, calcareous, fine calcite laminations and coarse rounded accretions, fine to medium grained disseminated pyrite



3763 dolomite: light brown to cinnamon brown, hard, blocky, microcrystalline, sucrosic, uniform texture, clean, trace very poor intercrystalline porosity, occasional fine pyrite

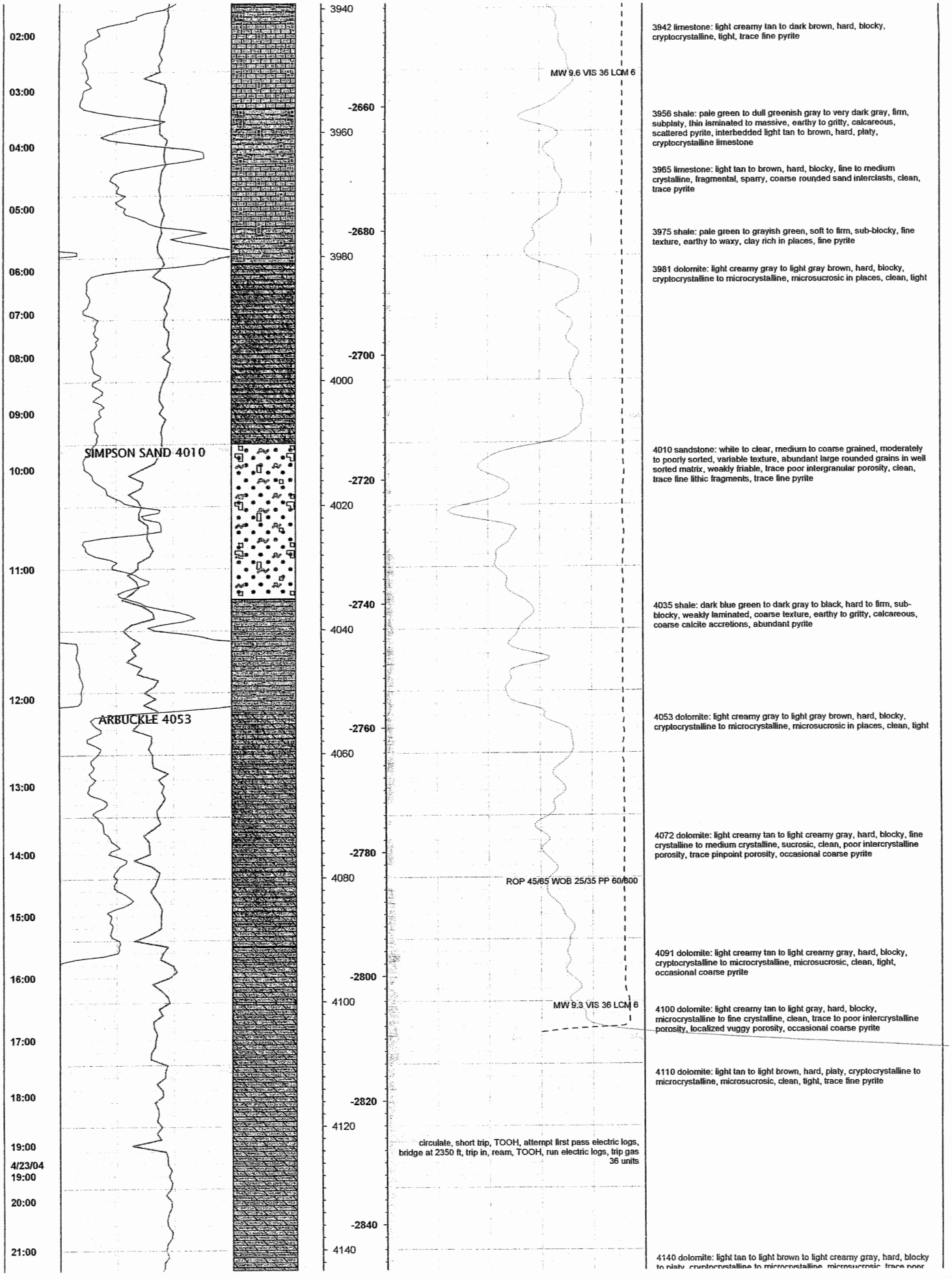
3796 limestone: light creamy tan to light brown, hard, blocky, crusty, microcrystalline to medium crystalline, heterogenous texture, sparry, fragmental in places, intergrown calcite rhombs, clean, trace vuggy porosity, occasional coarse pyrite

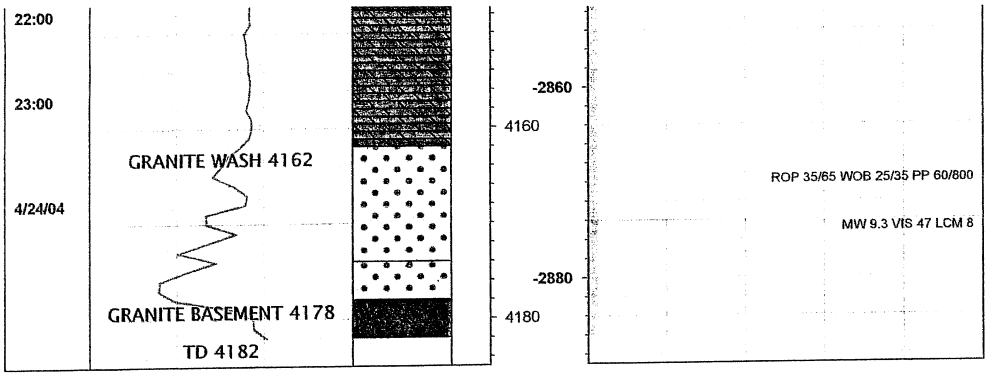
3802 dolomite: light creamy tan to light brown, hard, blocky, crusty, microcrystalline to fine crystalline, trace very poor intercrystalline porosity, trace poor pinpoint vuggy porosity, clean, occasional coarse pyrite

3858 dolomite: light brown to light gray brown, hard, blocky, crusty, fine crystalline, sucrosic, uniform texture, clean, trace poor intercrystalline porosity, occasional coarse pyrite

3880 dolomite: light creamy tan to light gray brown, hard, blocky to platy, cryptocrystalline to microcrystalline, clean, tight, variable texture, occasional coarse pyrite

3920 shale: pale green to very dark gray, hard to firm, blocky, thin laminated to massive, fine texture, earthy to gritty, scattered pyrite, calcareous, occasional coarse calcite


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SIMPSON SAND 4010
ARBUCKLE 4053
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4080
-2800
4100
-2820
4120
-2840
4140
MW 9.6 VIS 36 LCM 6
ROP 45/65 WOB 25/35 PP 60/800
MW 9.3 VIS 36 LCM 6
circulate, short trip, TOOH, attempt first pass electric logs, bridge at 2350 ft, trip in, ream, TOOH, run electric logs, trip gas 36 units
3942 limestone: light creamy tan to dark brown, hard, blocky, cryptocrystalline, tight, trace fine pyrite
3956 shale: pale green to dull greenish gray to very dark gray, firm, subplaty, thin laminated to massive, earthy to gritty, calcareous, scattered pyrite, interbedded light tan to brown, hard, platy, cryptocrystalline limestone
3965 limestone: light tan to brown, hard, blocky, fine to medium crystalline, fragmental, sparry, coarse rounded sand interclasts, clean, trace pyrite
3975 shale: pale green to grayish green, soft to firm, sub-blocky, fine texture, earthy to waxy, clay rich in places, fine pyrite
3981 dolomite: light creamy gray to light gray brown, hard, blocky, cryptocrystalline to microcrystalline, microsucrosic in places, clean, tight
4010 sandstone: white to clear, medium to coarse grained, moderately to poorly sorted, variable texture, abundant large rounded grains in well sorted matrix, weakly friable, trace poor intergranular porosity, clean, trace fine lithic fragments, trace fine pyrite
4035 shale: dark blue green to dark gray to black, hard to firm, sub-blocky, weakly laminated, coarse texture, earthy to gritty, calcareous, coarse calcite accretions, abundant pyrite
4053 dolomite: light creamy gray to light gray brown, hard, blocky, cryptocrystalline to microcrystalline, microsucrosic in places, clean, tight
4072 dolomite: light creamy tan to light creamy gray, hard, blocky, fine crystalline to medium crystalline, sucrosic, clean, poor intercrystalline porosity, trace pinpoint porosity, occasional coarse pyrite
4091 dolomite: light creamy tan to light creamy gray, hard, blocky, cryptocrystalline to microcrystalline, microsucrosic, clean, tight, occasional coarse pyrite
4100 dolomite: light creamy tan to light gray, hard, blocky, microcrystalline to fine crystalline, clean, trace to poor intercrystalline porosity, localized vuggy porosity, occasional coarse pyrite
4110 dolomite: light tan to light brown, hard, platy, cryptocrystalline to microcrystalline, microsucrosic, clean, tight, trace fine pyrite
4140 dolomite: light tan to light brown to light creamy gray, hard, blocky to platy, cryptocrystalline to microcrystalline, microsucrosic, trace poor



4162 sandstone: white to clear, fine to medium grained, well rounded well sorted, uniformly disseminated fine pyrite, abundant coarse pyrite, widespread dark pine green staining, friable, trace to poor intercrystalline porosity, trace pinpoint vuggy porosity

4174 sandstone: white to clear, coarse to very coarse grained, subrounded, moderately to poorly sorted, variable texture, locally well cemented, trace lithic fragments, moderate to good intergranular porosity, localized vuggy porosity, abundant coarse pyrite, uniform dark pine green staining

4178 granite: speckled, white to gray to orange-pink, medium grained, hypidiomorphic granular, zoned Kspar, coarse quartz, muscovite, trace hornblende, trace disseminated pyrite blebs