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KANSAS CORPORATION COMMISSION
OIL & GAS CONSERVATION DIVISION

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KANSAS CORPORATION COMMISSION
JUN 01 2004
CONSERVATION DIVISION
WICHITA, KS

Form ACO-1
September 1999
Form Must Be Typed

WELL COMPLETION FORM
WELL HISTORY - DESCRIPTION OF WELL & LEASE

Operator: License # 33240
Name: Wolverine Environmental Production LLC
Address: 1 Riverfront Plaza, 55 Campau NW
City/State/Zip: Grand Rapids, MI. 49503
Purchaser: None
Operator Contact Person: Richard Moritz
Phone: (616) 458-1150 ext.119
Contractor: Name: Mc Gowen Drilling Inc.
License: 5786
Wellsite Geologist: Chris Ryan

Designate Type of Completion:

___ New Well ___ Re-Entry ___ Workover
___ Oil ___ SWD ___ SIOW ___ Temp. Abd.
___ Gas ___ ENHR ___ SIGW
✓ Dry ___ Other (Core, WSW, Expl., Cathodic, etc)

If Workover/Re-entry: Old Well Info as follows:

Operator:
Well Name:
Original Comp. Date: ___ Original Total Depth:

___ Deepening ___ Re-perf. ___ Conv. to Enhr./SWD
___ Plug Back ___ Plug Back Total Depth
___ Commingled Docket No.
___ Dual Completion Docket No.
___ Other (SWD or Enhr.?) Docket No.

10/26/03	11/2/03	None- Dry Hole
Spud Date or Recompletion Date	Date Reached TD	Completion Date or Recompletion Date

API No. 15 - 111-204300000
County: Lyon
~~SW~~ - SE - SW Sec. 29 Twp. 15 S. R. 12 ☑ East ☐ West
~~585 ft. fr. S line~~ 430' feet from (S) / N (circle one) Line of Section
~~1980 ft. fr. W line~~ 3370' feet from (E) / W (circle one) Line of Section
Footages Calculated from Nearest Outside Section Corner:
(circle one) NE SE NW SW
Lease Name: Coulter Well #: 29-DW
Field Name: Wildcat
Producing Formation: None - Dry Hole
Elevation: Ground: 1980 Kelly Bushing:
Total Depth: 2196 Plug Back Total Depth:
Amount of Surface Pipe Set and Cemented at 105 Feet
Multiple Stage Cementing Collar Used? ☐ Yes ☑ No
If yes, show depth set Feet
If Alternate II completion, cement circulated from
feet depth to w/ sx cmt.

Drilling Fluid Management Plan DAA KJR 6/07/07
(Data must be collected from the Reserve Pit)
Chloride content 800 ppm Fluid volume 1300 bbls
Dewatering method used Evaporation
Location of fluid disposal if hauled offsite:
Operator Name: N/A
Lease Name: License No.:
Quarter Sec. Twp. S. R. ☐ East ☐ West
County: Docket No.:

INSTRUCTIONS: An original and two copies of this form shall be filed with the Kansas Corporation Commission, 130 S. Market - Room 2078, Wichita, Kansas 67202, within 120 days of the spud date, recompletion, workover or conversion of a well. Rule 82-3-130, 82-3-106 and 82-3-107 apply. Information of side two of this form will be held confidential for a period of 12 months if requested in writing and submitted with the form (see rule 82-3-107 for confidentiality in excess of 12 months). One copy of all wireline logs and geologist well report shall be attached with this form. ALL CEMENTING TICKETS MUST BE ATTACHED. Submit CP-4 form with all plugged wells. Submit CP-111 form with all temporarily abandoned wells.

All requirements of the statutes, rules and regulations promulgated to regulate the oil and gas industry have been fully complied with and the statements herein are complete and correct to the best of my knowledge.

Signature: Joel Kuehn
Title: Petroleum Eng. Date: 5-28-04
Subscribed and sworn to before me this 28 day of May,
20 04.
Notary Public: Janice R. Weaver
Date Commission Expires: 5-1-2005
#01006609

KCC Office Use ONLY

NO **Letter of Confidentiality Received**
If Denied, Yes ☐ Date:
___ **Wireline Log Received**
___ **Geologist Report Received**
___ **UIC Distribution**

✓

X

Side Two

Operator Name: Wolverine Environmental Production LLC Lease Name: Coulter Well #: 29-DW

Sec. 29 Twp. 15 S. R. 12 ☑ East ☐ West County: Lyon

INSTRUCTIONS: Show important tops and base of formations penetrated. Detail all cores. Report all final copies of drill stems tests giving interval tested, time tool open and closed, flowing and shut-in pressures, whether shut-in pressure reached static level, hydrostatic pressures, bottom hole temperature, fluid recovery, and flow rates if gas to surface test, along with final chart(s). Attach extra sheet if more space is needed. Attach copy of all Electric Wireline Logs surveyed. Attach final geological well site report.

Drill Stem Tests Taken (Attach Additional Sheets) ☐ Yes ☑ No

Samples Sent to Geological Survey ☑ Yes ☐ No

Cores Taken ☑ Yes ☐ No

Electric Log Run (Submit Copy) ☐ Yes ☑ No

List All E. Logs Run:

☐ Log Formation (Top), Depth and Datum ☐ Sample

Name Top Datum

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WICHITA, KS

CASING RECORD ☑ New ☐ Used
Report all strings set-conductor, surface, intermediate, production, etc.

Purpose of String	Size Hole Drilled	Size Casing Set (In O.D.)	Weight Lbs. / Ft.	Setting Depth	Type of Cement	# Sacks Used	Type and Percent Additives
Surface	12-1/4"	8 5/8"	23 ppf	103.22'	A Ptld.	56	3%cc;2%gel;
							1/4pps floseal

ADDITIONAL CEMENTING / SQUEEZE RECORD

Purpose: ___ Perforate ___ Protect Casing ___ Plug Back TD ___ Plug Off Zone	Depth Top Bottom	Type of Cement	#Sacks Used	Type and Percent Additives
		N/A		

Shots Per Foot	PERFORATION RECORD - Bridge Plugs Set/Type Specify Footage of Each Interval Perforated	Acid, Fracture, Shot, Cement Squeeze Record (Amount and Kind of Material Used)	Depth
	N/A		

TUBING RECORD Size N/A Set At Packer At

Liner Run ☐ Yes ☑ No

Date of First, Resumerd Production, SWD or Enhr. Dry Hole

Producing Method ☐ Flowing ☐ Pumping ☐ Gas Lift ☐ Other (Explain)

Estimated Production Per 24 Hours	Oil Bbls.	Gas Mcf	Water Bbls.	Gas-Oil Ratio	Gravity

Disposition of Gas METHOD OF COMPLETION Production Interval

☐ Vented ☐ Sold ☐ Used on Lease (If vented, Submit ACO-18.)

☐ Open Hole ☐ Perf. ☐ Dually Comp. ☐ Commingled

☐ Other (Specify)

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KANSAS CORPORATION COMMISSION

JUN 0 1 2004

CONSERVATION DIVISION
WICHITA, KS

CONSOLIDATED OIL WELL SERVICES, INC.
211 W. 14TH STREET, CHANUTE, KS 66720
620-431-9210 OR 800-467-8676

TICKET NUMBER 23118

LOCATION Ottawa

FOREMAN Alan Made

TREATMENT REPORT

DATE	CUSTOMER ACCT #	WELL NAME	QTR/QTR	SECTION	TWP	RGE	COUNTY	FORMATION
10-26-03		Coulter 29-OW		29	15	12		

CHARGE TO	Wolverine Environmental	OWNER	
MAILING ADDRESS	1 Riverfront Plaza Campau	OPERATOR	
CITY	Grand Rapids	CONTRACTOR	Cont Lick
STATE	Mi	DISTANCE TO LOCATION	55
ZIP CODE	49503		
TIME ARRIVED ON LOCATION	4:00 AM	TIME LEFT LOCATION	5:30 AM

WELL DATA

HOLE SIZE	12 1/4
TOTAL DEPTH	110
CASING SIZE	8 5/8
CASING DEPTH	103
CASING WEIGHT	
CASING CONDITION	12 Land sub
TUBING SIZE	
TUBING DEPTH	
TUBING WEIGHT	
TUBING CONDITION	
PACKER DEPTH	
PERFORATIONS	
SHOTS/FT	
OPEN HOLE	
TREATMENT VIA	

TYPE OF TREATMENT

[✓] SURFACE PIPE	[ ] ACID BREAKDOWN
[ ] PRODUCTION CASING	[ ] ACID STIMULATION
[ ] SQUEEZE CEMENT	[ ] ACID SPOTTING
[ ] PLUG & ABANDON	[ ] FRAC
[ ] PLUG BACK	[ ] FRAC + NITROGEN
[ ] MISC PUMP	[ ] FOAM FRAC
[ ] OTHER	[ ] NITROGEN

PRESSURE LIMITATIONS

	THEORETICAL	INSTRUCTED
SURFACE PIPE		
ANNULUS LONG STRING		
TUBING		

INSTRUCTION PRIOR TO JOB Cement Surface with Portland A 3% Cal 2% gel 1/4# Flo-seal. Mix @ 14.8 PPG.
386 A Made
368 B Zabel 195 R Abb

JOB SUMMARY

DESCRIPTION OF JOB EVENTS Established circulation, Mixed + pumped 1 bbl dye followed by 56 sx cement. Circulated dye to surface. Displaced casing with 6 1/4 bbl clean water. Circulated 3 bbl cement returns. Closed valve.

5:15 AM Finished

Alan Made

PRESSURE SUMMARY

BREAKDOWN or CIRCULATING	100	psi
FINAL DISPLACEMENT	100	psi
ANNULUS		psi
MAXIMUM		psi
MINIMUM		psi
AVERAGE		psi
ISIP	100	psi
5 MIN SIP		psi
15 MIN SIP		psi

TREATMENT RATE

BREAKDOWN BPM	
INITIAL BPM	
FINAL BPM	
MINIMUM BPM	
MAXIMUM BPM	
AVERAGE BPM	4 BPM

AUTHORIZATION TO PROCEED Steve Hart

TITLE EXACT (918) 599.9801

DATE 10/26/03

ALL THE TERMS AND CONDITIONS STATED ON THE REVERSE SIDE ARE INCORPORATED AS PART OF THIS SALE.

Ravin 1259

CONSOLIDATED OIL WELL SERVICES
An Infinity Company
211 W. 14TH STREET, CHANUTE, KS 66720
620-431-9210 OR 800-467-8676

TICKET NUMBER 20606

LOCATION Ottawa

FIELD TICKET

DATE	CUSTOMER ACCT #	WELL NAME	QTR/QTR	SECTION	TWP	RGE	COUNTY	FORMATION
10-26-03		Coulter	29-DW	29	15	12	Ly	

CHARGE TO Wolverine Environmental	OWNER
MAILING ADDRESS 1 River Front Plaza Campau, NW	OPERATOR Steve Hash
CITY & STATE Grand Rapids Mi 49503	CONTRACTOR Gullick

ACCOUNT CODE	QUANTITY or UNITS	DESCRIPTION OF SERVICES OR PRODUCT	UNIT PRICE	TOTAL AMOUNT
5401	1	PUMP CHARGE cement surface		525.00
5402	115'	casing footage	.14	NC
1102	3	calcium chloride	34.00	102.00
1118	1	premium gel	11.80	11.80
1107	1	flo-seal	37.25	37.25
4111	1	8 5/8 centralizer		37.50
		BLENDING & HANDLING		209.00
5407	55 miles	TON-MILES		
		STAND BY TIME		
		MILEAGE		
		WATER TRANSPORTS		
		VACUUM TRUCKS supplied		
		FRAC SAND		
1104	53	CEMENT Portland "A" Lyon 5.6%	8.40	445.20
			SALES TAX	37.37
			ESTIMATED TOTAL	1415.62

Ravin 2790

CUSTOMER or AGENTS SIGNATURE Steve Hash CIS FOREMAN Alan Mader

EXACT Engineering Inc. (918) 599-9801

CUSTOMER or AGENT (PLEASE PRINT) DATE 10-26-03

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

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KANSAS CORPORATION COMMISSION
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CONSERVATION DIVISION
WICHITA, KS

FORMATION EVALUATION LOG

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

COMPANY: Wolverine Environmental Production LLC
WELL: Coulter 29-DW
FIELD: Wildcat
COUNTY: Lyon **STATE:** KANSAS

API #: 15-111-20430-00-00
LOCATION: 585 fsl 3300 fel
s/2 se sw
Sec 29 Twp 15 Rge 12

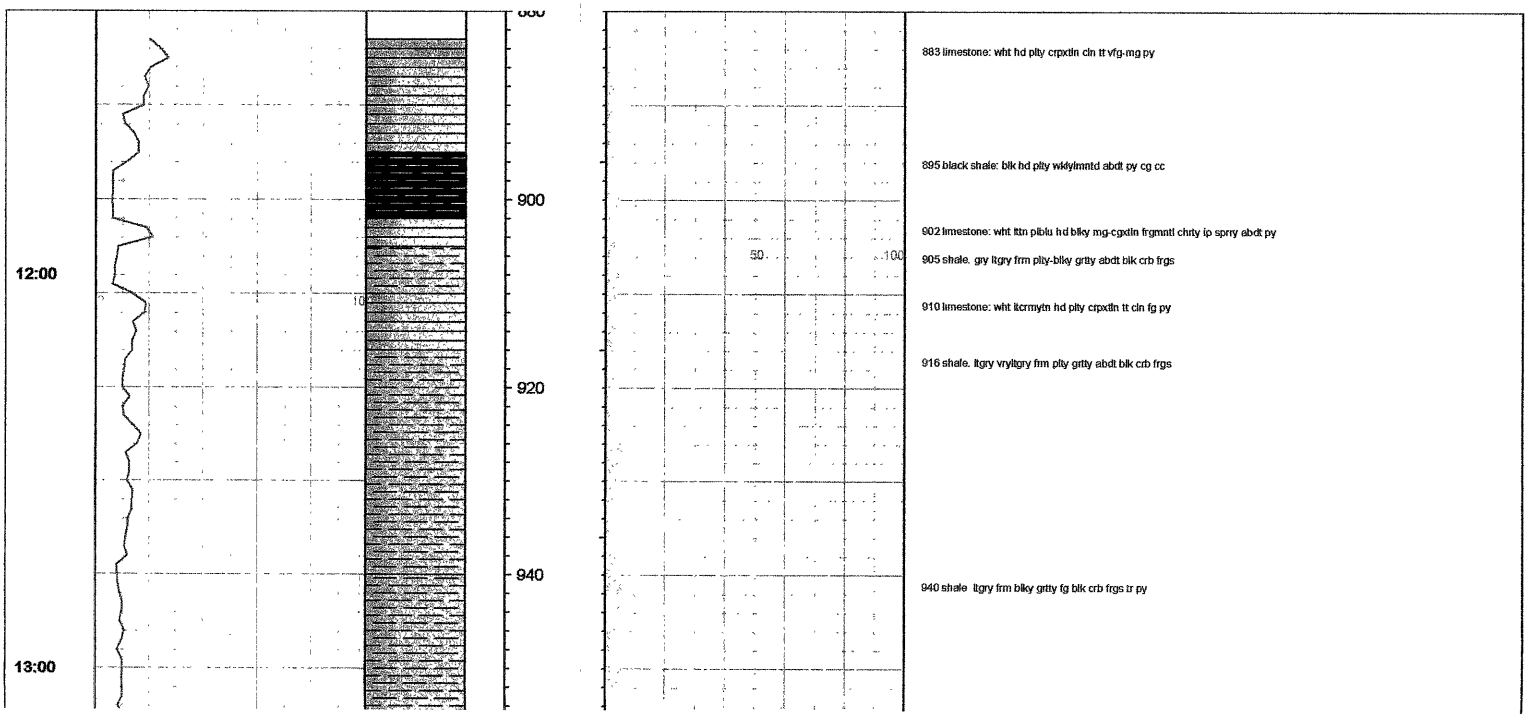
ELEV GL: 1260 ft
ELEV KB: 1268 ft
Log Measured from: KB

Spud Date	October 25, 2003
Surface Casing	8.625 @ 113 ft
Hole Size	7.875
Total Depth	2196 ft
Logging Dates	October 27 - November 1, 2003
Interval Logged	880 - 2196 ft
Drilling Fluid	bentonite gel
Mud Pumps	Gardner Denver 6 x 10
Drilling Contractor	Gulick Drilling Inc.
Rig Pusher	Ron Gulick
Company Geologist	John Vrona
Company Engineer	Steve Hash, EXACT Engineering
Logging Geologist	Chris Ryan

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 — 10; 0 second scale = x10 100
GAMMA RAY (API UNITS) 0 — 300
LITHOLOGY
CORE
DEPTH (FT)
ELEVATION (FT)
TOTAL GAS (UNITS) 0 — 100
LITHOLOGIC DESCRIPTION



883 limestone: wht hd plty crpxtln cln tr vfg-mg py

895 black shale: blk hd plty wkdylmntd abdt py cg cc

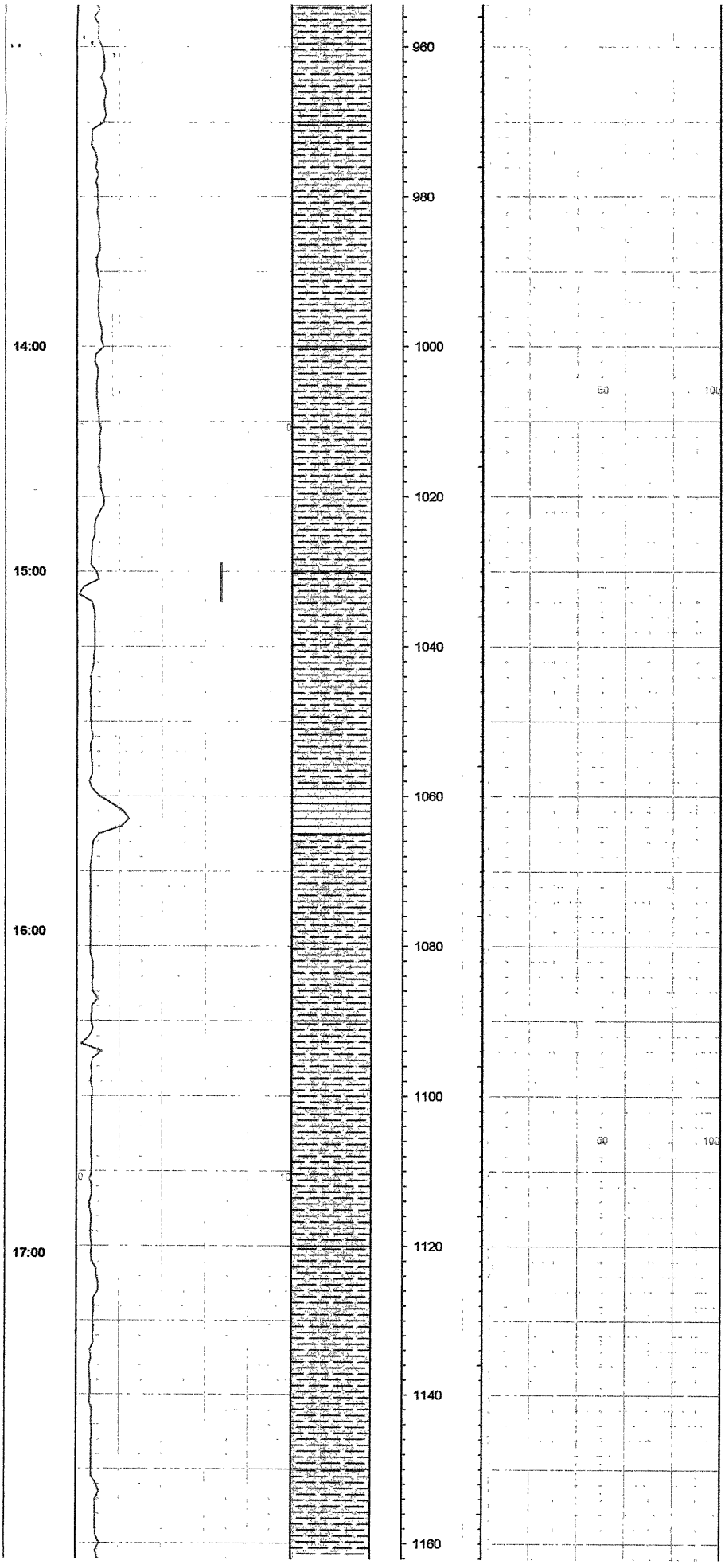
902 limestone: wht ltn plblu hd blky mg-cgxtln frgmntl chrty ip spnry abdt py

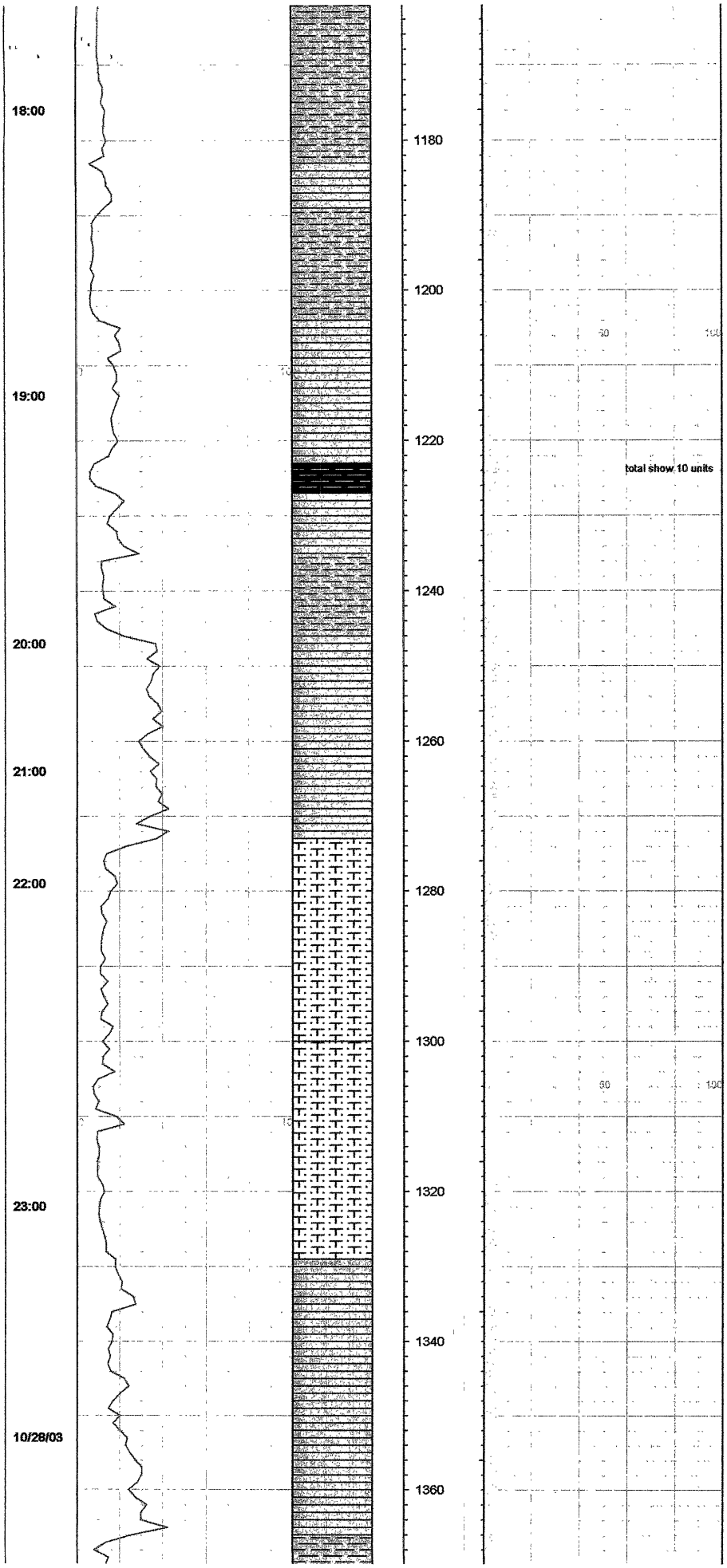
905 shale. gry ltgry frm plty-blky grtty abdt blk crb frgs

910 limestone: wht ltcrmytn hd plty crpxtln tt cln fg py

916 shale. ltgry vrylt gry frm plty grtty abdt blk crb frgs

940 shale ltgry frm blky grtty fg blk crb frgs tr py





1183 limestone wht ltcrmytn hd blky crpxtln-micxtln cln tt tr py

1189 shale: ltgry ltbrngry frm plty grtty abdt blk crb frgs

1204 limestone. wht ltbn hd plty crpxtln cln tt tr fg py

1223 black shale. blk hd blky thnlmntd wdy fg py occ cc

1227 limestone. ltbrn ltbn mtlld hd blky micxtln micsuc frgmntl ip fg skel frgs pcypds tr py

1235 shale. ltgry gry frm plty grtty fg blk crb frgs

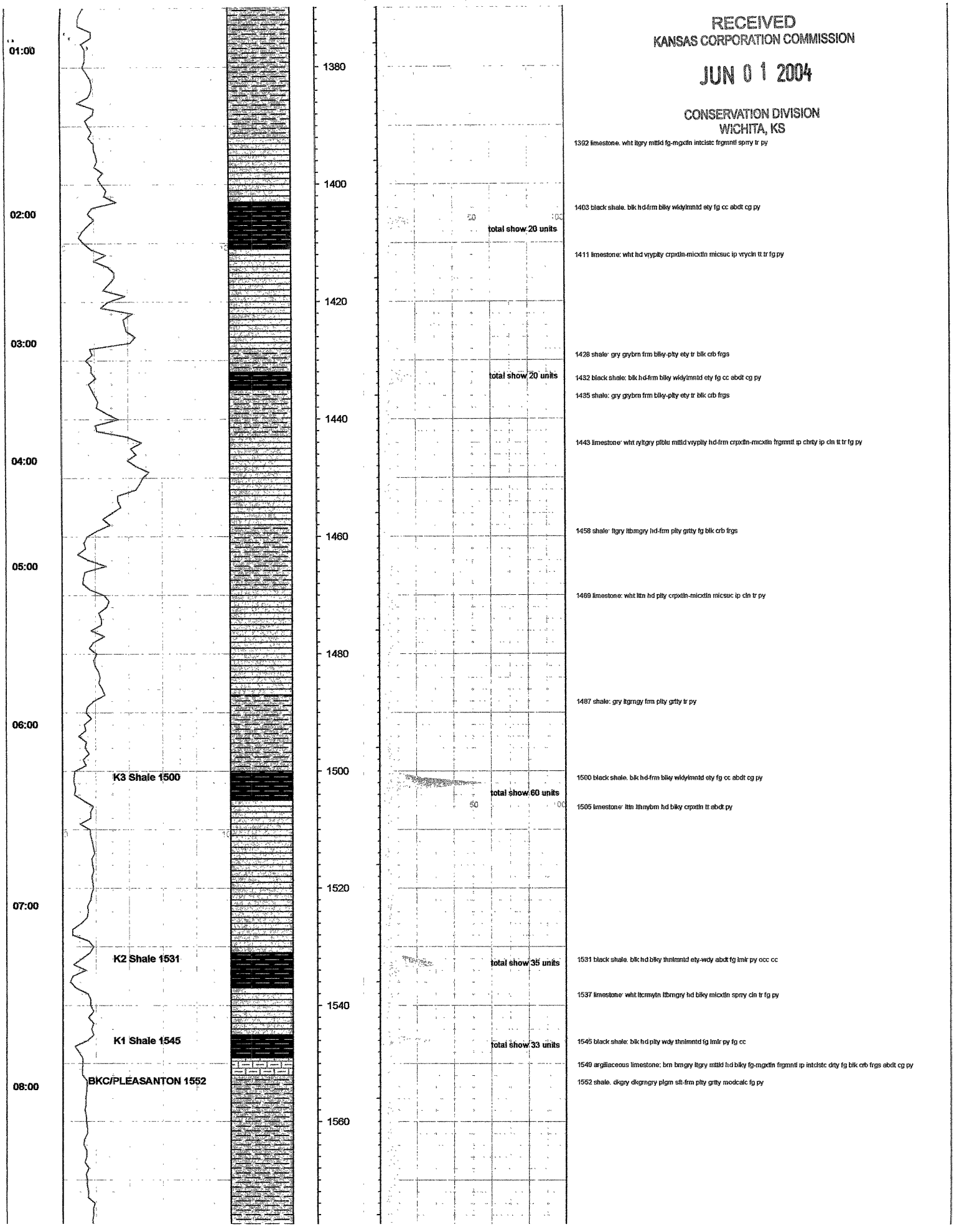
1246 limestone: wht ltcrmytn hd plty crpxtln-micxtln cln tt tr py

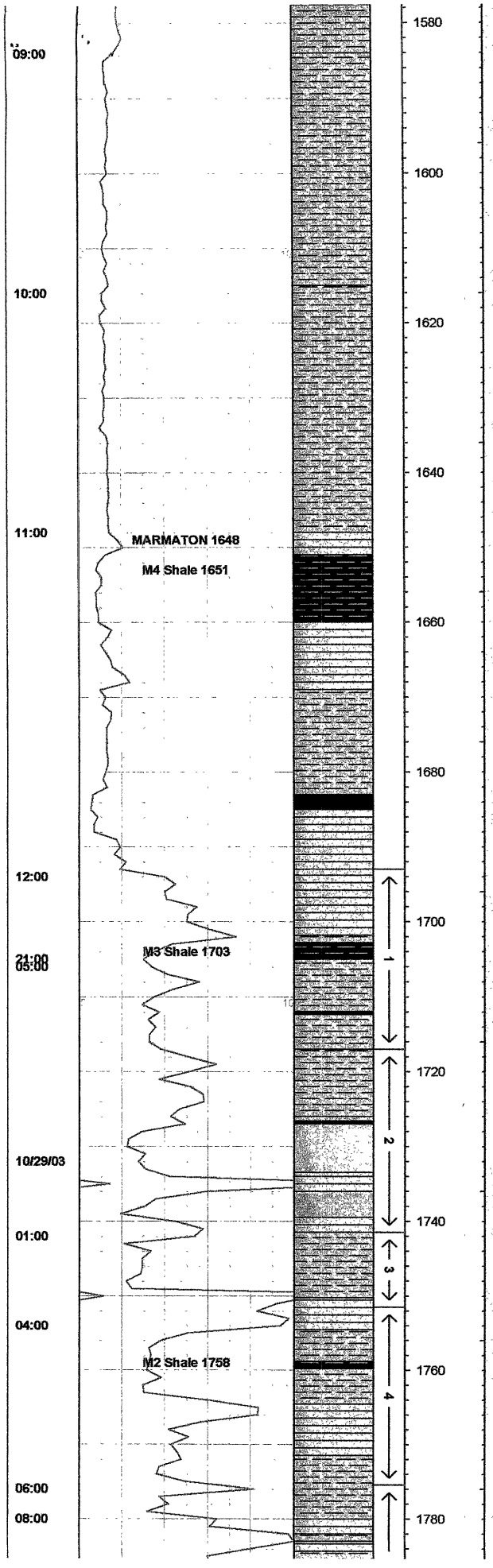
1273 silty sand. ltgry - ltgrybrn, fg, sbrnd, wlsrtd, modcmntd, wkdyfrbl, slty, pigm sh flgs, tr vp por

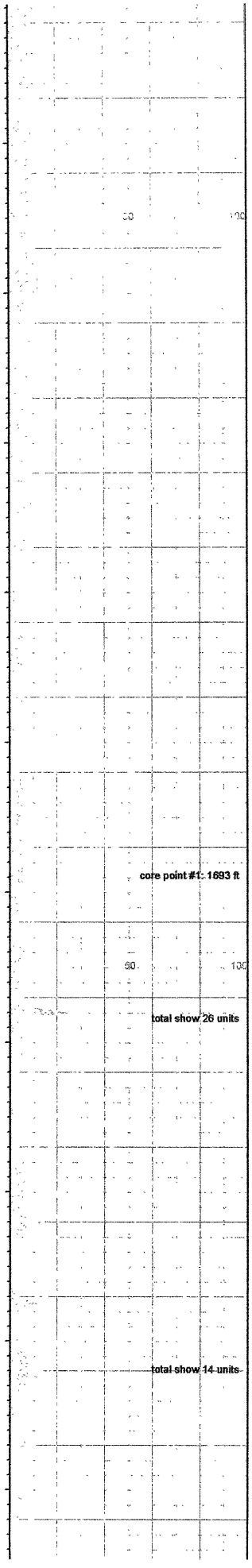
1300 silty sand: ltgry - ltgrybrn, fg, sbrnd, wlsrtd, modcmntd, wkdyfrbl, slty, pigm sh flgs, tr vp por

1329 limestone. wht hd plty crpxtln tt cln fg py

1366 shale: gr ltgry frm plty wkly lmntd grtty tr blk crb frgs







1584 shale: plgrn ltgrngry frm plty grtty calc fg py

1615 shale: plgrn ltgrngry frm plty grtty wkdylmntd wkdycalc tr fg py

1648 limestone: wht ltcrmytn ltbrngry hd blky micxtln sprry cln tr fg py

1651 black shale, blk hd blky wkdylmntd ety occ fg py cc

1660 limestone: ltn ltyllw hd blky micxtln sprry frgmntl ip fg skel frgs fg py

1669 shale: plgrn ltgrnbrn sft-frm plty grtty tr py calc ip

1683 coal: blk hd blky vit wlmntd bny abdt fg lmlr py cc mtclsts

1685 limestone: wht ltbrngry hd plty crpxtln-micxtln micsuc ip arg ip tr fg py

1693 limestone: ltcrmytn, hd, micxtln, micsuc, mctc, 10% intbdd olvgrn sh, occ skel frgs, bvivs

1702 shale: olvgrn, frm, mssv, vryfntxt, ety-wxy, calc

1703 black shale: blk, hd-frm, plty, fssl, fg txt, vry carb, sltly calc, occ cg skel frgs, fg lmlr py, tr vis gas

1705 shale: dkgrnbrn-ltbrn, frm, plty, wkdylmntd, fn-med txt, ety, vry calc, fg skel frgs, brchs, occ fg diss py

1712 coal: hd, blk, wlmntd, subvit, fg lmlr py, shly ip, tr vis gas

1712 shale: ltgrn-tl, vry hd, mssv, fntxt, ety, abdt blk carb frgs, lrg 2-3 cm plnt frgs, abdt py

1717 shale: dkgry-dkgrngry, hd, plty, wlmntd, fn txt, thnbdd, 2-5 mm ltn sltstn intbds, ety, lrg plnt frgs

1726 shale: blk-vrydkgrngry-dkbrn, plty, fssl, wdy, abdt nrw blk vit cl strgrs

1727 coal: blk, hd, wlmntd, subvit, wkly dvdp ortclts, tr py, vis gas

1727 clay rich shale: dkgrngry-grybrn, frm, wkdylmntd, mssv, wxy, wkly calc

1734 limestone: ltgrybrn, hd, fg xtln, tt, no por, sprry ip, scttrd cg skel frgs, bvivs, wlcmntd

1736 limey shale: tlgrn, hd, wkdylmntd, fn txt, wxy, vry trbtd, lrg irr lst nods 25-30%, cg skel frgs

1740 limestone: tlgrn-dkgrybrn, hd, vfgxtln-micxtln, mctc, abdt cg skel frgs, brchs

1742 shale: dkgrn, dkgrngry, hd-frm, wkdylmntd, crs txt, ety-grtty, calc, trbtd, irr lst nods, scttrd skel frgs, fossl rch bds, crnds, brchs

1750 limestone: dkbrn, hd, mg-cgxtln, sprry, wlcmntd, abdt cg skel frgs, brchs

1755 shale: vrydkgry-fltblk, hd, plty, vryfntxt, wkly carb, tr fg diss py, wkdylmntd, tr skel frgs

1759 black shale: blk, hd, plty, wlmntd, carb, vryfntxt, abdt fg lmlr py, fg py frct tlgs, lrg py nods, vis gas

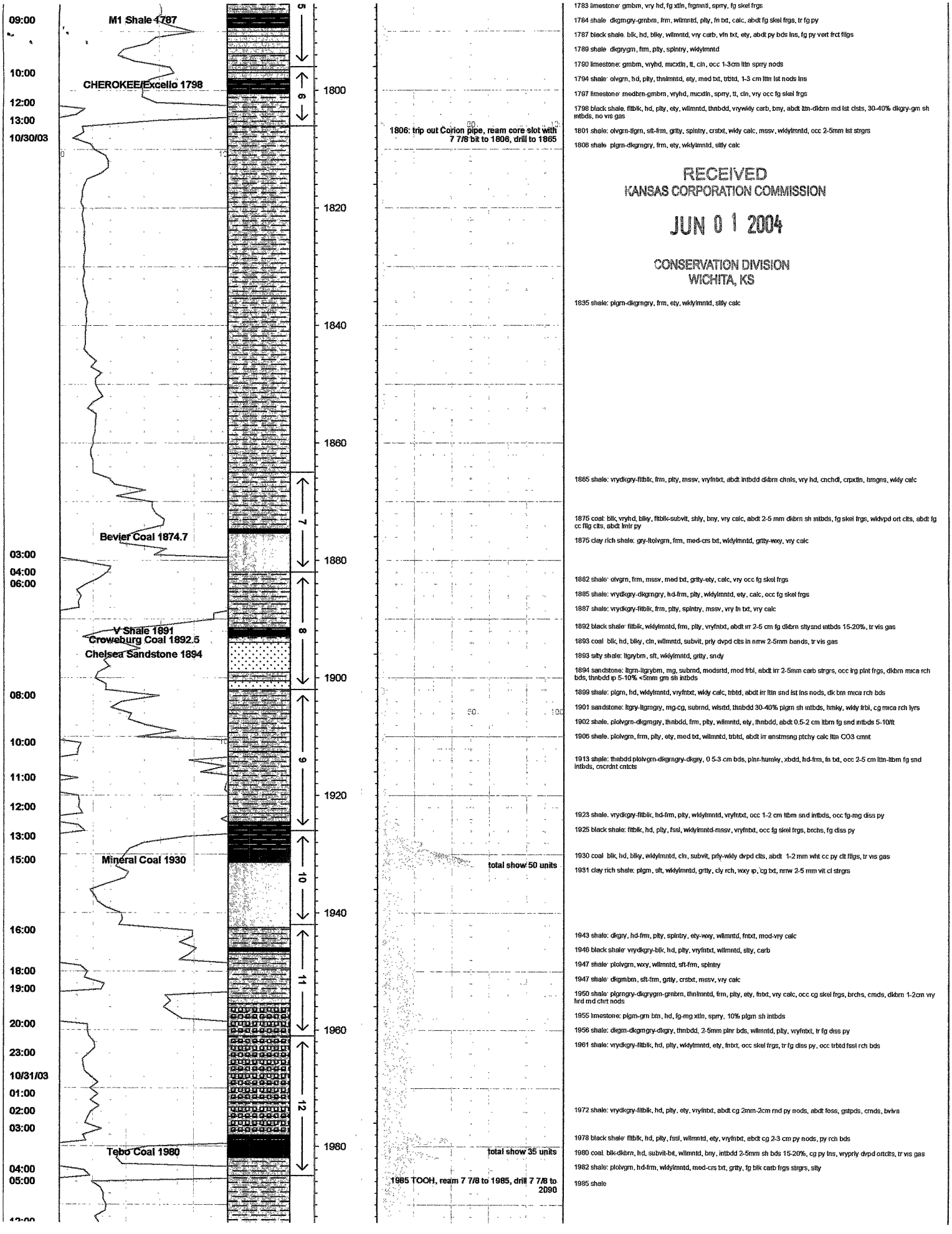
1760 shale: vrydkgry-dkgrngry, wkdylmntd, hd-frm, plty, sltly calc, wxy, 1-3cm lst intbds 10%, occ skel frgs

1765 limestone: ltbrn-dkbrn, hd, fg-mgxtln, sprry, tt, wlcmntd, fg skel frgs, 15-20% mtbdd tlgrn sh, hd, mssv, fg diss py

1772 shale: dkpngrn, frm, wkdylmntd, med-crsbxt, wxy, sltly calc, occ fg skel frgs, fg diss py

1780 limestone: tlgrn-gmbrn, fgxtln, sprry, hd, wlcmntd, abdt cg skel frgs, brchpds

1782 shale: olvgrn-dkgrngry, frm, wlmntd, ety, plty, fssl, wkly calc, abdt fg skel frgs, crnd bds



1783 limestone: gmbrn, vry hd, fg xtln, frgmntl, spnry, fg skel frgs

1784 shale: dkgmgry-grnbrn, frm, wlmmtd, plty, fn txt, calc, abdt fg skel frgs, tr fg py

1787 black shale: blk, hd, blky, wlmmtd, vry carb, vfn txt, ety, abdt py bds lns, fg py vert frct fllgs

1789 shale: dkgrygrn, frm, plty, splntry, wkdylmntd

1790 limestone: grnbrn, vryhd, mcxtln, tl, cln, occ 1-3cm ltbn spnry nods

1794 shale: olvgrn, hd, plty, thnlmntd, ety, med txt, trbtd, 1-3 cm ltbn lst nods lns

1797 limestone: medbrn-grnbrn, vryhd, mcxtln, spnry, tt, cln, vry occ fg skel frgs

1798 black shale, fltblk, hd, plty, ety, wlimntd, thnbdd, vrywkly carb, bny, abdt ltbn-dkbrn md lst clsts, 30-40% dkgry-grn sh intbds, no vis gas

1801 shale: olvgrn-tlgrn, sft-frm, grtty, splntry, crstxt, wkly calc, mssv, wkdylmntd, occ 2-5mm lst strgrs

1806 shale: plgrn-dkgrngry, frm, ety, wkdylmntd, slty calc

1835 shale: plgrn-dkgrngry, frm, ety, wkdylmntd, slty calc

1865 shale: vrydkgry-fltblk, frm, plty, mssv, vryfntxt, abdt intbdd dkbrn chnls, vry hd, cnchdl, crpxtln, lmgns, wkly calc

1875 coal: blk, vryhd, blky, fltblk-subvit, shly, bny, vry calc, abdt 2-5 mm dkbrn sh intbds, fg skel frgs, wkdvpd ort clts, abdt fg cc fllg clts, abdt lmtr py

1875 clay rich shale: gry-ltolvgrn, frm, med-crs txt, wkdylmntd, grtty-wxy, vry calc

1882 shale: olvgrn, frm, mssv, med txt, grtty-ety, calc, vry occ fg skel frgs

1885 shale: vrydkgry-dkgrngry, hd-frm, plty, wkdylmntd, ety, calc, occ fg skel frgs

1887 shale: vrydkgry-fltblk, frm, plty, splntry, mssv, vry fn txt, vry calc

1892 black shale: fltblk, wkdylmntd, frm, plty, vryfntxt, abdt irr 2-5 cm fg dkbrn siltysnd intbds 15-20%, tr vis gas

1893 coal: blk, hd, blky, cln, wlimntd, subvit, prly dvpd clts in nrrw 2-5mm bands, tr vis gas

1893 silty shale: ltgrybrn, sft, wkdylmntd, grtty, sndy

1894 sandstone: ltgrn-ltgrybrn, mg, subrnd, modsrtd, mod frbl, abdt irr 2-5mm carb strgrs, occ lrg plnt frgs, dkbrn mica rch bds, thnbdd ip 5-10% <5mm grn sh intbds

1899 shale: plgrn, hd, wkdylmntd, vryfntxt, wkly calc, trbtd, abdt irr ltbn snd lst lns nods, dk brn mica rch bds

1901 sandstone: ltgry-ltgrngry, mg-cg, subrnd, wlsttd, thnbdd 30-40% plgrn sh intbds, hmky, wkly frbl, cg mica rch lyrs

1902 shale: plolvgrn-dkgrngry, thnbdd, frm, plty, wlimntd, ety, thnbdd, abdt 0.5-2 cm ltbrn fg snd intbds 5-10/ft

1906 shale: plolvgrn, frm, plty, ety, med txt, wlimntd, trbtd, abdt irr anstmsng ptchy calc ltbn CO3 cmnt

1913 shale: thnbdd plolvgrn-dkgrngry-dkgry, 0.5-3 cm bds, plnr-humky, xbdd, hd-frm, fn txt, occ 2-5 cm ltbn-ltbrn fg snd intbds, cncrdnt cntcts

1923 shale: vrydkgry-fltblk, hd-frm, plty, wkdylmntd, vryfntxt, occ 1-2 cm ltbrn snd intbds, occ fg-mg diss py

1925 black shale: fltblk, hd, plty, fssl, wkdylmntd-mssv, vryfntxt, occ fg skel frgs, brchs, fg diss py

1930 coal: blk, hd, blky, wkdylmntd, cln, subvit, prly-wkly dvpd clts, abdt 1-2 mm wht cc py clt fllgs, tr vis gas

1931 clay rich shale: plgrn, sft, wkdylmntd, grtty, cly rch, wxy ip, cg txt, nrrw 2-5 mm vit cl strgrs

1943 shale: dkgry, hd-frm, plty, splntry, ety-wxy, wlimntd, fntxt, mod-vry calc

1946 black shale: vrydkgry-blk, hd, plty, vryfntxt, wlimntd, slty, carb

1947 shale: plolvgrn, wxy, wlimntd, sft-frm, splntry

1947 shale: dkgrnbrn, sft-frm, grtty, crstxt, mssv, vry calc

1950 shale: plgrngry-dkgrygrn-grnbrn, thnlmntd, frm, plty, ety, fntxt, vry calc, occ cg skel frgs, brchs, cmds, dkbrn 1-2cm vry hrd md chrt nods

1955 limestone: plgrn-grn brn, hd, fg-mg xtln, spnry, 10% plgrn sh intbds

1956 shale: dkgrn-dkgrngry-dkgry, thnbdd, 2-5mm plnr bds, wlimntd, plty, vryfntxt, tr fg diss py

1961 shale: vrydkgry-fltblk, hd, plty, wkdylmntd, ety, fntxt, occ skel frgs, tr fg diss py, occ trbtd fssl rch bds

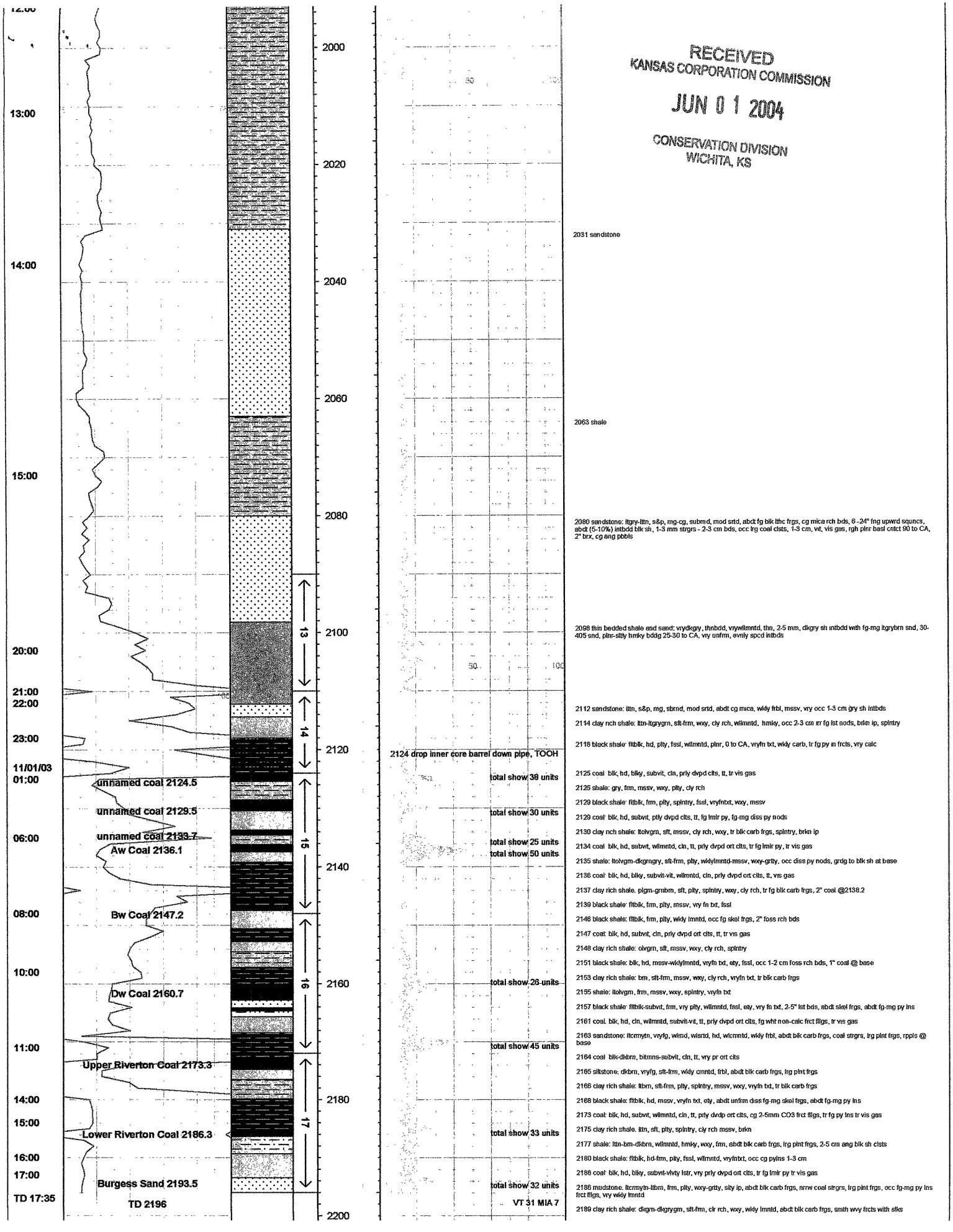
1972 shale: vrydkgry-fltblk, hd, plty, ety, vryfntxt, abdt cg 2mm-2cm rnd py nods, abdt foss, gstpds, cmds, bvlvs

1978 black shale: fltblk, hd, plty, fssl, wlimntd, ety, vryfntxt, abdt cg 2-3 cm py nods, py rch bds

1980 coal: blk-dkbrn, hd, subvit-bit, wlimntd, bny, intbdd 2-5mm sh bds 15-20%, cg py lns, vrypriy dvpd ortclts, tr vis gas

1982 shale: plolvgrn, hd-frm, wkdylmntd, med-crs txt, grtty, fg blk carb frgs strgrs, slty

1985 shale



2031 sandstone

2063 shale

2080 sandstone: ltgry-ltbn, s&p, mg-cg, subrnd, mod srtd, abdt fg blk lithc frgs, cg mica rch bds, 6 -24" fng upwrd squncs, abdt (5-10%) intbdd blk sh, 1-3 mm strgrs - 2-3 cm bds, occ lrg coal clsts, 1-3 cm, vt, vis gas, rgh plnr basl cntct 90 to CA, 2" brx, cg ang pbbls

2098 thin bedded shale and sand: vrydkgry, thnbdd, vrywllmntd, thn, 2-5 mm, dkgry sh intbdd with fg-mg ltgrybrn snd, 30-405 snd, plnr-silty hmky bddg 25-30 to CA, vry unfrm, evnly spcd intbds

2112 sandstone: ltbn, s&p, mg, sbrnd, mod srtd, abdt cg mica, wkly frbl, mssv, vry occ 1-3 cm gry sh intbds

2114 clay rich shale: ltbn-ltgrygrn, sft-frm, wxy, cly rch, wllmntd, hmky, occ 2-3 cm irr fg lst nods, brkn ip, splntry

2118 black shale: fltblk, hd, plty, fssl, wllmntd, plnr, 0 to CA, vryfn txt, wkly carb, tr fg py in frcts, vry calc

2125 coal blk, hd, blky, subvit, cln, prly dvpd clts, tt, tr vis gas

2125 shale: gry, frm, mssv, wxy, plty, cly rch

2129 black shale: fltblk, frm, plty, splntry, fssl, vryfntxt, wxy, mssv

2129 coal: blk, hd, subvit, ptly dvpd clts, tt, fg lmir py, fg-mg diss py nods

2130 clay rich shale: ltolvgrn, sft, mssv, cly rch, wxy, tr blk carb frgs, splntry, brkn ip

2134 coal blk, hd, subvit, wllmntd, cln, tt, prly dvpd ort clts, tr fg lmir py, tr vis gas

2135 shale: ltolvgm-dkgrngry, sft-frm, plty, wkylmntd-mssv, wxy-grlty, occ diss py nods, grdg to blk sh at base

2136 coal: blk, hd, blky, subvit-vit, wllmntd, cln, prly dvpd ort clts, tt, vis gas

2137 clay rich shale. plgm-grnbrn, sft, plty, splntry, wxy, cly rch, tr fg blk carb frgs, 2" coal @2138.2

2139 black shale: fltblk, frm, plty, mssv, vry fn txt, fssl

2146 black shale: fltblk, frm, plty, wkly lmntd, occ fg skel frgs, 2" foss rch bds

2147 coal: blk, hd, subvit, cln, prly dvpd ort clts, tt, tr vis gas

2148 clay rich shale: olvgrn, sft, mssv, wxy, cly rch, splntry

2151 black shale: blk, hd, mssv-wkylmntd, vryfn txt, ety, fssl, occ 1-2 cm foss rch bds, 1" coal @ base

2153 clay rich shale: brn, sft-frm, mssv, wxy, cly rch, vryfn txt, tr blk carb frgs

2155 shale: ltolvgrn, frm, mssv, wxy, splntry, vryfn txt

2157 black shale: fltblk-subvit, frm, vry plty, wllmntd, fssl, ety, vry fn txt, 2-5" lst bds, abdt skel frgs, abdt fg-mg py lns

2161 coal: blk, hd, cln, wllmntd, subvit-vit, tt, prly dvpd ort clts, fg wht non-calc frct fllgs, tr vis gas

2163 sandstone: ltcrnytn, vryfg, wlmd, wlsrtd, hd, wlcmntd, wkly frbl, abdt blk carb frgs, coal strgrs, lrg plnt frgs, rppls @ base

2164 coal: blk-dkbrn, bitmns-subvit, cln, tt, vry pr ort clts

2165 siltstone: dkbrn, vryfg, sft-frm, wkly cmntd, frbl, abdt blk carb frgs, lrg plnt frgs

2166 clay rich shale: ltbrn, sft-frm, plty, splntry, mssv, wxy, vryfn txt, tr blk carb frgs

2168 black shale: fltblk, hd, mssv, vryfn txt, ety, abdt unfrm diss fg-mg skel frgs, abdt fg-mg py lns

2173 coal: blk, hd, subvit, wllmntd, cln, tt, prly dvdp ort clts, cg 2-5mm CO3 frct fllgs, tr fg py lns tr vis gas

2175 clay rich shale. ltbn, sft, plty, splntry, cly rch mssv, brkn

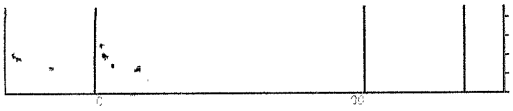
2177 shale: ltbn-brn-dkbrn, wllmntd, hmky, wxy, frm, abdt blk carb frgs, lrg plnt frgs, 2-5 cm ang blk sh clsts

2180 black shale: fltblk, hd-frm, plty, fssl, wllmntd, vryfntxt, occ cg pyins 1-3 cm

2186 coal: blk, hd, blky, subvit-vivty lstr, vry prly dvpd ort clts, tr fg lmir py tr vis gas

2186 mudstone. ltcrmytn-ltbrn, frm, plty, wxy-grlty, silty ip, abdt blk carb frgs, nrrw coal strgrs, lrg plnt frgs, occ fg-mg py lns frct fllgs, vry wkly lmntd

2189 clay rich shale: dkgrn-dkgrygrn, sft-frm, clr rch, wxy, wkly lmntd, abdt blk carb frgs, smth wvy frcts with slks



2194 sandstone dkolvgrn-dkgrnbrn, hd, wlcmntd, wkly frbl, vfg, wlrnd, sh fllgs, trbtd, abdt fg blk carb frgs, rts, plnt frgs

DESCRIPTION ABBREVIATIONS

abdt-abundant,accs-accretions, as abv - as above,bddg-bedding,blk-black, blky - blocky, bny - bony, brkn - broken, brchpds - brachiopods,brrws - burrows, bvlvs - bivalves, calc - calcareous, cc - calcite, cg - coarse grained,chrt - chert, cln - clean, cltsts - clasts, cly - clay cont - continuous, crb - carbonaceous, crsng - coarsening,diss - disseminated,dkgrngry - dark greenish gray, dkgry - dark gray ety - earthy fgxtln - fine grained crystalline, fllgs - fillings, fltblk - flat black, fntxt - fine texture, frbl - friable, frgmntl - fragmental, frgs - fragments, frm - firm, fssl - fissile, grdg - grading, grnbrn - greenish browngrtty - gritty, hd - hard, hmky - hummocky, intbds - interbeds,ip - in places, irn stng - iron staining, lns - lenses lst - limestone, ltcrmytn - light creamy tan ltgry - light creamy gray, ltgry - light gray, ltgrybrn - light gray brown, ltolv - light olive, lttn - light tan, lvs - leaves, mdtly - moderately, micsuc mictc - micritic, micxtln - microcrystalline, nods - nodules, nods - nodules, nrrw - narrow, occ - occasional, ortclts - orthogonal cleats, ostcds - ostracods, per - pervasive, plgrn - pale green, plnr - planar, plnt - plant, plty - platy, ptchy - patchy, py - pyrite, rnd - round, rcvry - recovery, sbrnd - subrounded, sft - soft, sh - shale, shly - shaly, skel - skeletal, slks - slickensides sltstn - siltstone, slty - silty smplnrfrcts - smooth planar fractures,smooth wavy fractures, splntry - splintery, snd -sand sndy - sandy, strgrs - stringers, sprry - sparry, sty - stylolites, subvit -subvitreous,thnbdd - thin bedded, teal, tr - trace, trbdt - turbated,tt - tight, vert - vertical, vis gas - visible gas, vit - vitreous, vlvty - velvety, vfg - very fine grained,vrydkbrkn - very dark brown, wht - white, wlcmntd - well cemented,wldvlpd - well developed,wlsrtd - well sorted, 0 to CA - 0 degrees to core axis90 to CA - 90 degrees to core axis