Test Results

Paleomagnetic Orientation of Induced & Natural Fractures in Ireton, Duvernay, Majeau Lake, & Beaverhill Lake Core from COPRC 100 HZ Twock 16-29-63-16

Prepared for
ConocoPhillips Canada

June 2014

APPLIED PALEOMAGNETICS, INC.

Seattle Area Office: 1113 207th Place N.E., Redmond, Washington 98074
San Francisco Area Office: 1334 Brommer Street, Suite B4, Santa Cruz, California 95062
Telephone: 425-868-5750 Fax: 425-696-0003 E-mail: info@appliedpaleomagnetics.com

Test Results

Paleomagnetic Orientation of Induced & Natural Fractures in Ireton, Duvernay, Majeau Lake, & Beaverhill Lake Core from COPRC 100 HZ Twock 16-29-63-16

by
David R. Van Alstine
and
Joseph E. Butterworth

Prepared for
ConocoPhillips Canada

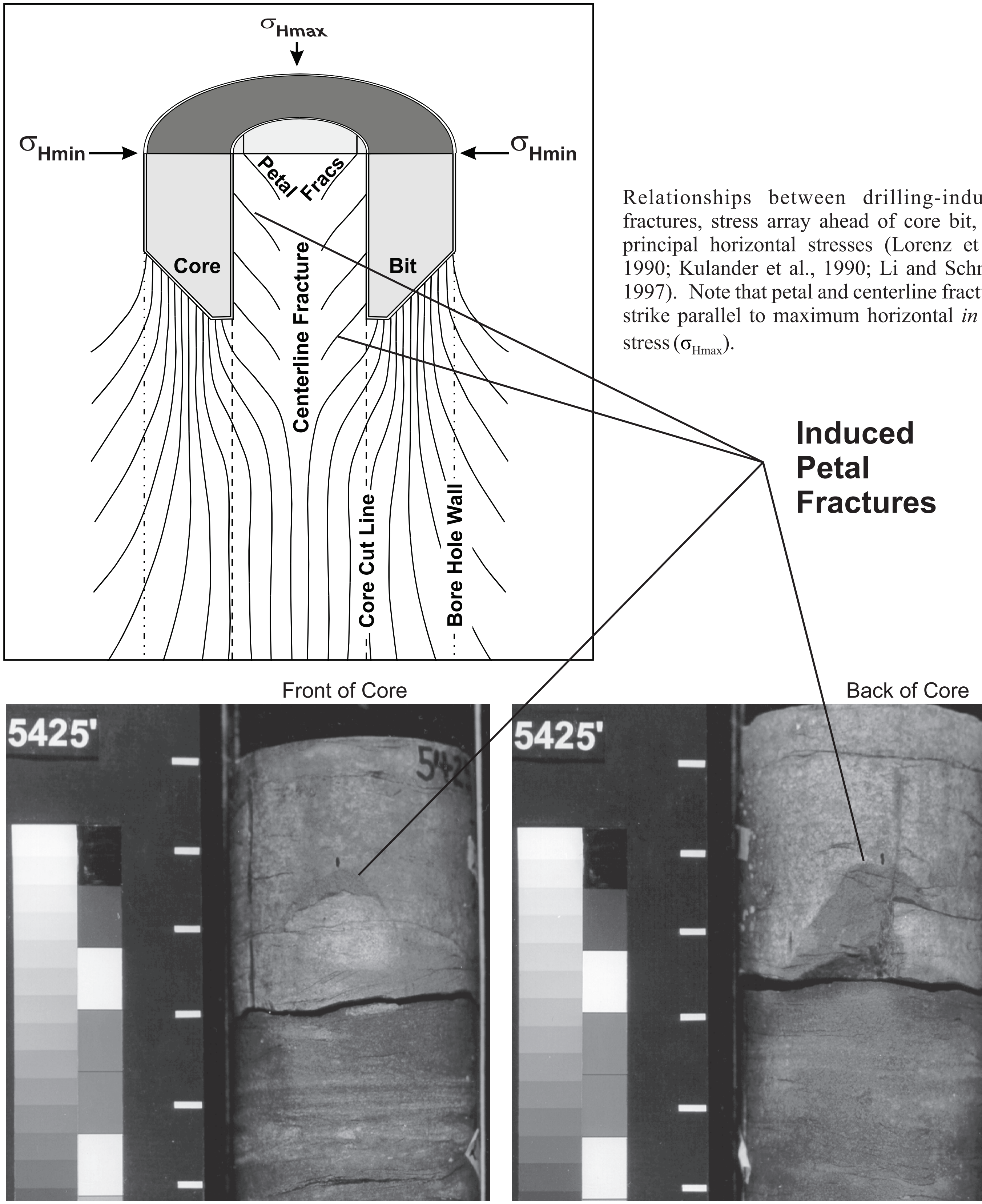
June 2014

APPLIED PALEOMAGNETICS, INC.

Seattle Area Office: 1113 207th Place N.E., Redmond, Washington 98074
San Francisco Area Office: 1334 Brommer Street, Suite B4, Santa Cruz, California 95062
Telephone: 425-868-5750 Fax: 425-696-0003 E-mail: info@appliedpaleomagnetics.com

TABLE OF CONTENTS

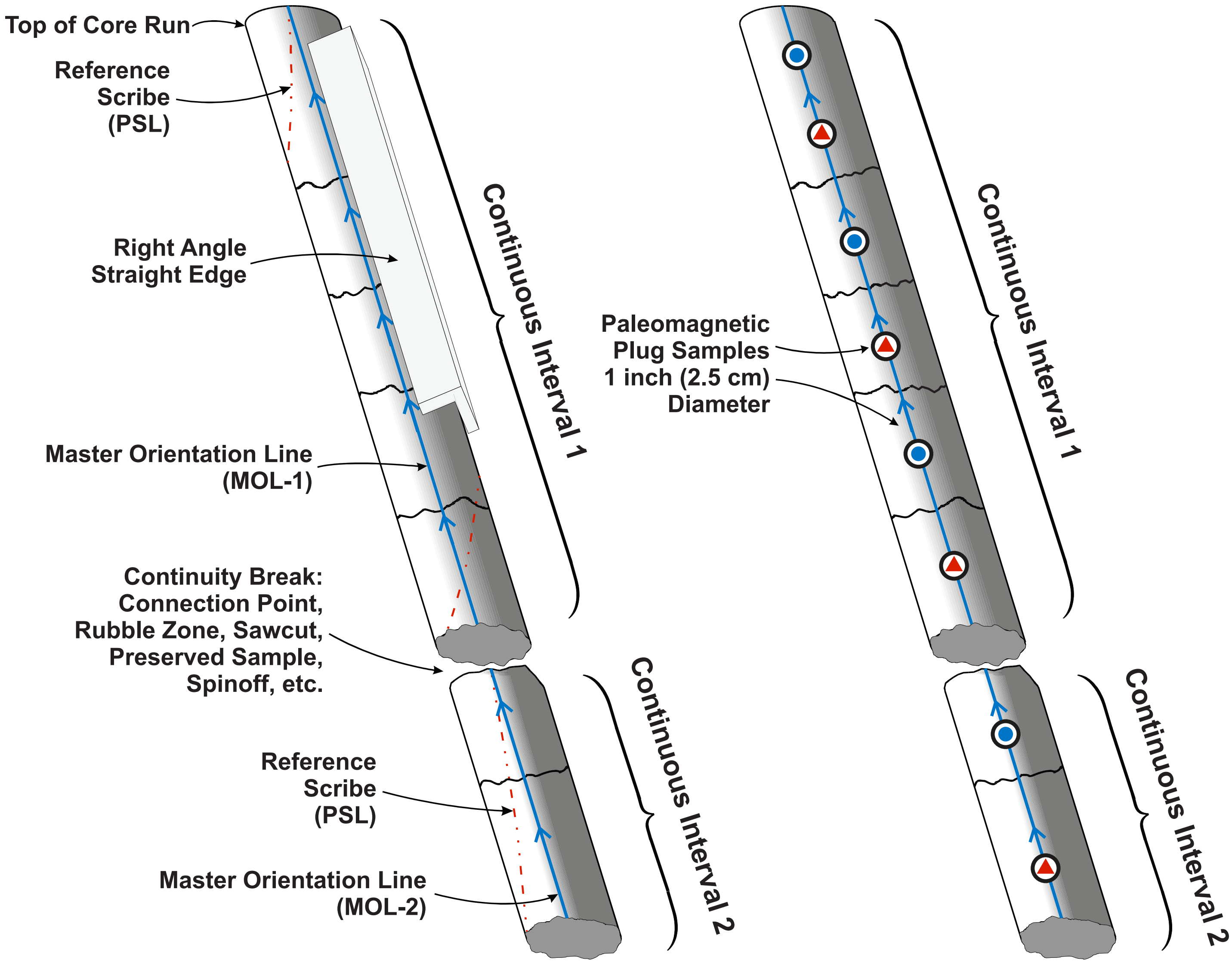
In Situ Stress from Paleomagnetically Oriented Induced Fractures



Relationships between drilling-induced fractures, stress array ahead of core bit, and principal horizontal stresses (Lorenz et al., 1990; Kulander et al., 1990; Li and Schmitt, 1997). Note that petal and centerline fractures strike parallel to maximum horizontal *in situ* stress (σ_{Hmax}).

Figure 1. Top = origin of drilling-induced petal and centerline fractures relative to maximum horizontal principal stress (σ_{Hmax}). Bottom = typical petal fractures in Eocene core from Lake Maracaibo, Venezuela (Van Alstine & Butterworth, 2002). Note that petal fractures dip inward toward the core center on opposite sides of the core, and petal fractures terminate at sandstone/shale contact.

Methodology of the Paleomagnetic Core-Orientation Technique

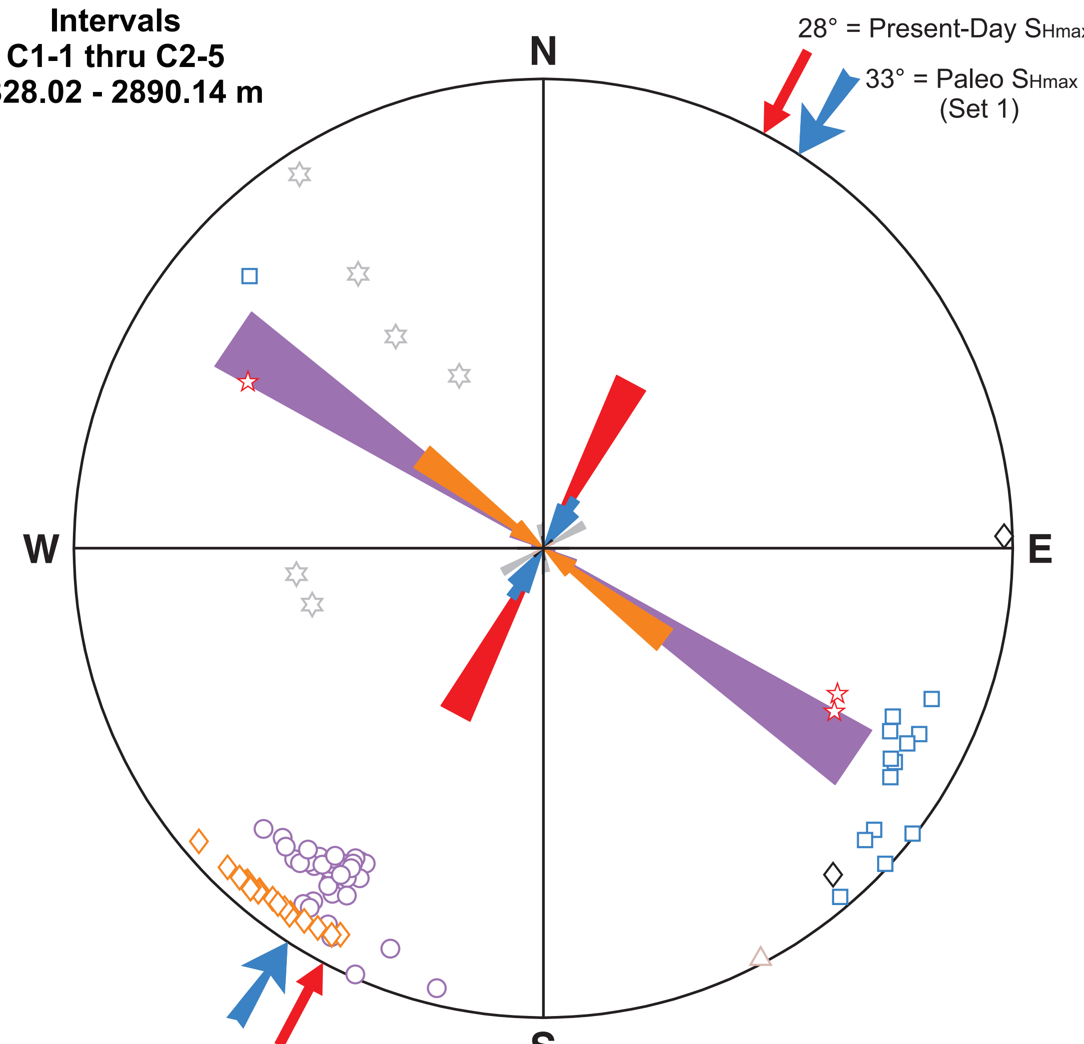


Step 1. Reconstruct the core into "continuous intervals" and mark the "Master Orientation Line" (MOL), which is a known straight line. In contrast, the Principal Scribe Line (PSL) rotates relative to the MOL. The PSL is only present if the core has been scribed and oriented using the downhole "multishot" core-orientation technique.

Step 2. Drill a suite of paleomagnetic plugs using our "antiparallel plug technique." Half the plugs (blue dots) are drilled into the MOL, and the other half of the plugs (red triangles) are drilled opposite the MOL.

Figure 2. Methodology of the paleomagnetic core-orientation technique as developed by Applied Paleomagnetics, Inc. After reconstructing the core into "continuous intervals" and marking the Master Orientation Line (MOL), fracture and bedding orientations are measured relative to the MOL. Next, we drill a suite of 4 to 6 "antiparallel" paleomagnetic plugs per interval, and the plugs are shipped to the Applied Paleomagnetics lab in Santa Cruz, California. At our lab, we use our cryogenic magnetometer to measure magnetic signals recorded in the plugs to determine the orientation of the MOL (Table 1) and fractures and bedding (Table 2) relative to North.

Paleomagnetically Oriented Induced & Natural Fractures in Ireton, Duvernay, MLK, & BHLK Cores from Twock 16-29-63-16



SYMBOLS: STEREONET
Data points = upper hemisphere poles to:
□ = Set 1 natural extension fracture
○ = Set 2 natural extension fracture
△ = Set 3 natural extension fracture
◇ = Cleavage
✡ = Dipping shear fracture
◇ = Slickenline trend on bed-parallel shear
☆ = Induced petal fracture (SHmax)

SYMBOLS: ROSE DIAGRAM
Rose petals = strike of:
= Set 1 natural extension fracture
= Set 2 natural extension fracture
= Set 3 natural extension fracture
= Cleavage
= Dipping shear fracture
= Slickenline trend on bed-parallel shear
= Induced petal fracture (SHmax)

Figure 3. Paleomagnetically oriented induced & natural fractures in Ireton, Duvernay, Majeau Lake, & Beaverhill Lake cores from Two Creek 16-29-63-16. The average strikes of natural fractures are Set 1 = 33°, Set 2 = 124°, Set 3 = 62°, cleavage = 127°, dipping shears = 350° & 58°, slickenline trends on bed-parallel shears = 358° & 48°. The average strike of induced petal fractures is 28°, which is the inferred present-day SHmax.

Applied Paleomagnetics, Inc.

APPLIED PALEOMAGNETICS, INC.

Paleomagnetic Core Orientation Service

Client: ConocoPhillips Canada Resources Corp.
Well Name: COPRC 100 Hz Two Creek 16-29-63-16 W5M
Location: Two Creek field, Alberta
Lat.: 54.50°N, Long.: 116.39°W
Formations: Ireton & Duvernay
Lithologies: Gray siltst (Ireton)
Dk gry organic-rich siltst & Ls (Duvernay)

Formation Age: Late Devonian
Magnetization Age: Late Cenozoic
Ref. Paleomag. Pole: 90°N/0°E
Ref. Pmag. Direction (D/I): 0°/+70.4°

Date: 21 April 2014

Sampled: JEB, DVA
Measured: JEB
Calc. with: ORIENT.IBM
Orientation checked by: DVA

Continuous Interval (m)	Plug Depths (Min/Max)	#Sel./ #Meas.	Well Dev./ Corr. Ref. Dir.	MOL Orientation[γ] [Relative to North]	Remarks
2828.02-2830.95 C1-1	2828.12- 2830.58	8/8	8.7° @ 162.3° 354.8°/+61.9°	79° [N 79° E]	Mostly Ireton. Intvl contains induced fracs, Set 2 fracs, & cleavage.
2843.62-2847.55 C1-2	2843.85- 2846.80	12/12	7.9° @ 163.5° 355.5/+62.7°	28° [N 28° E]	Duvernay. Intvl contains Set 1 & Set 2 fracs. Intvl bottom = desorp. #2.
2849.80-2854.36 C2-1	2849.94- 2854.21	12/12	7.8° @ 164.9° 355.9°/+62.8°	210° [S 30° W]	Duvernay. Intvl contains Set 1 & Set 2 fracs. Intvl top = top Core 2; intvl bottom = desorp. #3.
2867.21-2871.26 C2-2	2867.81- 2871.06	8/8	7.6° @ 166.0° 356.3°/+62.9°	311° [N 49° W]	Duvernay carbonate. Intvl contains cleavage in Ls & Set 2 frac.

Notes:

[γ]The Master Orientation Line (MOL) is a blue line constructed by Applied Paleomagnetics, Inc. Whole (unslabbed) core. Core diameter = 3.0 inch (7.6 cm) drilled conventionally using oil-based mud.

APPLIED PALEOMAGNETICS, INC.

Paleomagnetic Core Orientation Service

Client: ConocoPhillips Canada Resources Corp.	Formation Age: Late Devonian	Date: 21 April 2014
Well Name: COPRC 100 Hz Two Creek 16-29-63-16 W5M	Magnetization Age: Late Cenozoic	
Location: Two Creek field, Alberta	Ref. Paleomag. Pole: 90°N/0°E	Sampled: JEB, DVA
Lat.: 54.50°N, Long.: 116.39°W	Ref. Pmag. Direction (D/I): 0°/+70.4°	Measured: JEB
Formations: Duvernay, Majeau Lake, Beaverhill Lake		Calc. with: ORIENT.IBM
Lithologies: Dark gray organic-rich siltst (Duvernay) Calcareous med. gray siltst (Majeau Lake) Gray limestone (Beaverhill Lake)		Orientation checked by: DVA

Continuous Interval (m)	Plug Depths (Min/Max)	#Sel./ #Meas.	Well Dev./ Corr. Ref. Dir.	MOL Orientation[γ] [Relative to North]	Remarks
2871.75-2881.00 C2-3	2872.25- 2880.12	12/12	7.4° @ 166.8° 356.6°/+63.1°	31° [N 31° E]	Mostly Duvernay. Interval contains abundant Set 2 fracs.
2881.00-2885.69 C2-4	2881.90- 2884.10	8/8	7.1° @ 166.2° 356.5°/+63.4°	152° [S 28° E]	Majeau Lake. Intvl contains Set 1, Set 2, & Set 3 extension fracs.
2885.69-2890.14 C2-5	2886.46- 2889.82	8/8	7.0° @ 166.2° 356.6°/+63.5°	128° [S 52° E]	Majeau Lake & Beaverhill Lake. Intvl contains Set 1 & Set 2 extension fracs, bed-parallel shears, & dipping shears w/ hoz & oblique slicks.

Notes:

[γ]The Master Orientation Line (MOL) is a blue line constructed by Applied Paleomagnetics, Inc. Whole (unslabbed) core. Core diameter = 3.0 inch (7.6 cm) drilled conventionally using oil-based mud.

EXPLANATION OF COLUMN HEADINGS

Continuous Interval:

Paleomagnetic directions from plugs from the same "continuous interval" should exhibit a common azimuth relative to the Master Orientation Line (MOL).

Plug Depths (Min/Max):

Minimum and maximum depths of plugs yielding reliable paleomagnetic directions included in the statistical calculation of the core orientation.

#Sel./#Meas.:

The difference between the number measured and the number selected is equal to the number of specimens rejected on the basis of either an anomalous magnetization direction or intensity relative to the average paleomagnetic signal for the interval.

Well Dev./Corr. Ref. Dir.:

The well deviation angle (from vertical) and well deviation azimuth (from north) provided by the well deviation survey. Rotating the "reference paleomagnetic direction" (given in the header) by the well deviation yields the "corrected reference direction" to which the core is paleomagnetically oriented.

MOL Orientation:

The azimuth and bearing of the MOL in degrees (clockwise positive) from present-day geographic north.

Table 2
Paleomagnetically Oriented Induced & Natural Fractures & Bedding in Ireton, Duvernay, Majeau Lk, & Beaverhill Lk Core from COPRC 100 HZ Twock 16-29-63-16

API Plane ID	Core Depth(m)	Downdip Azimuth and Dip of Fractures/Bedding in Well Coords. DnDipAz (°)	Well Coords. Dip (°)	Geog. Coords. DnDipAz (°)	Geog. Coords. Dip (°)	Remarks
Continuous Interval:	C1-1		Well Deviation:	Inc. 8.7° @ Az. 162.3°		
1.101 B	2828.16	169.3	11.0	193.8	2.6	Shaly
1.102 I	2828.25	299.3	65.0	301.7	71.5	Induced petal, brkn, H=2, W=0.1
1.103 I	2828.25	116.3	63.0	112.6	57.1	Induced petal, brkn, H=1, W=0.1
1.104 I	2828.26	119.3	64.0	115.9	57.8	Induced petal, brkn, H=1, W=0.1
1.105 2	2828.60	209.3	89.0	209.8	83.1	Set 2, unmin, plnr, split, H=21, W=0.1
1.106 B	2828.71	169.3	8.0	291.7	1.3	Shaly
1.107 C	2829.19	219.3	89.9	219.7	85.2	Cleavage in Ireton, not well dvlpd, 1.5cm sp, H=1
1.108 B	2830.72	169.3	8.0	291.7	1.3	Silty/shaly
1.109 C	2829.57	221.3	89.9	221.6	85.4	Cleavage in Ireton, 1.5cm sp, H=1
1.110 C	2829.68	207.3	89.9	207.7	83.7	Cleavage in Ireton, not well dvlpd, 2cm sp, H=0.5
1.111 C	2829.87	217.3	89.9	217.7	84.9	Cleavage in Ireton, 2.5cm sp, H=0.8
1.112 2	2830.08	28.3	89.0	208.6	84.9	Set 2, unmin, plnr, hackles, H=15, W=0.1
1.113 C	2830.25	49.3	89.9	229.6	86.7	Cleavage in Ireton, 1.5cm sp, H=0.7
Continuous Interval:	C1-2		Well Deviation:	Inc. 7.9° @ Az. 163.5°		
1.201 2	2844.01	208.6	75.0	210.4	69.5	Set 2, unmin, plnr, hackles, H=20, W=0.1
1.202 2	2844.24	208.6	76.0	210.3	70.5	Set 2, unmin, plnr, hackles, H=33, W=0.1
1.203 B	2844.25	158.6	8.0	77.3	0.7	Silty
1.204 B	2844.31	160.6	9.0	140.2	1.2	Silty
1.205 B	2844.35	156.6	8.0	74.5	1.0	Silty
1.206 B	2844.66	156.6	9.0	116.6	1.5	Silty
1.207 2	2844.96	207.6	75.0	209.4	69.4	Set 2, unmin, p.open, set w/ 2cm sp, H=7, W=0.1
1.208 B	2845.28	153.6	9.0	104.9	1.8	Silty
1.209 2	2845.62	208.6	78.0	210.1	72.5	Set 2, unmin, plnr, en echln, hackles, split, H=21, W=0.1
1.210 B	2845.90	160.6	7.0	4.4	1.0	Thin lam vfgSS
1.211 2	2846.04	207.6	78.0	209.1	72.4	Set 2, unmin, plnr, en echln, hackles, split, H=14, W=0.1
1.212 B	2845.82	156.6	8.0	74.5	1.0	Thin lam vfgSS
1.213 1	2847.24	311.6	70.0	312.8	76.8	Set 1, unmin, hackles, intersects 1.214 at top, brkn, H=5
1.214 1	2847.41	130.6	89.9	130.4	83.3	Set 1, unmin, plnr, brkn, @ Core1/Core2 boundary, H=29
Continuous Interval:	C2-1		Well Deviation:	Inc. 7.8° @ Az. 164.9°		
2.101 1	2849.83	132.4	89.9	132.2	83.3	Set 1, unmin, same frac as 1.214, split, H=5, W=0.1
2.102 B	2849.97	163.4	6.0	349.7	1.8	Silty
2.103 2	2850.45	210.4	78.0	211.9	72.6	Set 2, unmin, plnr, mnr hackles, split, H=21, W=0.1
2.104 B	2850.73	157.4	6.0	8.0	2.0	Thin lam vfgSS
2.105 2	2851.12	210.4	83.0	211.4	77.6	Set 2, unmin, plnr, hackle plume, split, H=45, W=0.1
2.106 B	2851.42	165.4	8.0	183.6	0.2	Thin lam vfgSS
2.107 B	2851.90	169.4	8.0	236.9	0.7	Thin lam vfgSS
2.108 2	2852.27	212.4	79.0	213.8	73.8	Set 2, unmin, subplnr, p.open, H=24, W=0.1
2.109 2	2852.94	209.4	75.0	211.2	69.5	Set 2, unmin, subplnr, split, H=22, W=0.1
2.110 B	2853.32	165.4	7.0	339.8	0.8	Thin lam vfgSS
2.111 B	2853.68	166.4	8.0	208.5	0.3	Thin lam vfgSS
2.112 2	2853.85	211.4	77.0	213.0	71.7	Set 2, unmin, plnr, mnr hackles, split, H=31, W=0.1
Continuous Interval:	C2-2		Well Deviation:	Inc. 7.6° @ Az. 166.0°		
2.201 C	2867.21	40.5	89.9	220.7	85.7	Cleavage in Duvernay LS, 1.5cm sp, H=0.5
2.202 C	2867.43	34.5	89.9	214.7	85.1	Cleavage in Duvernay LS, 2cm sp, H=0.3
2.203 C	2867.63	34.5	89.5	214.7	85.5	Cleavage in Duvernay LS, 8mm sp, H=0.2
2.204 C	2867.94	28.5	89.9	208.7	84.5	Cleavage in Duvernay LS, 2cm sp, H=0.5
2.205 C	2868.00	30.5	89.9	210.7	84.7	Cleavage in Duvernay LS, 2cm sp, dipolar, H=0.4
2.206 C	2868.10	215.5	89.9	215.7	85.0	Cleavage in Duvernay LS, 1.5cm sp, dipolar, H=0.3
2.207 C	2868.40	39.5	89.9	219.7	85.6	Cleavage in Duvernay LS, 2cm sp, dipolar, H=0.4
2.208 C	2868.67	32.5	89.9	212.7	84.9	Cleavage in Duvernay LS, 2.5cm sp, H=0.8
2.209 C	2868.90	41.5	89.9	221.7	85.8	Cleavage in Duvernay LS, 2cm sp, dipolar, H=0.6
2.210 C	2869.16	40.5	89.9	220.7	85.7	Cleavage in Duvernay LS, 2cm sp, H=0.5
2.211 C	2869.42	44.5	89.9	224.7	86.1	Cleavage in Duvernay LS, 3mm sp, H=0.3
2.212 C	2869.56	216.5	89.9	216.7	85.1	Cleavage in Duvernay LS, 2cm sp, dipolar, H=0.4
2.213 C	2869.75	42.5	89.9	222.7	85.9	Cleavage in Duvernay LS, 2cm sp, H=0.5
2.214 C	2870.19	40.5	89.5	220.7	86.1	Cleavage in Duvernay LS, 2.5cm sp, H=0.3
2.215 B	2870.72	172.5	6.0	323.8	1.8	Shaly, between LS nodules
2.216 2	2871.20	212.5	86.0	213.1	80.8	Set 2, unmin, plnr, hackles, split, H= 18(+53 below intvl), W=0.1

Notes:

"Well coordinates" are with respect to the core axis (before correcting for well deviation); "Geographic coordinates" are with respect to present-day horizontal (after correcting for well deviation).

Plane ID: 1=Set 1 extension fracture; Set 2 extension fracture; Set 3 extension fracture; C=Cleavage; S= Dipping shear fracture; Z= Subhorizontal shear fracture (parallel to bedding); L=Perpendicular to slickenlines on bed-parallel shear; B=Bedding; I=Induced petal fracture (parallel to SHmax).

Remarks: H=Fracture Height (cm) parallel to the core axis; W=Fracture Width (mm). Depths are core depths at midpoints of fractures.

Fracture & bedding orientations are listed as downdip azimuth and dip angle.

Table 2
Paleomagnetically Oriented Induced & Natural Fractures & Bedding in Ireton, Duvernay, Majeau Lk, & Beaverhill Lk Core from COPRC 100 HZ Twock 16-29-63-16

API Plane ID	Core Depth(m)	Well Coords. DnDipAz (°)	Well Coords. Dip (°)	Geog. Coords. DnDipAz (°)	Geog. Coords. Dip (°)	Remarks
Continuous Interval: C2-3		Well Deviation: Inc. 7.4° @ Az. 166.8°				
2.301 B	2872.07	173.6	8.0	227.4	1.1	Silty
2.302 B	2872.29	170.6	9.0	187.5	1.7	Silty
2.303 B	2872.86	165.6	7.0	6.3	0.4	Silty
2.304 B	2873.31	165.6	5.0	349.2	2.4	Silty
2.305 2	2873.64	211.6	81.0	212.6	75.8	Set 2, unmin, plnr, hackles, split, set w/ 5.5cm sp, H=30, W=0.1
2.306 2	2873.61	209.6	79.0	210.8	73.6	Set 2, unmin, plnr, brkn, in set w/ 2.305, H=2
2.307 2	2873.90	212.6	79.0	213.8	73.9	Set 2, unmin, plnr, split, H=29, W=0.1
2.308 B	2874.04	166.6	9.0	165.6	1.6	Silty
2.309 2	2874.28	209.6	76.0	211.1	70.6	Set 2, unmin, plnr, hackles, brkn, set w/ 4cm sp, H=10
2.310 2	2874.36	209.6	77.0	211.0	71.6	Set 2, unmin, plnr, brkn, in set w/ 2.309, H=3
2.311 2	2874.44	208.6	82.0	209.5	76.5	Set 2, unmin, plnr, split, in set w/ 2.309, H=15, W=0.1
2.312 2	2875.18	214.6	78.0	216.0	73.1	Set 2, unmin, plnr, split, set w/ 2.5cm sp, H=26, W=0.1
2.313 2	2875.14	212.6	78.0	213.9	72.9	Set 2, unmin, plnr, split, in set w/ 2.312, H=7, W=0.1
2.314 B	2875.56	169.6	5.0	341.0	2.4	Silty
2.315 2	2875.93	211.6	82.0	212.5	76.8	Set 2, unmin, plnr, hackles, split, set w/ 2.5cm sp, H=35, W=0.1
2.316 2	2876.01	210.6	79.0	211.8	73.7	Set 2, unmin, plnr, split, in set w/ 2.315, H=10, W=0.1
2.317 2	2876.30	214.6	80.0	215.8	75.1	Set 2, unmin, plnr, hckles, split, in set w/ 2.315, H=24, W=0.1
2.318 2	2876.48	217.6	81.0	218.7	76.4	Set 2, unmin, plnr, hackles, split, set w/ 4.5cm sp, H=16, W=0.1
2.319 2	2876.47	215.6	80.0	216.8	75.2	Set 2, unmin, plnr, hckles, split, in set w/ 2.318, H=12, W=0.1
2.320 B	2876.56	174.6	6.0	317.8	1.7	Silty/shaly
2.321 2	2876.89	216.6	81.0	217.7	76.3	Set 2, unmin, plnr, hackles, split, H= 38, W=0.1
2.322 2	2877.19	220.6	79.0	222.0	74.7	Set 2, unmin, plnr, hackles, split, H= 20, W=0.1
2.323 B	2877.07	169.6	6.0	335.1	1.4	Silty/shaly
2.324 2	2877.37	219.6	80.0	220.8	75.6	Set 2, unmin, plnr, split, steps from 2.322, H=12, W=0.1
2.325 B	2877.56	168.6	8.0	189.9	0.6	Silty
2.326 2	2877.87	223.6	80.0	224.9	76.0	Set 2, unmin, plnr, split, H=8, W=0.1
2.327 2	2877.99	212.6	77.0	214.1	71.9	Set 2, unmin, curvplnr, split, steps from 2.326, H=28, W=0.1
2.328 B	2878.26	169.6	7.0	307.8	0.5	Silty
2.329 B	2878.80	165.6	6.0	351.8	1.4	Silty
2.330 2	2879.07	213.6	79.0	214.9	74.0	Set 2, unmin, plnr, split, H=36, W=0.1
2.331 B	2879.34	161.6	8.0	114.2	0.9	Silty
2.332 2	2879.78	216.6	78.0	218.0	73.3	Set 2, unmin, plnr, split, H=16, W=0.1
2.333 B	2880.52	168.6	7.0	319.0	0.5	Silty
Continuous Interval: C2-4		Well Deviation: Inc. 7.1° @ Az. 166.2°				
2.401 B	2881.64	186.0	7.0	269.5	2.4	Silty
2.402 1	2881.90	122.0	84.0	121.3	78.9	Set 1, unmin?, plnr, H=2, W=0.1
2.403 B	2881.99	177.0	8.0	230.7	1.7	Silty
2.404 1	2882.06	124.0	85.0	123.4	79.7	Set 1, unmin, plnr, hackles, H=7, W=0.1
2.405 1	2882.16	122.0	83.0	121.2	77.9	Set 1, unmin?, plnr, H=4, W=0.1
2.406 2	2882.16	24.0	85.0	203.8	89.3	Set 2, unmin?, plnr, intersects 2.405, H=4, W=0.1
2.407 1	2882.21	117.0	79.0	115.7	74.4	Set 1, unmin, plnr, steps w/ 2.405 & 2.408, H=5, W=0.1
2.408 1	2882.27	119.0	80.0	117.8	75.2	Set 1, unmin, plnr, stepping, H=4, W=0.1
2.409 3	2882.42	332.0	84.0	152.1	89.1	Set 3, min w/ Ca, plnr, hackles, H=43, W=0.1
2.410 1	2882.41	117.0	85.0	116.3	80.4	Set 1, unmin, plnr, hackles, steps w/ 2.411, H=8, W=0.1
2.411 1	2882.45	119.0	84.0	118.2	79.2	Set 1, unmin, plnr, H=6. W=0.1
2.412 1	2882.53	112.0	84.0	111.2	79.9	Set 1, unmin, plnr, steps w/ 2.410, H=3, W=0.1
2.413 B	2882.73	169.0	8.0	190.8	0.9	Silty
2.414 B	2883.28	180.0	8.0	238.0	2.0	Silty
2.415 B	2883.63	182.0	7.0	268.4	1.9	Silty
2.416 B	2884.42	177.0	6.0	304.4	1.7	Silty
2.417 B	2884.83	184.0	7.0	268.9	2.2	Silty
2.418 B	2885.61	177.0	7.0	267.9	1.3	Silty
Continuous Interval: C2-5		Well Deviation: Inc. 7.0° @ Az. 166.2°				
2.501 B	2885.70	164.6	7.0	80.0	0.2	Silty
2.502 B	2886.04	169.6	7.0	255.6	0.4	Silty
2.503 2	2886.33	13.6	87.0	193.6	86.8	Set 2, unmin, plnr, brkn, H=6
2.504 B	2886.51	172.6	8.0	208.7	1.3	Silty
2.505 1	2887.06	307.6	85.0	127.7	89.5	Set 1, unmin, plnr, H=8, W=0.1
2.506 Z	2886.93	156.6	8.0	110.3	1.6	Shear, bed parallel
2.507 L	2886.93	138.6	89.9	138.4	83.7	Perp to slicks on 2.506
2.508 Z	2887.05	164.6	12.0	162.3	5.0	Shear, irregular
2.509 L	2887.05	88.6	89.9	88.5	88.4	Perp to slicks on 2.508

Notes:
"Well coordinates" are with respect to the core axis (before correcting for well deviation); "Geographic coordinates" are with respect to present-day horizontal (after correcting for well deviation).
Plane ID: 1=Set 1 extension fracture; Set 2 extension fracture; Set 3 extension fracture; C=Cleavage; S= Dipping shear fracture; Z= Subhorizontal shear fracture (parallel to bedding); L=Perpendicular to slickenlines on bed-parallel shear; B=Bedding; I=Induced petal fracture (parallel to SHmax).
Remarks: H=Fracture Height (cm) parallel to the core axis; W=Fracture Width (mm). Depths are core depths at midpoints of fractures.
Fracture & bedding orientations are listed as downdip azimuth and dip angle.

Table 2
Paleomagnetically Oriented Induced & Natural Fractures & Bedding in Ireton, Duvernay, Majeau Lk, & Beaverhill Lk Core from COPRC 100 HZ Twock 16-29-63-16

API Plane ID	Core Depth(m)	Downdip Azimuth and Dip of Fractures/Bedding in Well Coords. DnDipAz (°)	Well Coords. Dip (°)	Geog. Coords. DnDipAz (°)	Geog. Coords. Dip (°)	Remarks
2.510 2	2887.10	200.6	88.0	200.9	82.2	Set 2, unmin, plnr, brkn, H=1
2.511 S	2887.44	324.6	57.0	326.0	63.5	Shear w/ hoz slicks, curvplnr, irreglr, H=8, W=0.1
2.512 S	2887.48	326.6	79.0	326.9	85.6	Shear w/ hoz slicks, curvplnr, irreglr, H=12, W=0.1
2.513 S	2887.50	331.6	30.0	334.0	36.8	Shear w/ hoz slicks, curvplnr, irreglr, polished, H=4
2.514 S	2887.52	322.6	43.0	325.1	49.5	Shear w/ dndip slicks, curvplnr, irreglr, H=4, W=0.1
2.515 S	2887.66	249.6	46.0	256.3	45.6	Shear w/ hoz slicks, curvplnr, irreglr, H=7, W=0.1
2.516 S	2887.73	257.6	47.0	264.0	47.6	Shear w/ oblique? slicks, H=3, W=0.1
2.517 B	2887.78	179.6	8.0	232.7	2.0	Silty, below shear zone
2.518 B	2888.12	176.6	7.0	260.6	1.3	Silty, below shear zone
2.519 1	2888.48	312.6	85.0	132.7	89.2	Set 1, unmin, plnr, hackles, split, H=45, W=0.1
2.520 B	2888.59	185.6	8.0	244.1	2.7	Silty
2.521 1	2888.89	319.6	86.0	139.6	87.8	Set 1, unmin, subplnr, hackles, split, in LS, H=22, W=0.1
2.522 2	2888.96	213.6	87.0	214.0	82.3	Set 2, unmin, subplnr, hackles, split, in LS, H=5, W=0.1
2.523 2	2889.06	212.6	87.0	213.0	82.2	Set 2, unmin, subplnr, hackles, split, in LS, H=14, W=0.1
2.524 2	2889.26	212.6	76.0	214.1	71.2	Set 2, unmin, subplnr, hackles, split, H=13, W=0.1
2.525 B	2889.99	176.6	8.0	224.5	1.7	Silty

Notes:

"Well coordinates" are with respect to the core axis (before correcting for well deviation); "Geographic coordinates" are with respect to present-day horizontal (after correcting for well deviation).

Plane ID: 1=Set 1 extension fracture; Set 2 extension fracture; Set 3 extension fracture; C=Cleavage; S= Dipping shear fracture; Z= Subhorizontal shear fracture (parallel to bedding); L=Perpendicular to slickenlines on bed-parallel shear; B=Bedding; I=Induced petal fracture (parallel to SHmax).

Remarks: H=Fracture Height (cm) parallel to the core axis; W=Fracture Width (mm). Depths are core depths at midpoints of fractures.

Fracture & bedding orientations are listed as downdip azimuth and dip angle.