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WESTERN CANADA SEDIMENTARY BASIN BOREHOLE IMAGERY ANALYSIS PROJECT: A SUMMARY OF PETRO CANADA MURRAY RIVER C-40-H/93-I-14

R.E. McCallum[1] and J.S. Bell[2]

[1] R.E.M. Consulting, 1447 19 Ave. S.W., Calgary, Alberta T2T 0J1

[2] Institute of Sedimentary and Petroleum Geology, Geological Survey of Canada
3303 33 Street N.W., Calgary, Alberta T2L 2A7

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Western Canada Sedimentary Basin Borehole Imagery Analysis
Project: A Summary of PETRO CANADA Murray River c-40-H/93-I-14

Well Name: PETRO CANADA Murray River c-40-H/93-I-14

Operator: Petro Canada Inc.

Location: latitude 54° 51' 58.6"
longitude 121° 0' 13.6"
(see figure 1)

Rig Release Date: February 11, 1991

Imagery Log/Interval Logged: FMS 1731.1 - 2180.7 m

Well Trajectory: Semi-vertical, deviated

Drill Bit Size: 8.0 inches over the interval logged

Formations Logged:

Triassic Pardonet	1727.0 m
Jurassic Nordegg	1750.5 m
Triassic Pardonet	1769.5 m
Triassic Baldonel	1805.0 m
Triassic Charlie Lk	1887.0 m

Lithologies: The section logged consists of Jurassic - Triassic carbonates.

Core Intervals: 1763.0 - 1770.0 m
1775.0 m - 1793.0 m

Structural Setting: Foothills thrust belt

Regional Stress trajectories: The nearest well with stress orientation data is Shenandoah et al INGA d-53-B/94-A-13 located 217 kms SE with a S_{Hmin} direction of 125.8° N (Bell et al, in press).

Description of Images:

Semi-Vertical Fractures: Twenty-five semi-vertical fractures were observed in the interval logged and examples are given in figures 8, 9, 10, and 11. The fractures are characterized by thin, continuous, dark (conductive) traces appearing 180° apart on the FMS microresistivity images. The interpretive software program FLIP converts digital microresistivity contrasts into brown-yellow tones (dark colors indicate high conductivity whereas light colors indicate low conductivity, Bourke et al 1989) and applies a sinusoidal curve to arrive at a true dip angle and

dip azimuth.

Chatter Fractures: Short, discontinuous, dark (conductive) traces on the FMS log that trend obliquely to borehole trajectory and occur in groups in an en echelon, steplike fashion are interpreted as drilling induced chatter fractures. These appear on opposite sides of the borehole wall 180° to each other. Figures 10, 11, 12, 13 and 14 are examples of chatter fractures observed in Murray River c-40-H/93-I-14.

Natural Fractures: Figures 14 to 17 illustrate examples of naturally occuring fractures in Murray River c-40-H/93-I-14. These fractures are characterized by dark, continuous traces which, unlike chatter fractures, can generally be seen on all sides of the borehole wall. This permits an excellent fit by the FMS Examiner workstation software and results in accurate orientation measurements.

Borehole Breakouts:

Borehole breakouts are measured by the four oriented arms of the FMS calipers to determine the profile of the wellbore (Plumb and Hickman, 1985). In the presence of anisotropic horizontal stresses borehole collapse may occur on opposite sides of the wellbore at the azimuths of the minimum horizontal stress directions (S_{Hmin}). The calipers will indicate a corresponding long axis where spalling has occurred and a perpendicular short axis near bit size. When the FMS tool is raised through a breakout zone, tool rotation will cease if the pads become entrenched within the zone. Frequently the pads themselves will be unable to make firm contact with the borehole wall in the spalled zone and a diffuse, unfocussed image will result.

In Murray River c-40-H/93-I-14 an early stage of breakout development has been observed. *Incipient breakout* is illustrated in figure 16. The dark, linear fracture trace observed on the microresistivity image is interpreted as a shear fracture thagwintersects the borehole wall in response to the anisotropic stresses acting upon it. There is only minimal lateral borehole elongation.

Results:

Semi-Vertical Fractures: In PETRO CANADA Murray River c-40-H/93-I-14 vertical fractures are found throughout the interval logged by the FMS tool. On FMS microresistivity images they are characterized by thin, continuous, dark (conductive), linear traces that parallel borehole trajectory, cross-cut bedding, and are open and mud-filled. They occur 180° apart on the images and range in length from 0.2 m to several meters. Strike azimuths are summarized in figure 18a. The mean strike azimuth from 25 samples is 197.5° N (standard deviation +/- 7.7°).

It is believed that these fractures form as hydraulic fractures in response to pressure exerted on the undrilled rock by the weight of the drillstem during drilling. Alternatively, fracture generation may be the result of the drillpipe acting as a loose fitting piston when it is run into the hole too quickly. This action will cause bottomhole pressures to exceed the parting pressure of the rocks (Dickey, 1986).

Hydraulic fractures propagate within the plane formed by the largest and intermediate principal stresses (S_v and S_{Hmax}) and are extensional. S_v is vertical and thus induced fractures can

be used to detect the direction of the maximum horizontal principal stress (S_{Hmax}). As figure 16a illustrates, this would give an S_{Hmax} azimuth of 017.5° N at Murray River c-40-H/93-I-14.

Chatter Fractures: Figure 18b summarizes the orientations of over ninety-six chatter fractures observed in Murray River c-40-H/93-I-14. Mean strike azimuth for the fracture set is computed as 197.0° N (standard deviation +/- 22.9°). Chatter fractures often appear on opposite sides of the borehole wall and may be stratabound. They are believed to be "drilling enhanced" natural fractures (Heliot et al, 1990) formed when a preexisting natural fracture is opened preferentially in the plane of S_{Hmax} and S_v in response to pressure exerted on the rock formation during drilling. This gives rise to the characteristic en echelon, steplike fashion of chatter fractures where the fracture traces are seen at the borehole azimuths of the maximum horizontal stress direction.

Natural Fractures: Figure 19a summarizes the orientations of 46 naturally occuring fractures. A mean strike azimuth for the fracture set is computed as 175.2° N (standard deviation of 29.1°). These thin planar preexisting fractures are open and and crosscut bedding and may be nearly perpendicular to it (figs 14-17). Unlike chatter fractures, this fracture set has sufficient thickness to appear on most sides of the borehole wall.

Borehole Breakouts: A stress regime characterized by anisotropic horizontal stresses acting on the borehole will often result in borehole collapse on opposite sides of the well. Borehole breakouts form when shear fractures develope subparallel to the borehole wall and extend the well in a direction parallel to S_{Hmin}. As these fractures propagate, portions of the borehole wall spall off creating an "ovalized" borehole. These features are excellent indicators of the direction of the minimum horizontal stress orientation S_{Hmin}, although cable torque on the tool may bias results slightly (Parker and Hefferman, 1992). While no clear examples of borehole wall collapse have been observed in the study well, two examples of fracture traces associated with incipient breakout have been observed (figure 16). Figure 19b summarizes the orientations of the two observed incipient borehole breakouts (mean strike azimuth = 136.0° N; standard deviation 12.1°).

This would suggest a mean S_{Hmin} direction of 136.0° N for Murray River c-40-H/93-I-14.

Conclusions

In Murray River c-40-H/93-I-14 FMS microresistivity images indicate a mean S_{Hmax} direction of 197.5° N. This orientation differs from the regional trend of S_{Hmax} as summarized in figure 1. The mean S_{Hmin} direction of 136.0° N differs only marginally from the S_{Hmin} direction derived from oriented caliper logs from the nearby well SHENANDOAH ET AL Inga d-53-B/94-A-13, with a values of 125.8° N. (see figure 1).

Figure 1. Location of Murray River c-40-H/93-I-14 with respect to the stress regime of the Western Canada Sedimentary Basin.

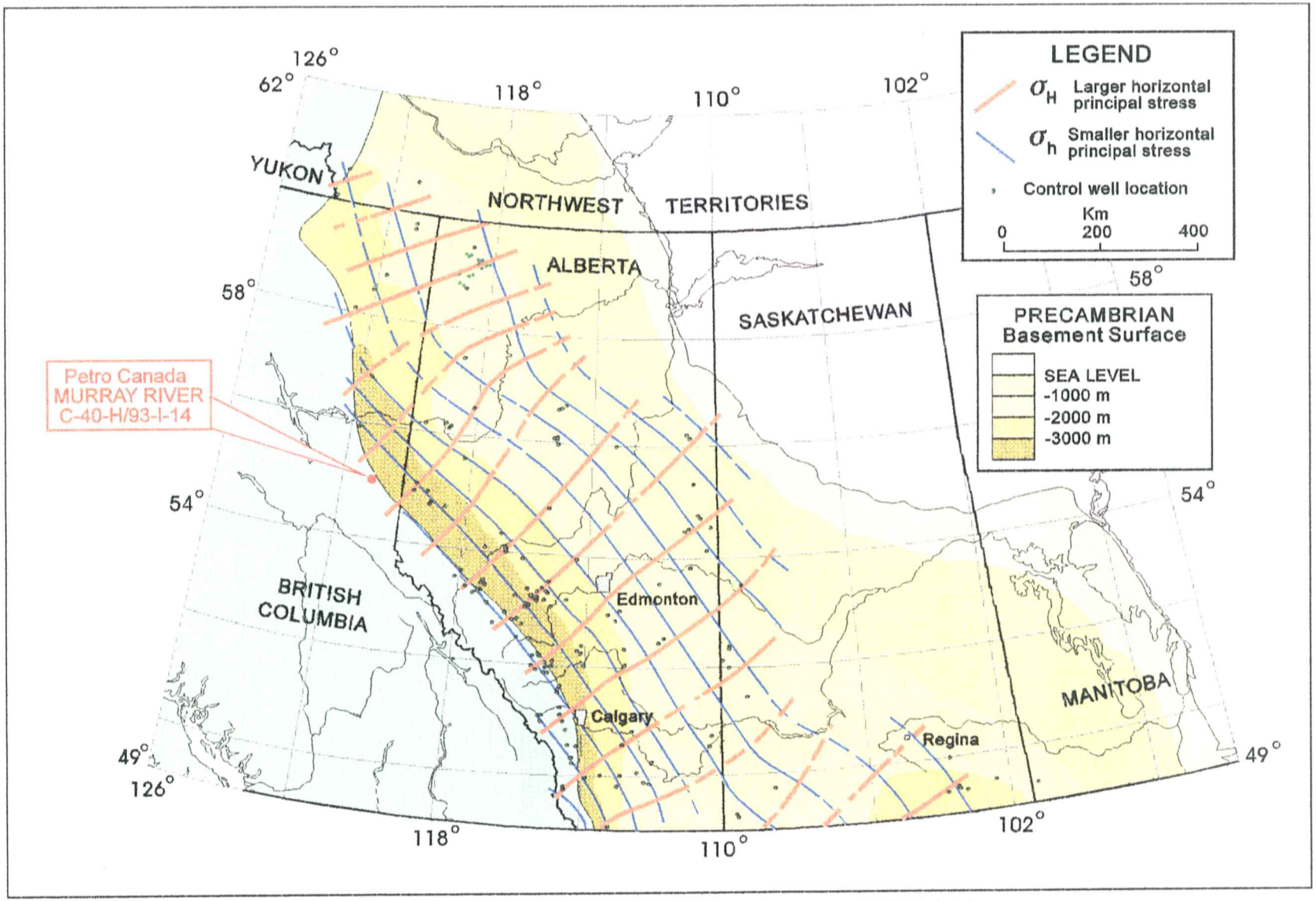


Fig. 1. Location map of Petro Canada Murray River C-40-H/93-I-14.

Figure 2. A well overview diagram of the entire Murray River c-40-H/93-I-14 well summarizing strike and dips of the various features observed.

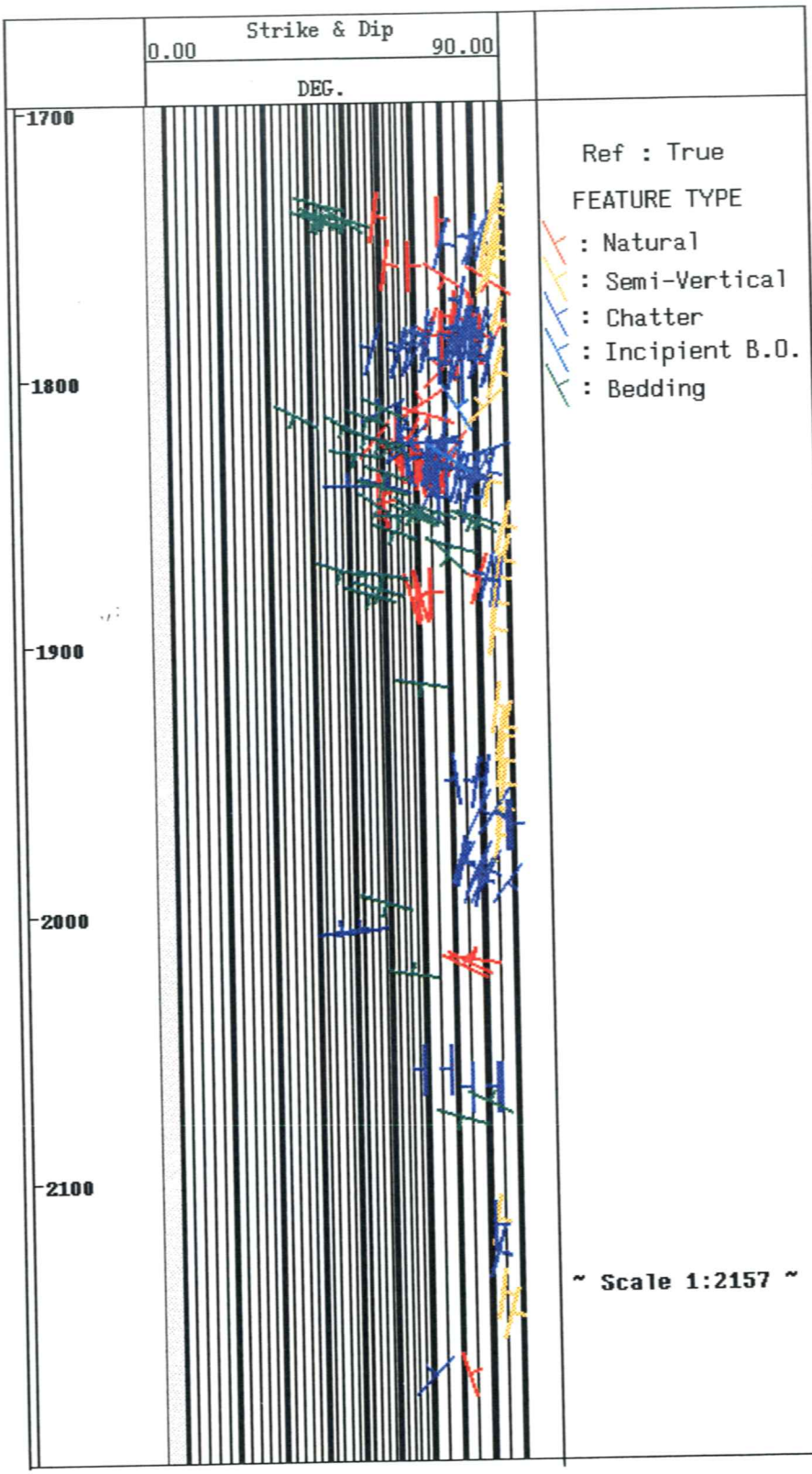

Strike & Dip
0.00
90.00
DEG.
1700
1800
1900
2000
2100
Ref : True
FEATURE TYPE
: Natural
: Semi-Vertical
: Chatter
: Incipient B.O.
: Bedding
~ Scale 1:2157 ~

Figure 3. Strike and dip summary chart of the 1700 to 1800 m interval.

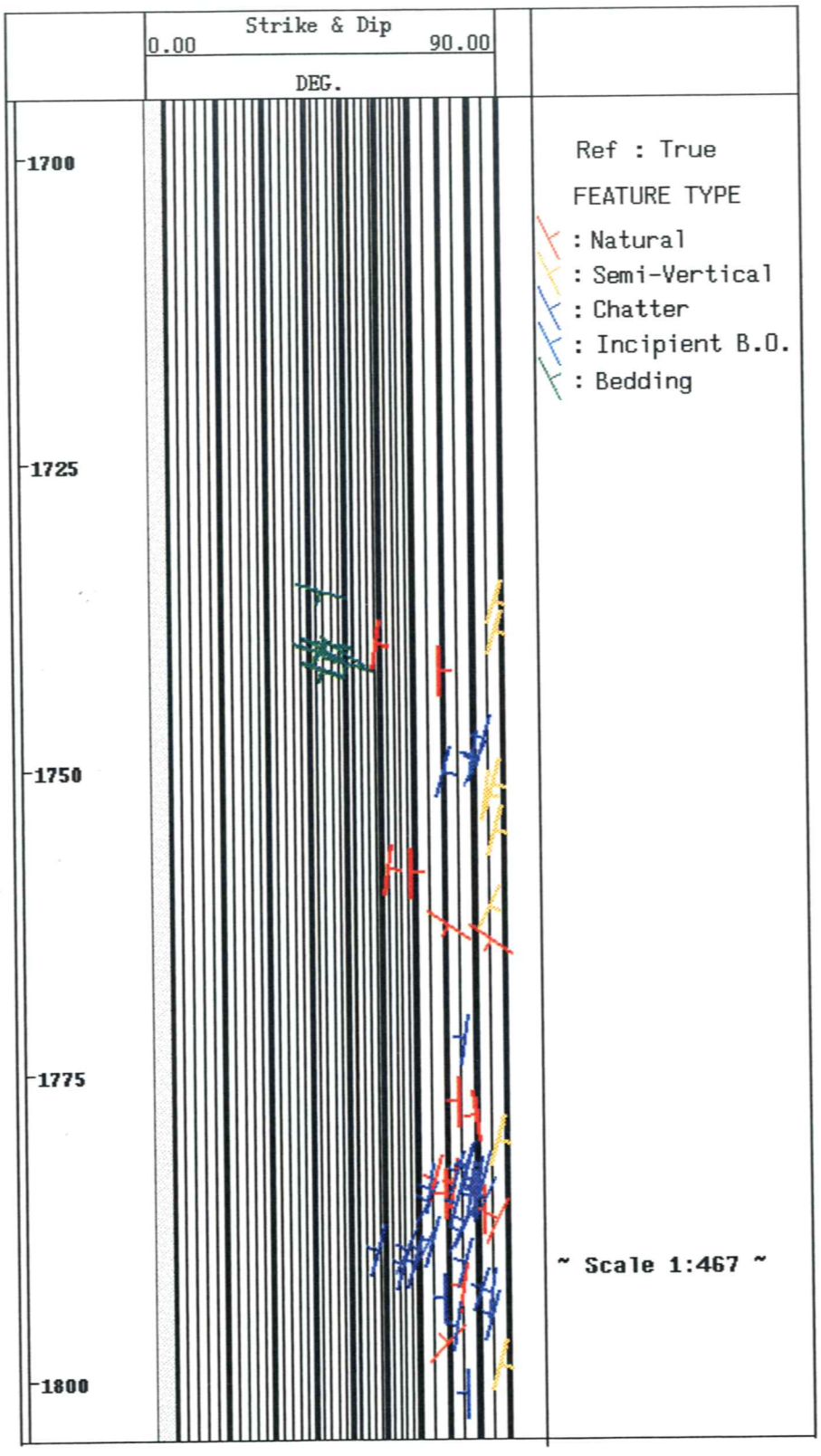

Strike & Dip
0.00
90.00
DEG.
1700
1725
1750
1775
1800
Ref : True
FEATURE TYPE
: Natural
: Semi-Vertical
: Chatter
: Incipient B.O.
: Bedding
~ Scale 1:467 ~

Figure 4. Strike and dip summary chart of the 1800 to 1900 m interval.

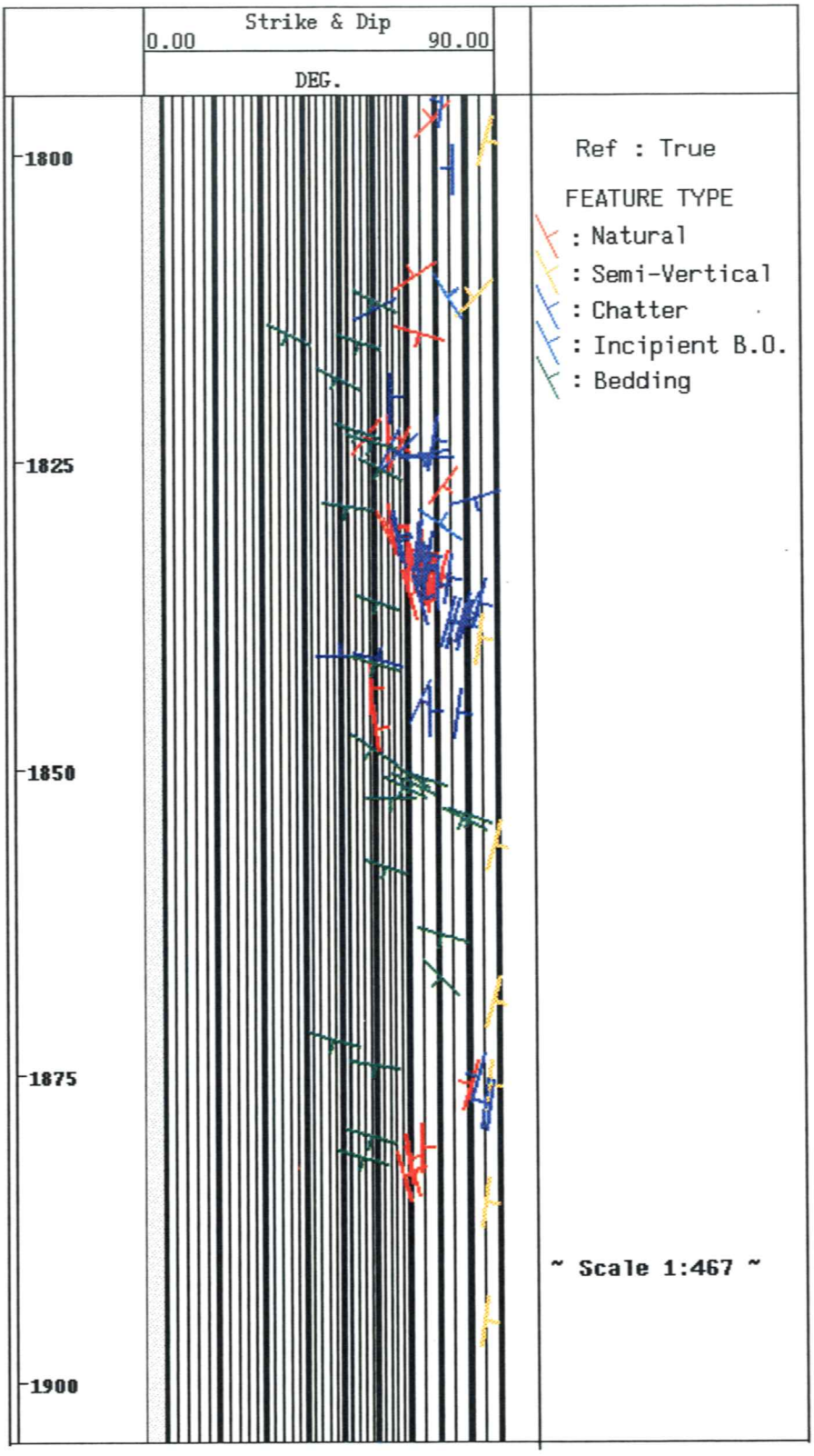

Strike & Dip
0.00
90.00
DEG.
1800
1825
1850
1875
1900
Ref : True
FEATURE TYPE
: Natural
: Semi-Vertical
: Chatter
: Incipient B.O.
: Bedding
~ Scale 1:467 ~

Figure 5. Strike and dip summary chart of the 1900 to 2000 m interval.

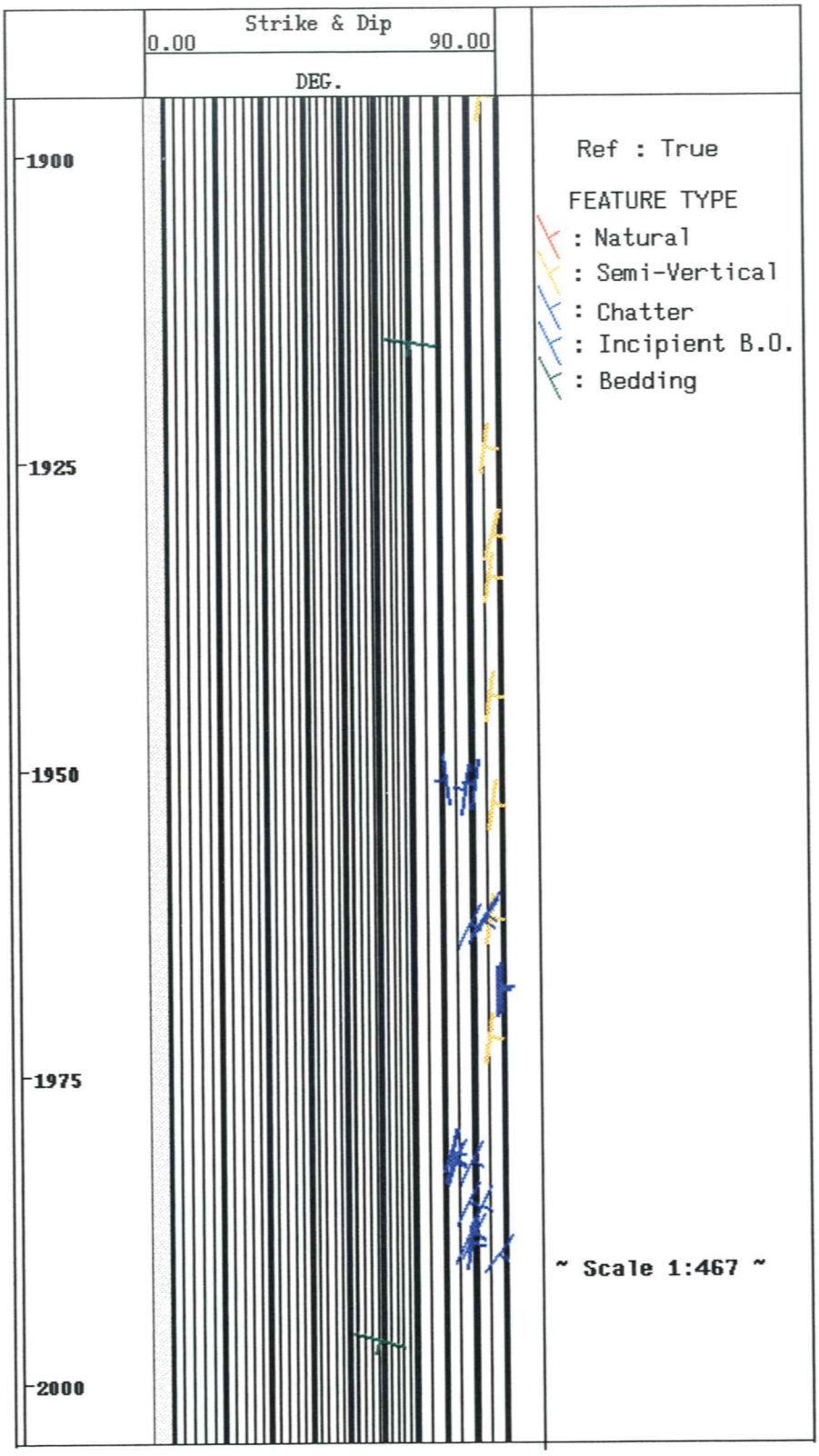

Strike & Dip
0.00
90.00
DEG.
1900
1925
1950
1975
2000
Ref : True
FEATURE TYPE
: Natural
: Semi-Vertical
: Chatter
: Incipient B.O.
: Bedding
~ Scale 1:467 ~

Figure 6. Strike and dip summary chart of the 2000 to 2100 m interval.

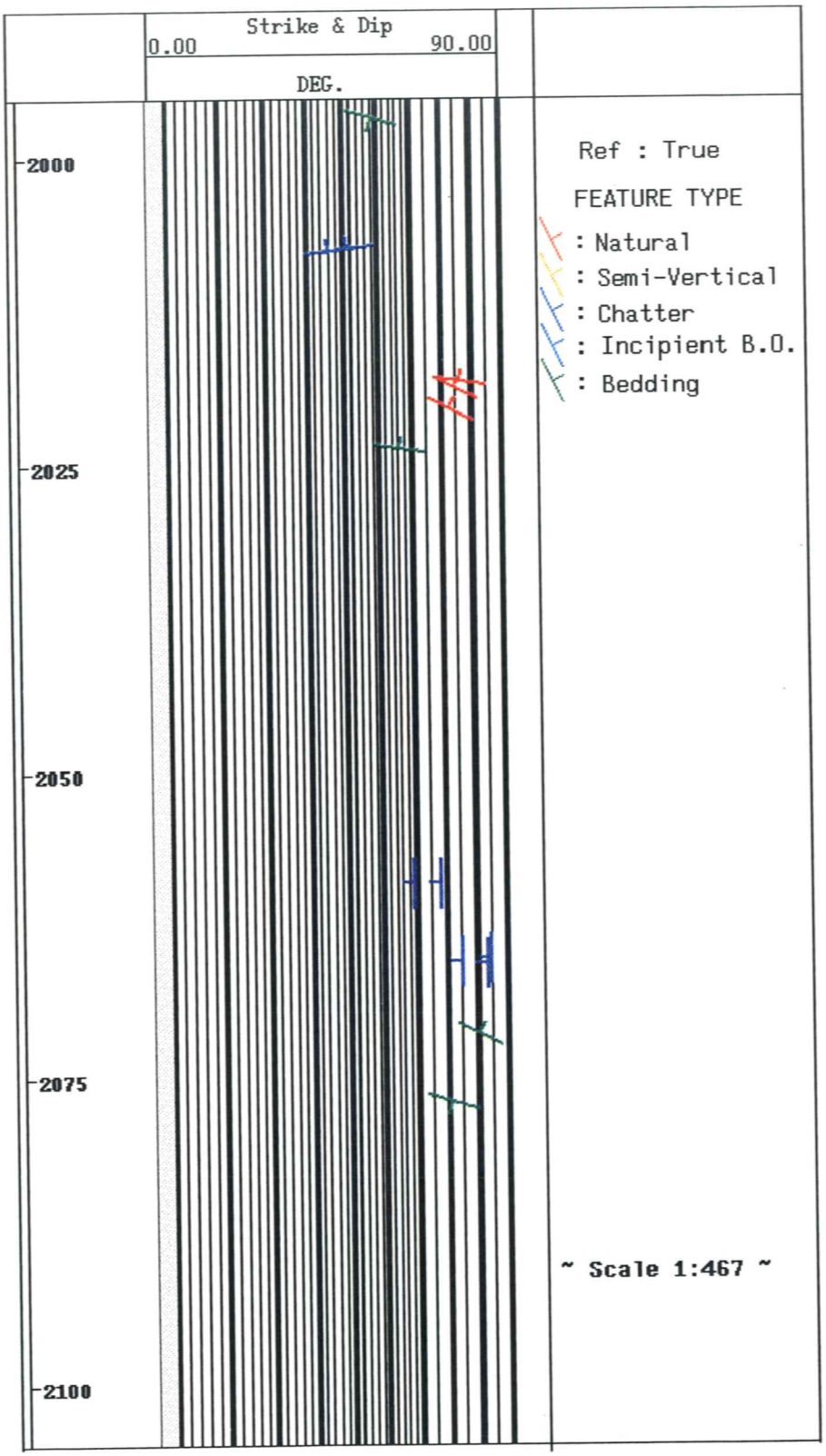

Strike & Dip
0.00
90.00
DEG.
2000
2025
2050
2075
2100
Ref : True
FEATURE TYPE
: Natural
: Semi-Vertical
: Chatter
: Incipient B.O.
: Bedding
~ Scale 1:467 ~

Figure 7. Strike and dip summary chart of the 2100 to 2200 m interval.

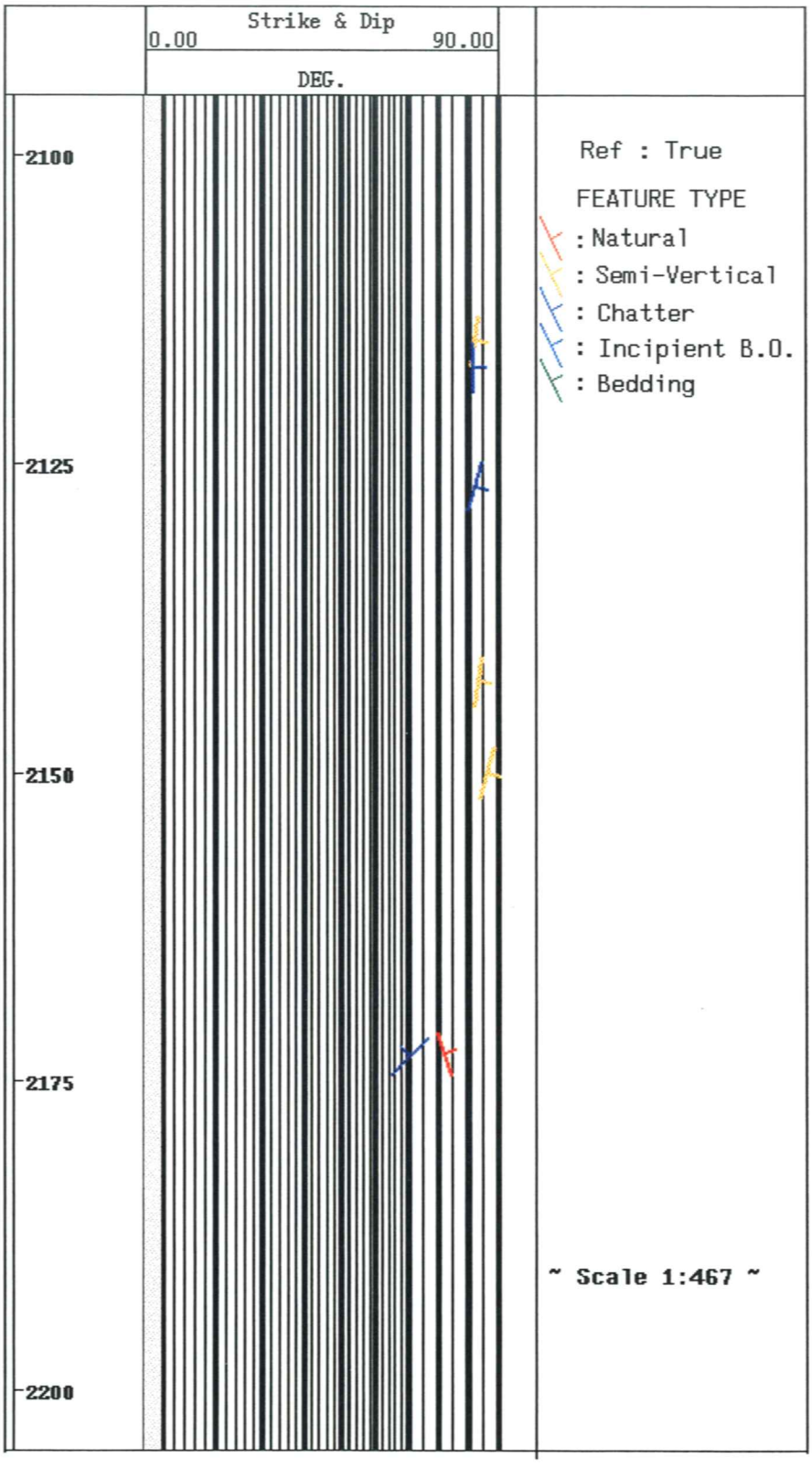

Strike & Dip
0.00
90.00
DEG.
2100
2125
2150
2175
2200
Ref : True
FEATURE TYPE
: Natural
: Semi-Vertical
: Chatter
: Incipient B.O.
: Bedding
~ Scale 1:467 ~

Figure 8. A vertical fracture at the 1943.5 m to 1947.0 m mark within the Triassic Charlie Lake carbonates. The fracture is characterized by a linear, dark (conductive) trace appearing at opposite sides of the borehole at azimuths of 015° and 195°. It dips at 87° with a dip azimuth of 105° (strike direction is 015° N). Vertical scale is 1:10, horizontal scale is 1:5.

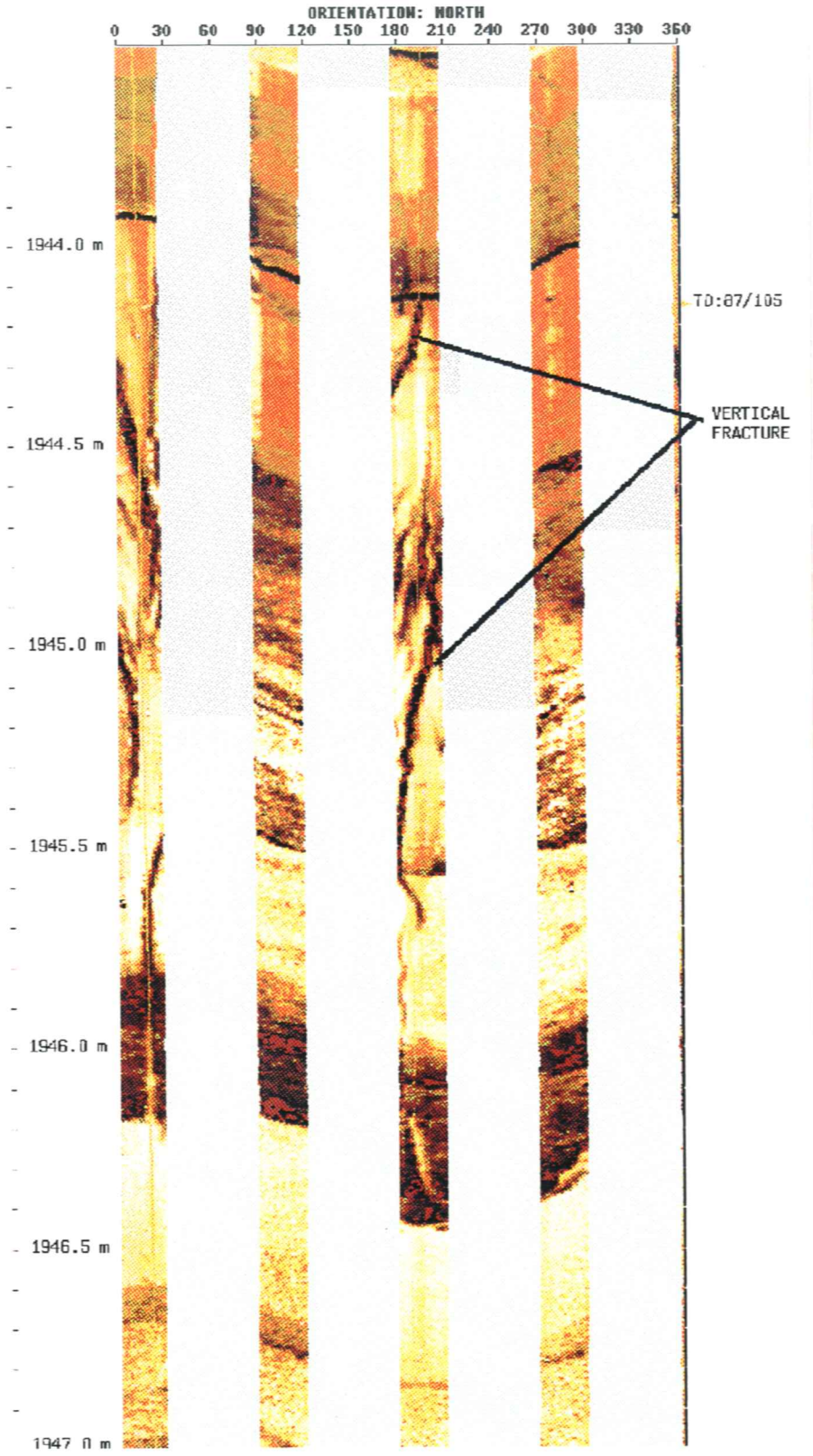

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1944.0 m
1944.5 m
1945.0 m
1945.5 m
1946.0 m
1946.5 m
1947.0 m
TD:87/105
VERTICAL
FRACTURE

Figure 9. A vertical fracture at the 1970.0 - 1973.5 m mark within the Triassic Charlie Lake carbonates. The fracture dips at 85° with a dip azimuth of 101° (strike 011° N). Vertical scale is 1:10, horizontal scale is 1:5.

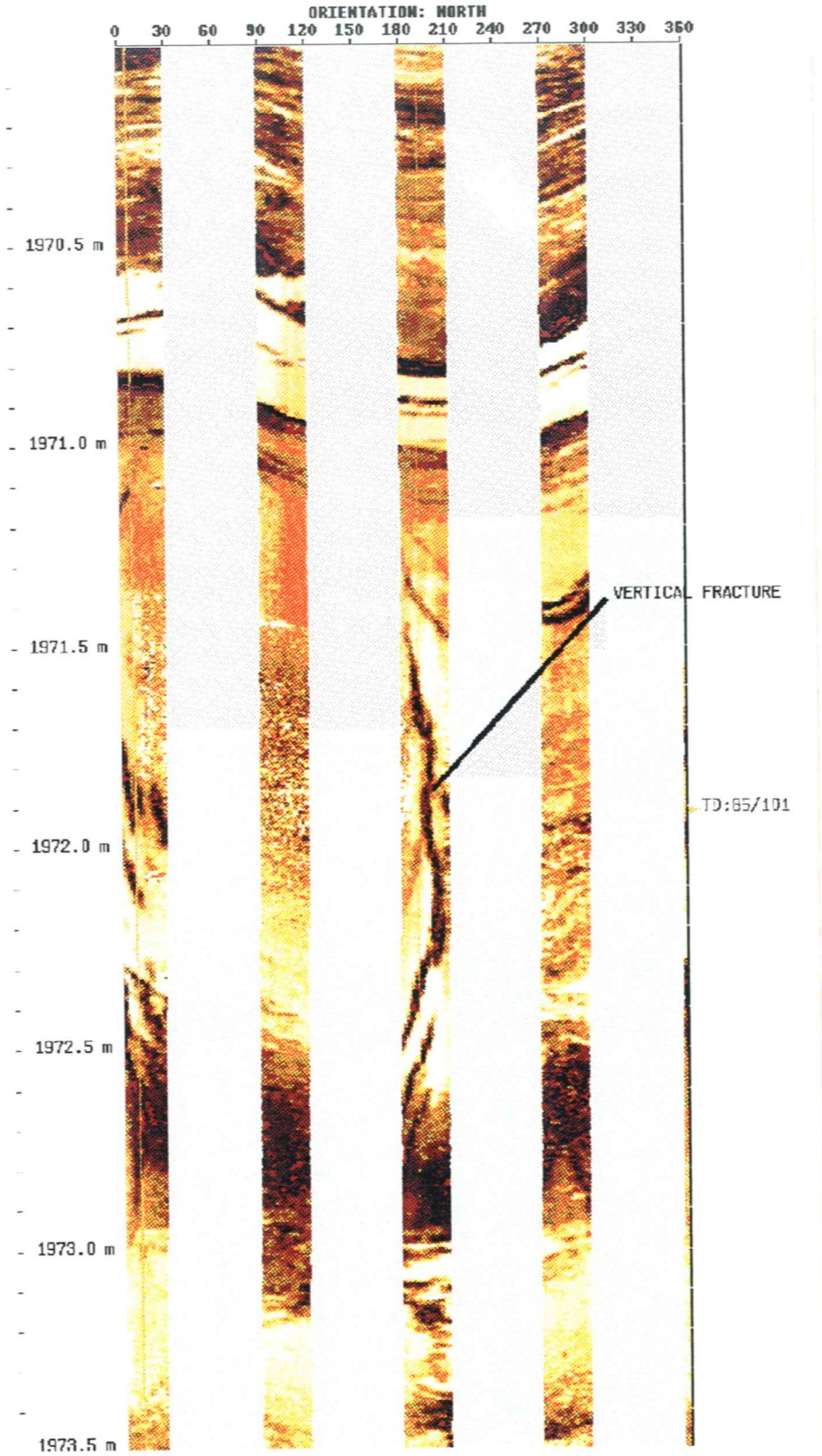

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1970.5 m
1971.0 m
1971.5 m
1972.0 m
1972.5 m
1973.0 m
1973.5 m
VERTICAL FRACTURE
TD:65/101

Figure 10. A vertical fracture dipping 86° and striking 011° within the Triassic Charlie Lake carbonates. Three chatter fractures, their orientations highlighted in blue, are also observed. Vertical scale is 1:20, horizontal scale is 1:5.

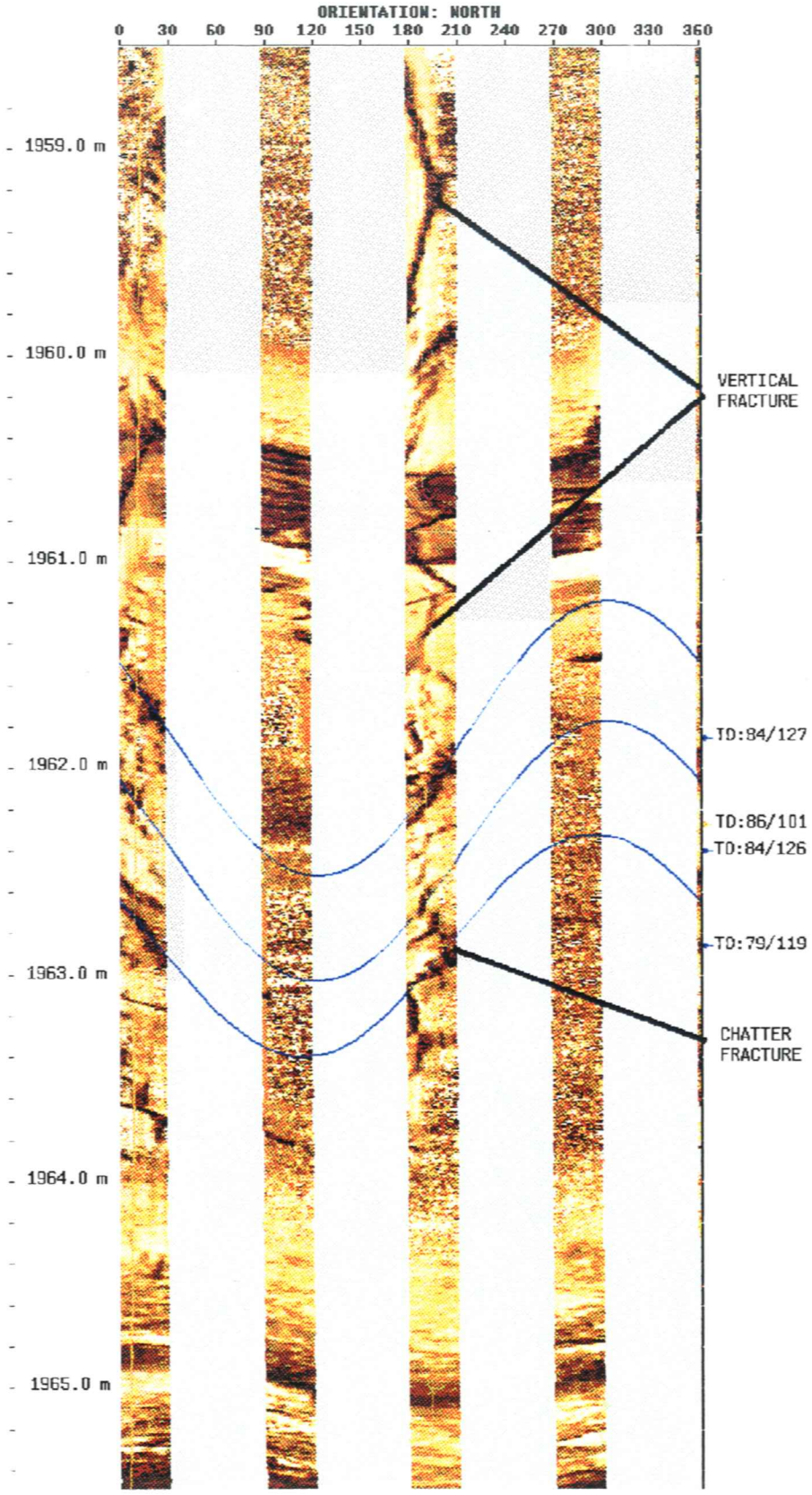

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1959.0 m
1960.0 m
1961.0 m
1962.0 m
1963.0 m
1964.0 m
1965.0 m
VERTICAL FRACTURE
TD:84/127
TD:86/101
TD:84/126
TD:79/119
CHATTER FRACTURE

Figure 11. A vertical fracture at the 1952.5 - 1959.0 m mark within the Triassic Charlie Lake Formation. The fracture dips at 87° and strikes 016° N. Vertical scale is 1:20, horizontal scale is 1:5.

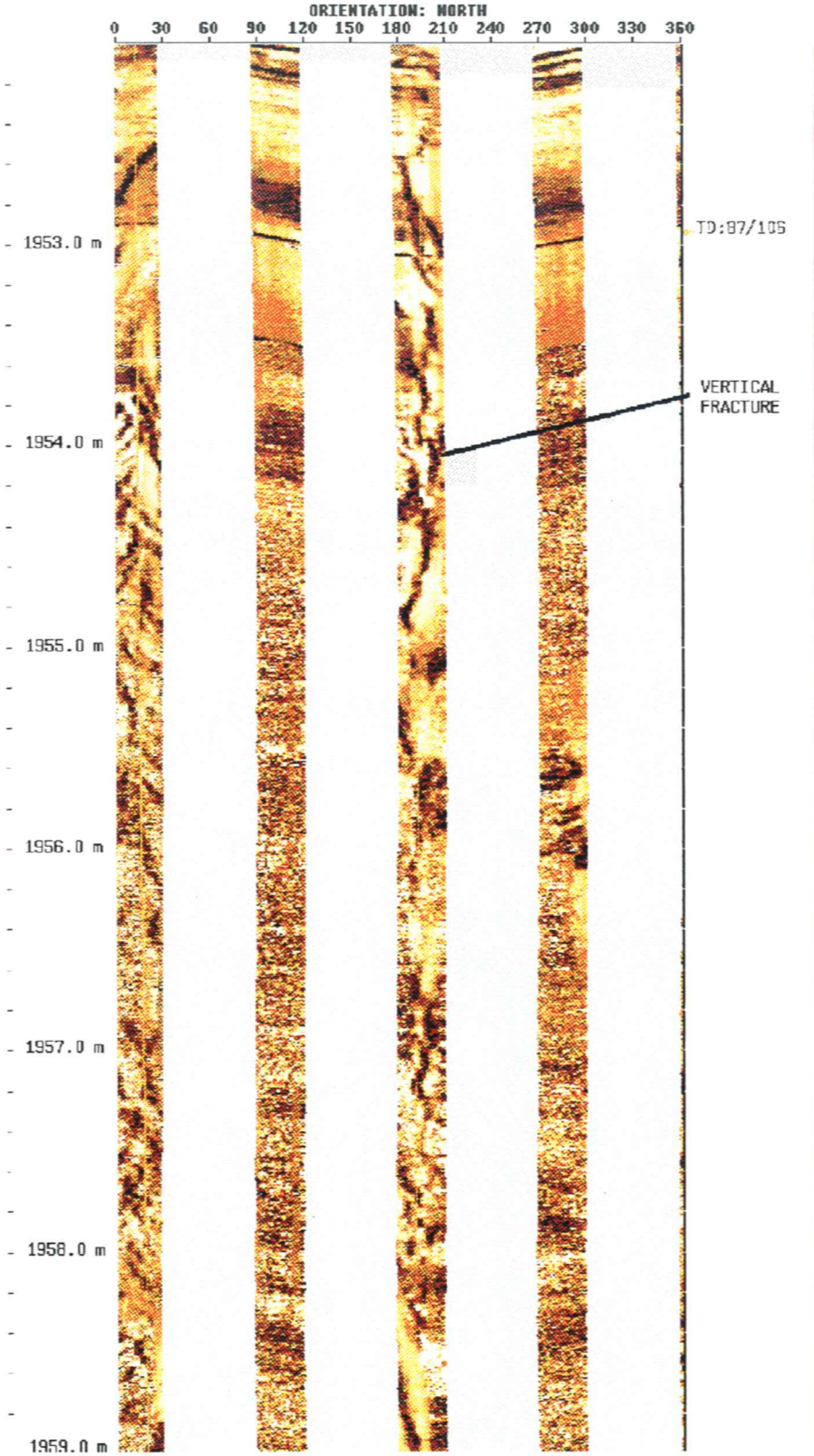

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1953.0 m
1954.0 m
1955.0 m
1956.0 m
1957.0 m
1958.0 m
1959.0 m
TD:87/105
VERTICAL
FRACTURE

Figure 12. Four chatter fractures and their plotted orientations within the carbonates of the Triassic Charlie Lake Formation. The fractures overlap each other in a slanted, en echelon, step-like fashion. They appear on opposite sides of the borehole 180° apart. Vertical scale is 1:10, horizontal scale is 1:5.

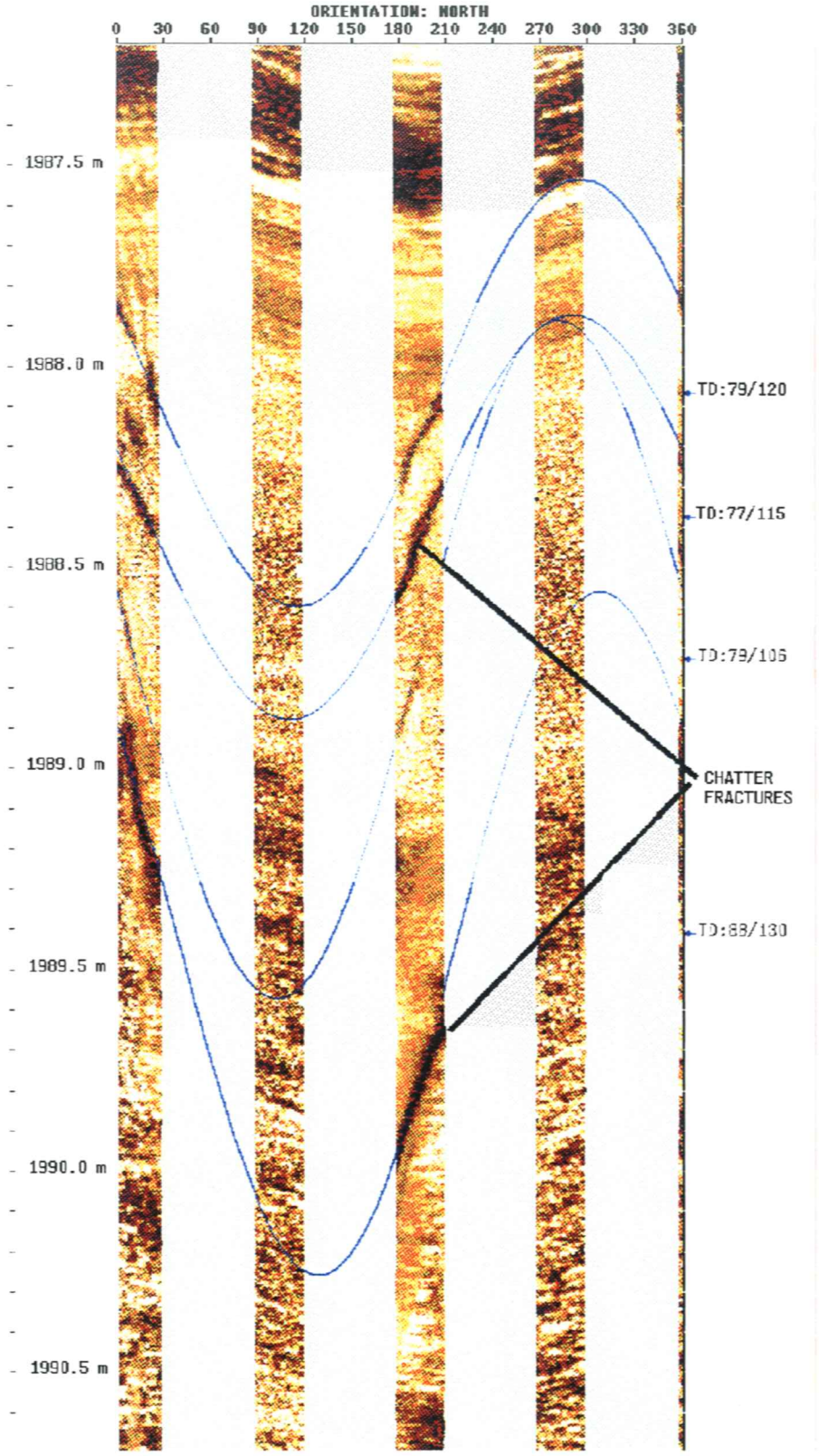

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1987.5 m
1988.0 m
1988.5 m
1989.0 m
1989.5 m
1990.0 m
1990.5 m
TD:79/120
TD:77/115
TD:79/105
CHATTER FRACTURES
TD:88/130

Figure 13. Chatter fractures and natural fracture traces at the 1782.0 - 1785.5 m interval within the carbonates of the Triassic Pardonet Formation. Vertical scale is 1:10, horizontal scale is 1:5.

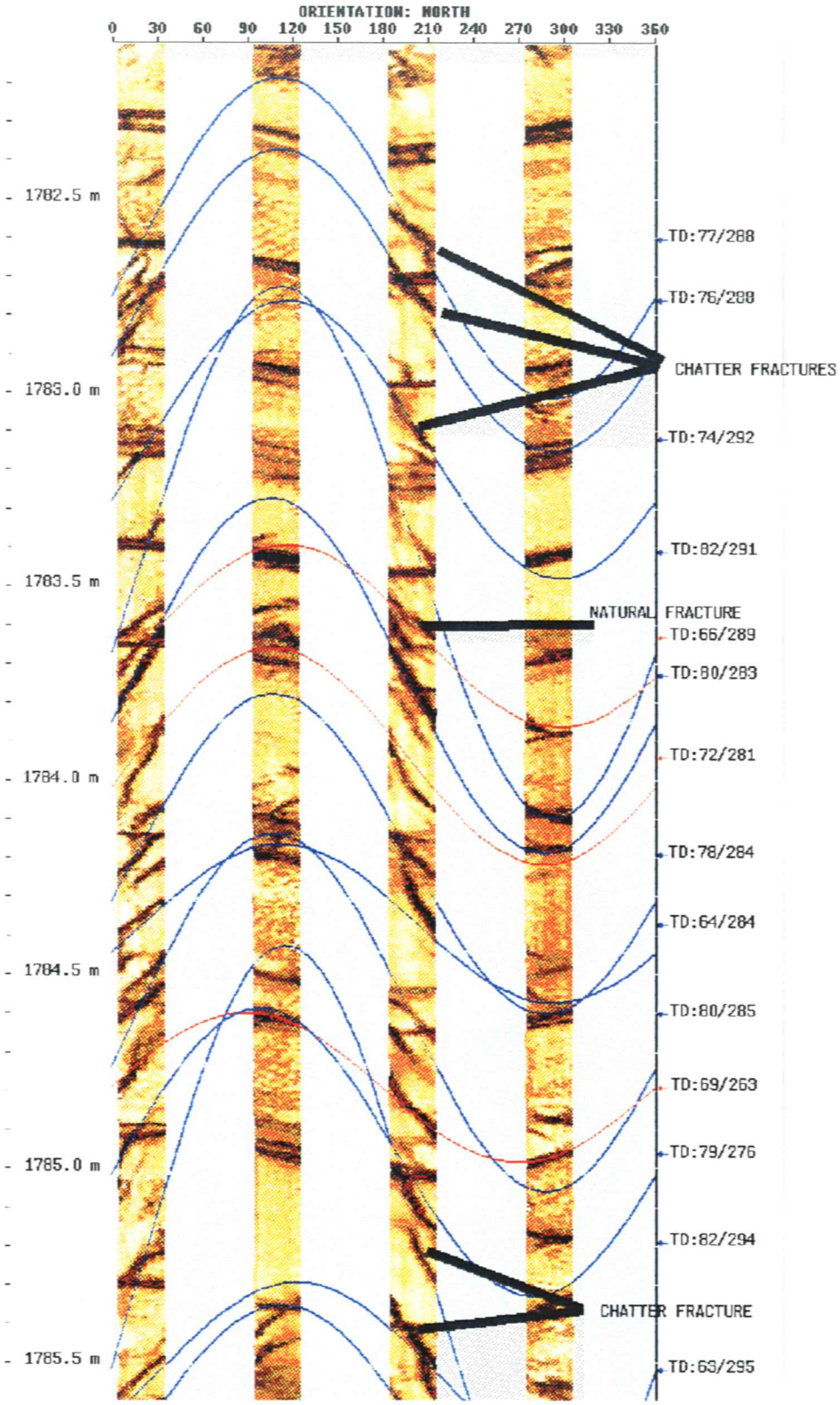

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1782.5 m
1783.0 m
1783.5 m
1784.0 m
1784.5 m
1785.0 m
1785.5 m
TD:77/288
TD:76/288
CHATTER FRACTURES
TD:74/292
TD:82/291
NATURAL FRACTURE
TD:66/289
TD:80/283
TD:72/281
TD:78/284
TD:64/284
TD:80/285
TD:69/263
TD:79/276
TD:82/294
CHATTER FRACTURE
TD:69/295

Figure 14. Natural fracture and chatter fracture traces within the carbonates of the Triassic Baldonel Formation at the 1830.0 - 1833.5 m interval. Vertical scale is 1:10, horizontal scale is 1:5.

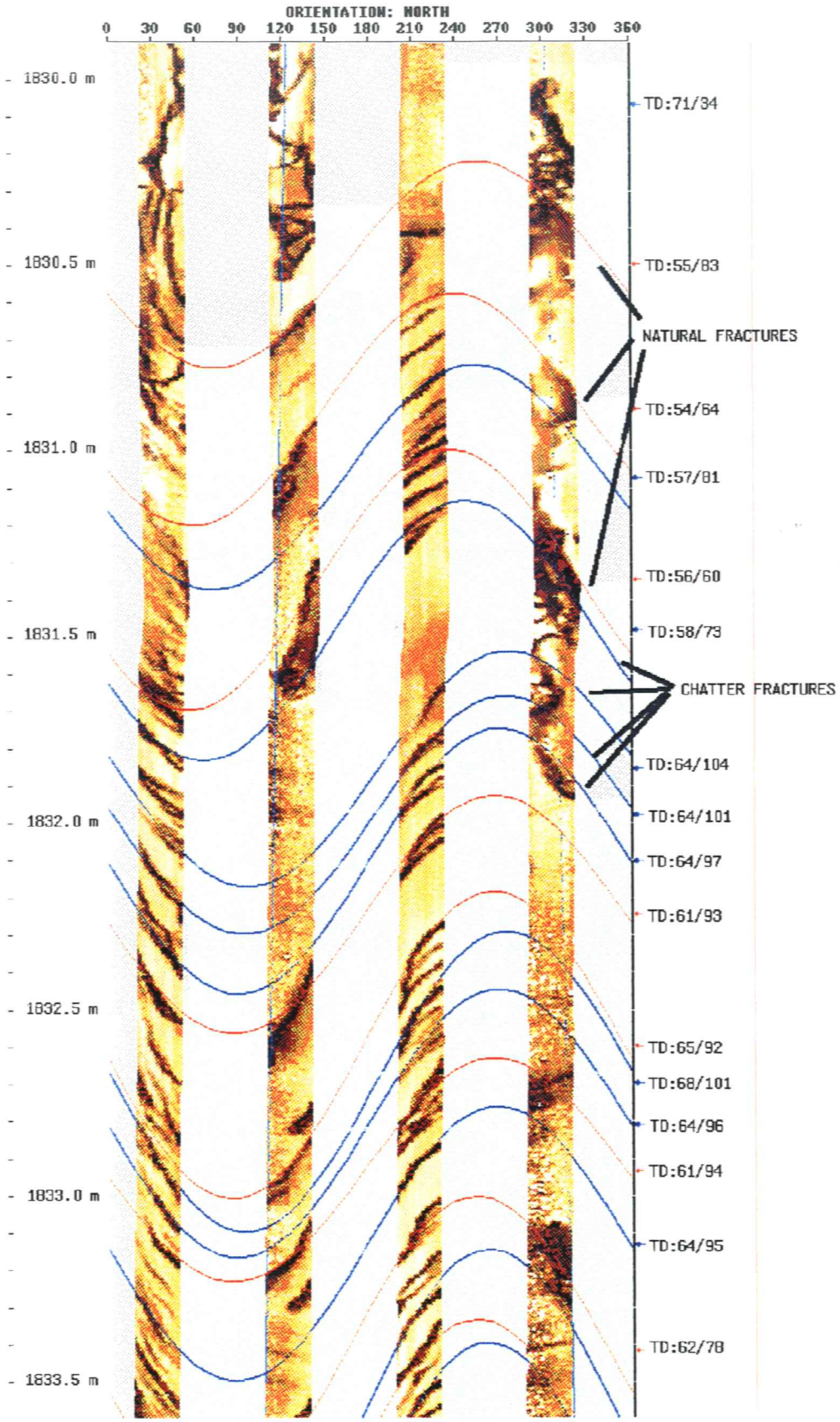

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1830.0 m
1830.5 m
1831.0 m
1831.5 m
1832.0 m
1832.5 m
1833.0 m
1833.5 m
TD:71/34
TD:55/83
NATURAL FRACTURES
TD:54/64
TD:57/81
TD:56/60
TD:58/73
CHATTER FRACTURES
TD:64/104
TD:64/101
TD:64/97
TD:61/93
TD:65/92
TD:68/101
TD:64/96
TD:61/94
TD:64/95
TD:62/78

Figure 15. Four natural fracture traces at the 1880.5 - 1883.5 m interval within the Triassic Baldonel Formation. These open planar fractures are uniform in their orientation and clearly crosscut bedding as shown at the 1881.7 m mark. Vertical scale is 1:10, horizontal scale is 1:5.

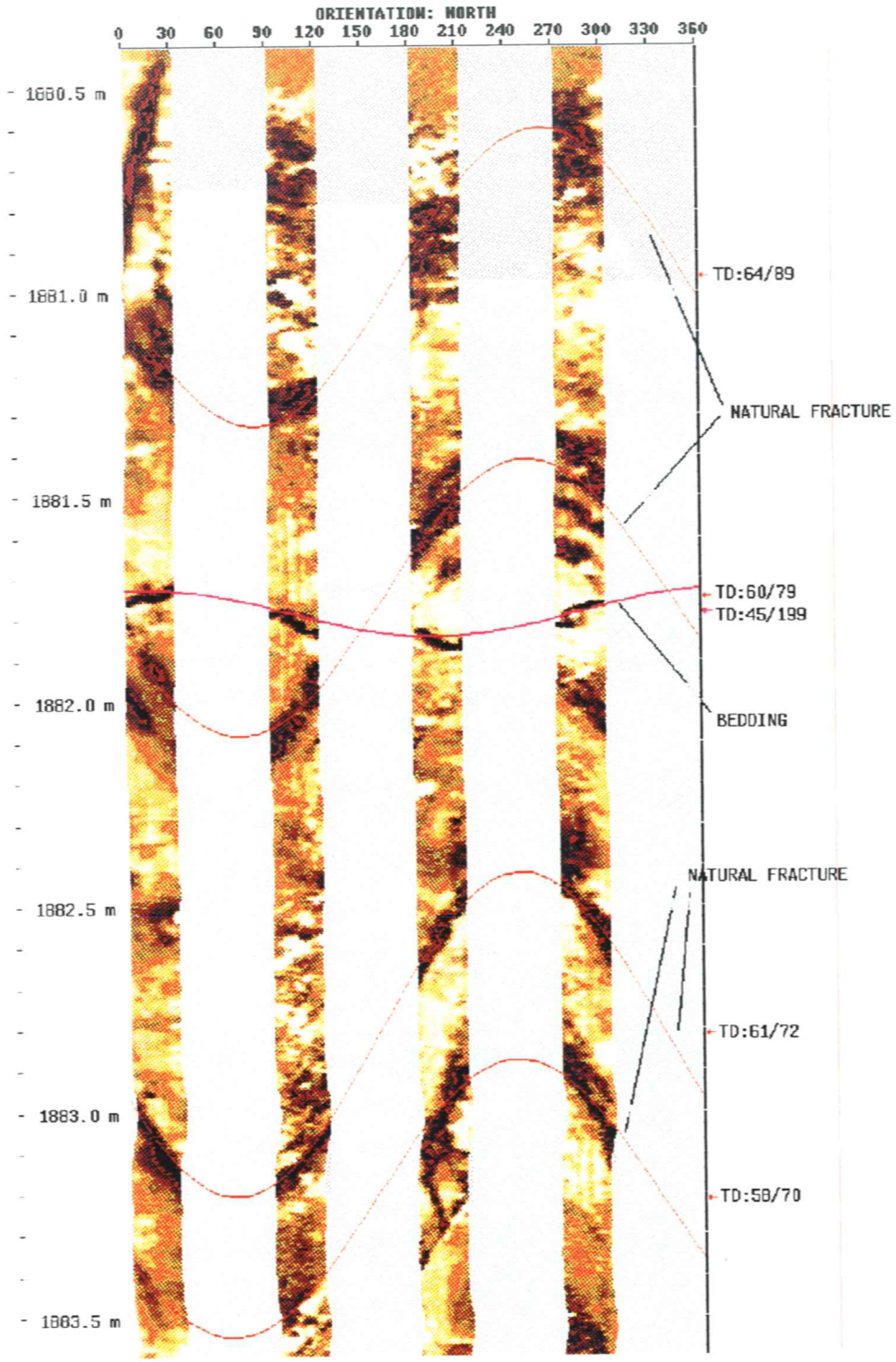

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1880.5 m
1881.0 m
1881.5 m
1882.0 m
1882.5 m
1883.0 m
1883.5 m
TD:64/89
NATURAL FRACTURE
TD:60/79
TD:45/199
BEDDING
NATURAL FRACTURE
TD:61/72
TD:58/70

Figure 16. An example of a fracture trace associated with incipient borehole breakout at the 1809.0 - 1812.0 m mark with in the Triassic Baldonel Formation. The fracture traces align themselves at an azimuth of 150° and represent the beginnings of borehole collapse as shear fractures intersect the borehole wall. Vertical scale is 1:10, horizontal scale is 1:5.

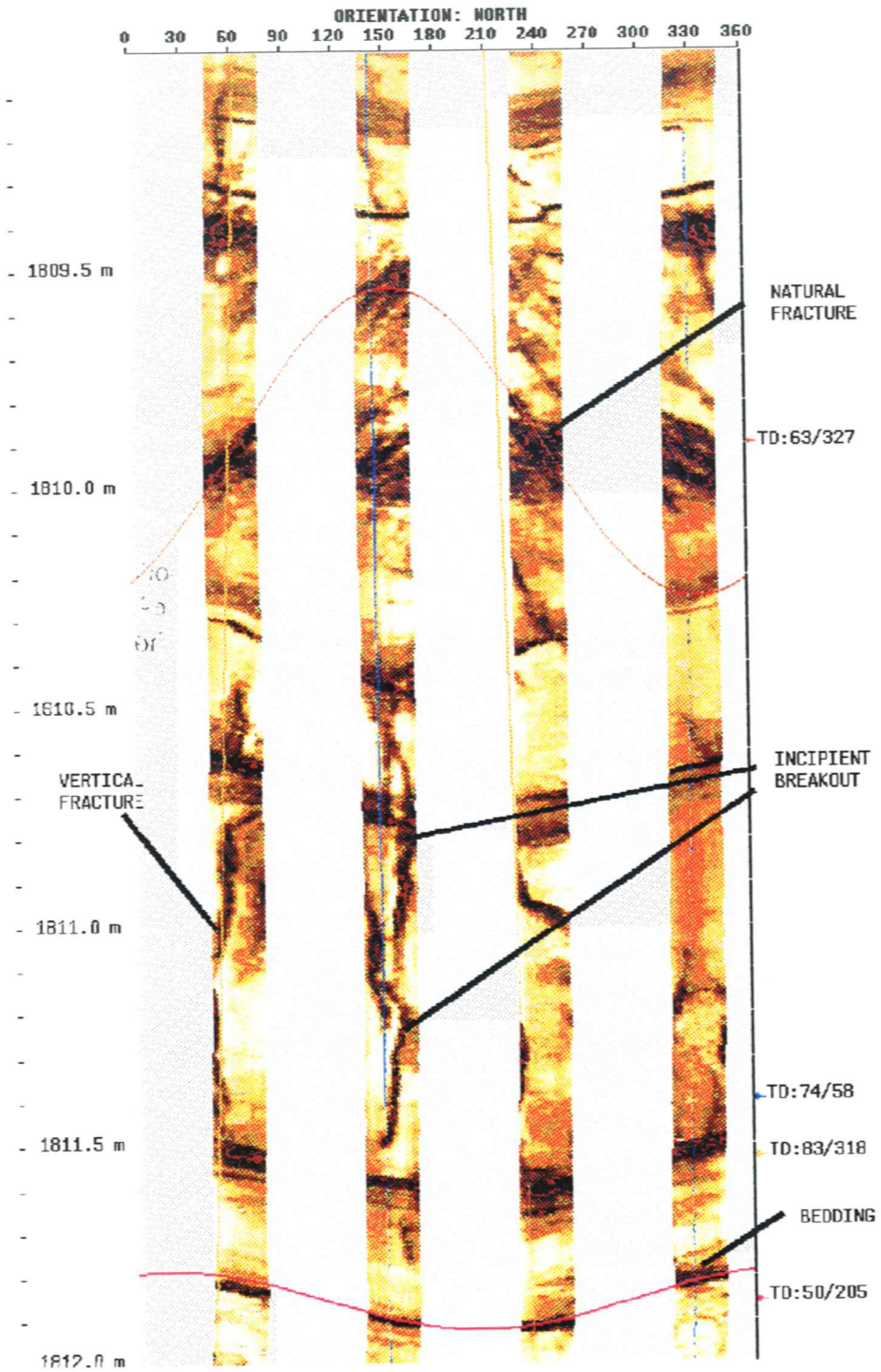

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1809.5 m
1810.0 m
1810.5 m
1811.0 m
1811.5 m
1812.0 m
NATURAL FRACTURE
TD:63/327
INCIPIENT BREAKOUT
VERTICAL FRACTURE
TD:74/58
TD:83/318
BEDDING
TD:50/205

Figure 17. An FMS image highlighting the orientation differences between bedding and natural fractures within the Triassic Pardonet Formation. At 1740.0 m the natural fractures clearly crosscut bedding.

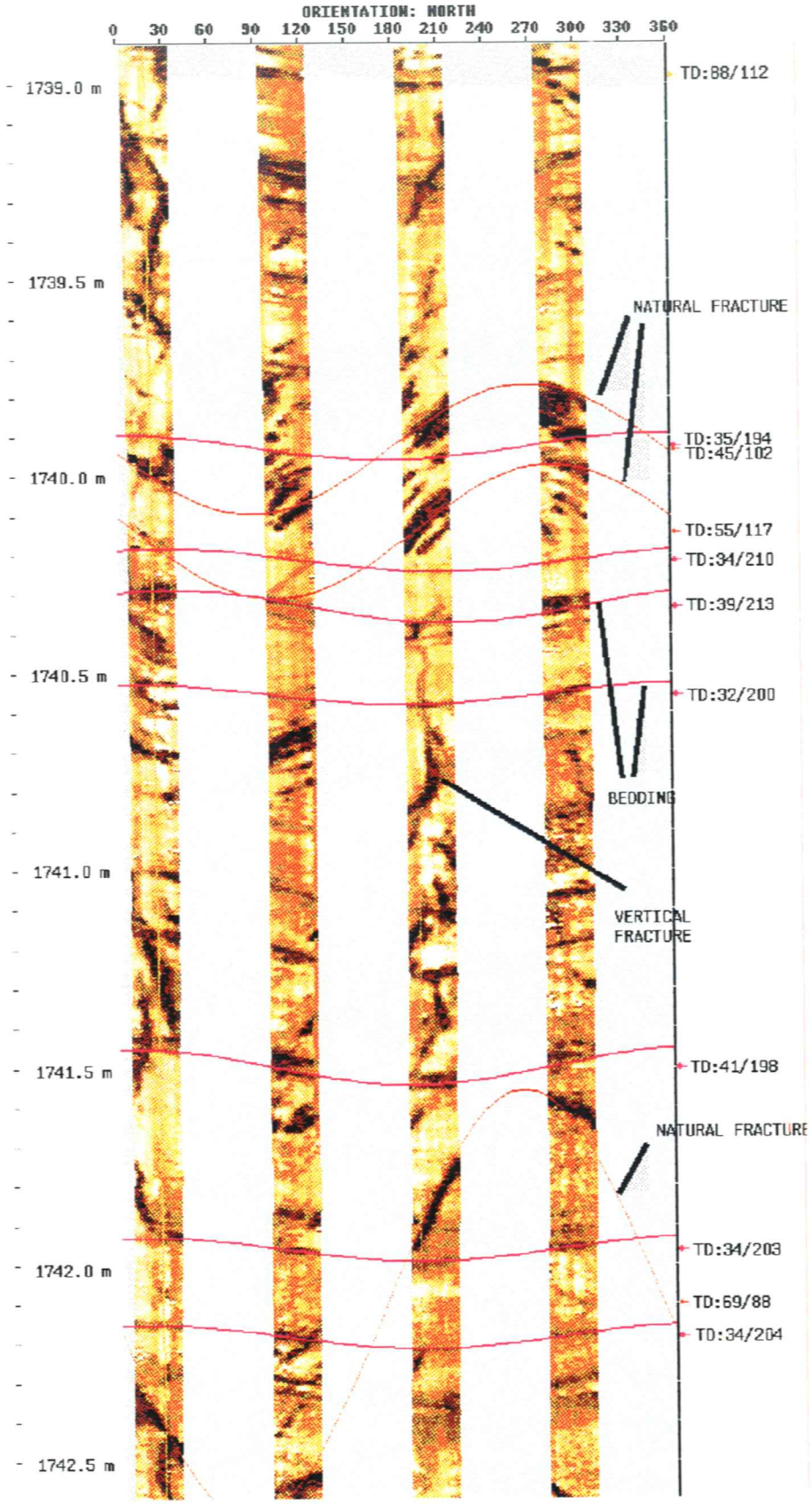
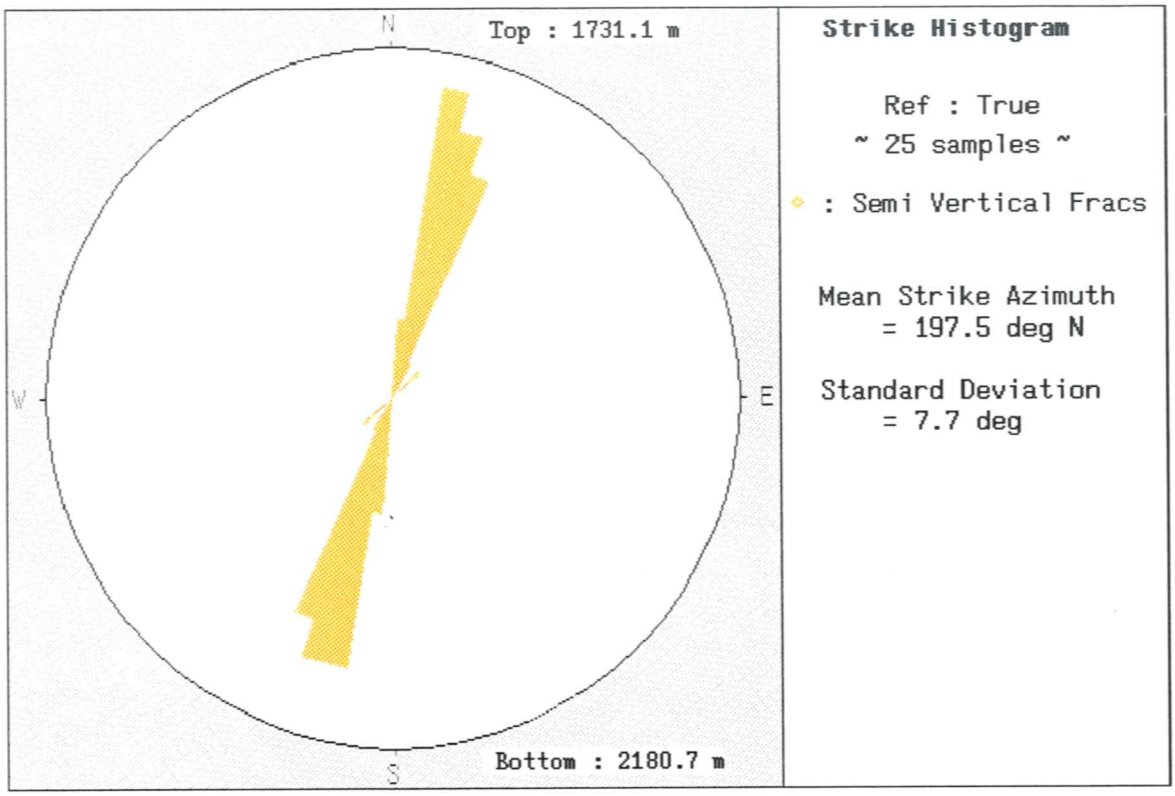

ORIENTATION: NORTH
0 30 60 90 120 150 180 210 240 270 300 330 360
1739.0 m
1739.5 m
1740.0 m
1740.5 m
1741.0 m
1741.5 m
1742.0 m
1742.5 m
TD:88/112
NATURAL FRACTURE
TD:35/194
TD:45/102
TD:55/117
TD:34/210
TD:39/213
TD:32/200
BEDDING
VERTICAL FRACTURE
TD:41/198
NATURAL FRACTURE
TD:34/203
TD:69/88
TD:34/204

Figure 18a. Strike azimuth plot of semi-vertical fractures in Murray River c-40-H/93-I-14. Mean strike azimuth from 25 samples is computed as 197.5° N (standard deviation = 7.7°).

Figure 18b. Strike azimuth plot of chatter fractures in Murray River c-40-H/93-I-14. Mean strike azimuth for 96 samples is computed as 197.0° N (standard deviation = 22.9°).


N
Top : 1731.1 m
W
E
S
Bottom : 2180.7 m
Strike Histogram
Ref : True
~ 25 samples ~
: Semi Vertical Fracs
Mean Strike Azimuth
= 197.5 deg N
Standard Deviation
= 7.7 deg

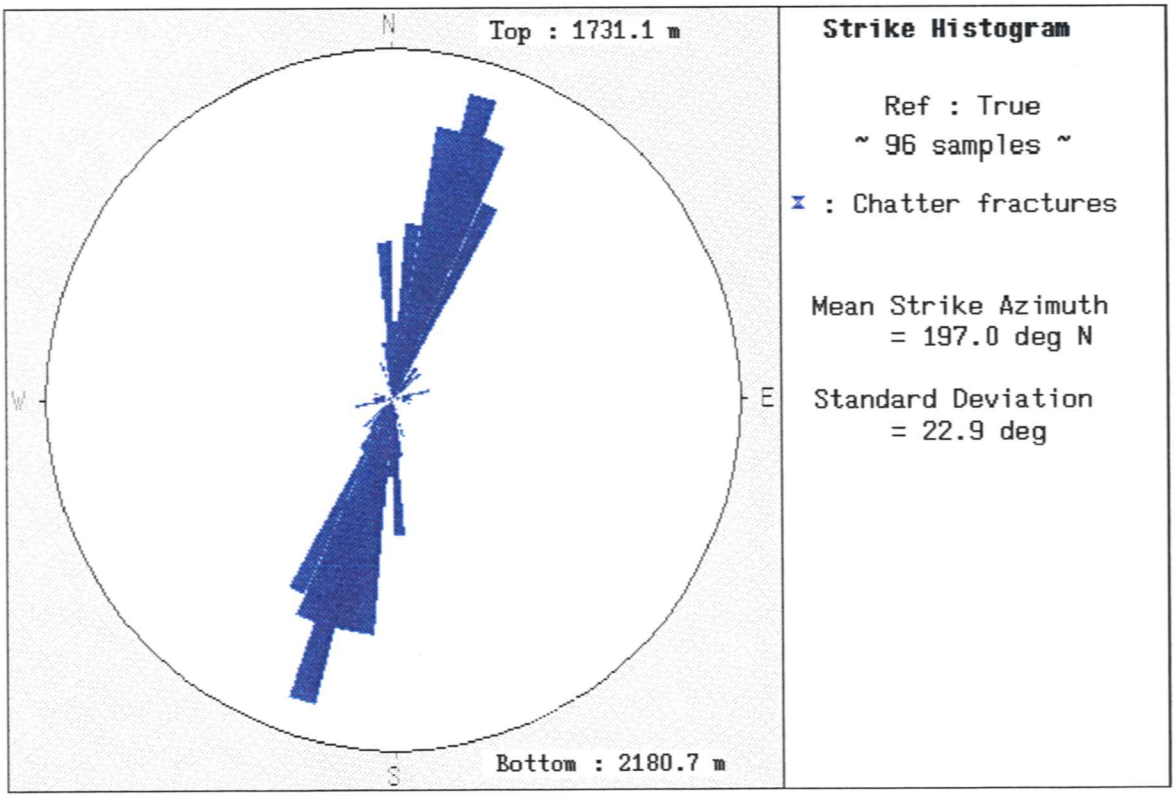
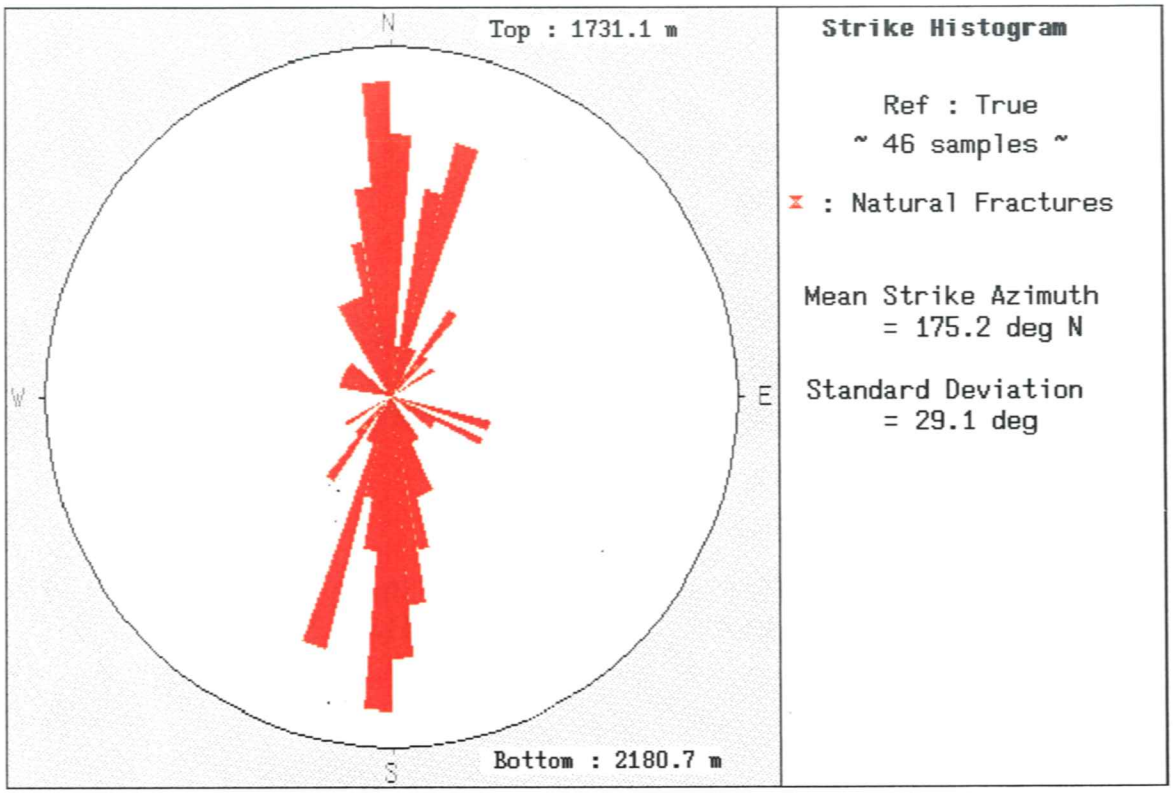

N
Top : 1731.1 m
W
E
S
Bottom : 2180.7 m
Strike Histogram
Ref : True
~ 96 samples ~
: Chatter fractures
Mean Strike Azimuth
= 197.0 deg N
Standard Deviation
= 22.9 deg

Figure 19a. Strike azimuth plot of natural fractures in Murray River c-40-H/93-I-14. Mean strike azimuth for 46 samples is computed as 175.2° N (standard deviation = 29.1°).

Figure 19b. Strike azimuth plot of incipient breakouts in Murray River c-40-H/93-I-14. Mean strike azimuth for 2 samples is computed as 136.0° N (standard deviation = 12.1°).


N
Top : 1731.1 m
W
E
S
Bottom : 2180.7 m
Strike Histogram
Ref : True
~ 46 samples ~
: Natural Fractures
Mean Strike Azimuth
= 175.2 deg N
Standard Deviation
= 29.1 deg

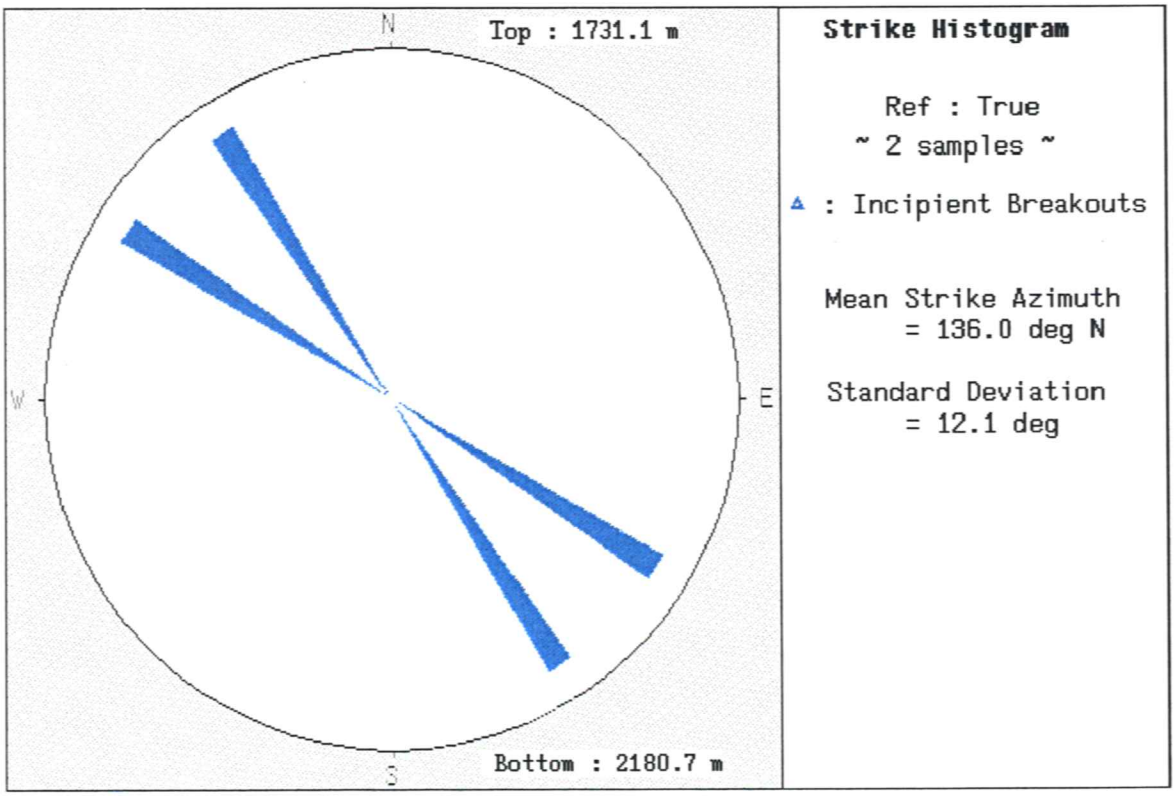
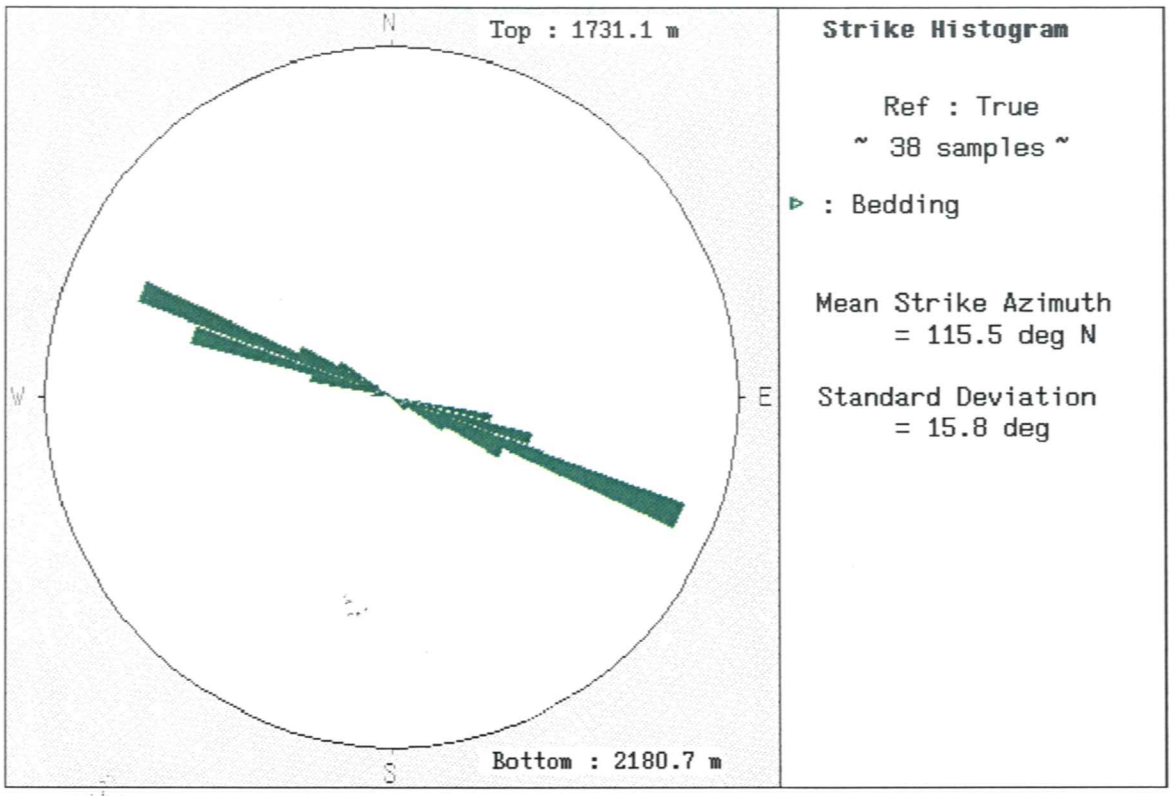

N
Top : 1731.1 m
W
E
S
Bottom : 2180.7 m
Strike Histogram
Ref : True
~ 2 samples ~
: Incipient Breakouts
Mean Strike Azimuth
= 136.0 deg N
Standard Deviation
= 12.1 deg

Figure 20a. Strike azimuth plot of bedding planes in Murray River c-40-H/93-I-14. Mean strike azimuth for the 38 measured samples is computed as 115.5° N (standard deviation = 15.8°).

Figure 20b. Strike azimuth summary plot of all the features measured in Murray River c-40-H/93-I-14.


N
W
E
S
Top : 1731.1 m
Bottom : 2180.7 m
Strike Histogram
Ref : True
~ 38 samples ~
▷ : Bedding
Mean Strike Azimuth
= 115.5 deg N
Standard Deviation
= 15.8 deg

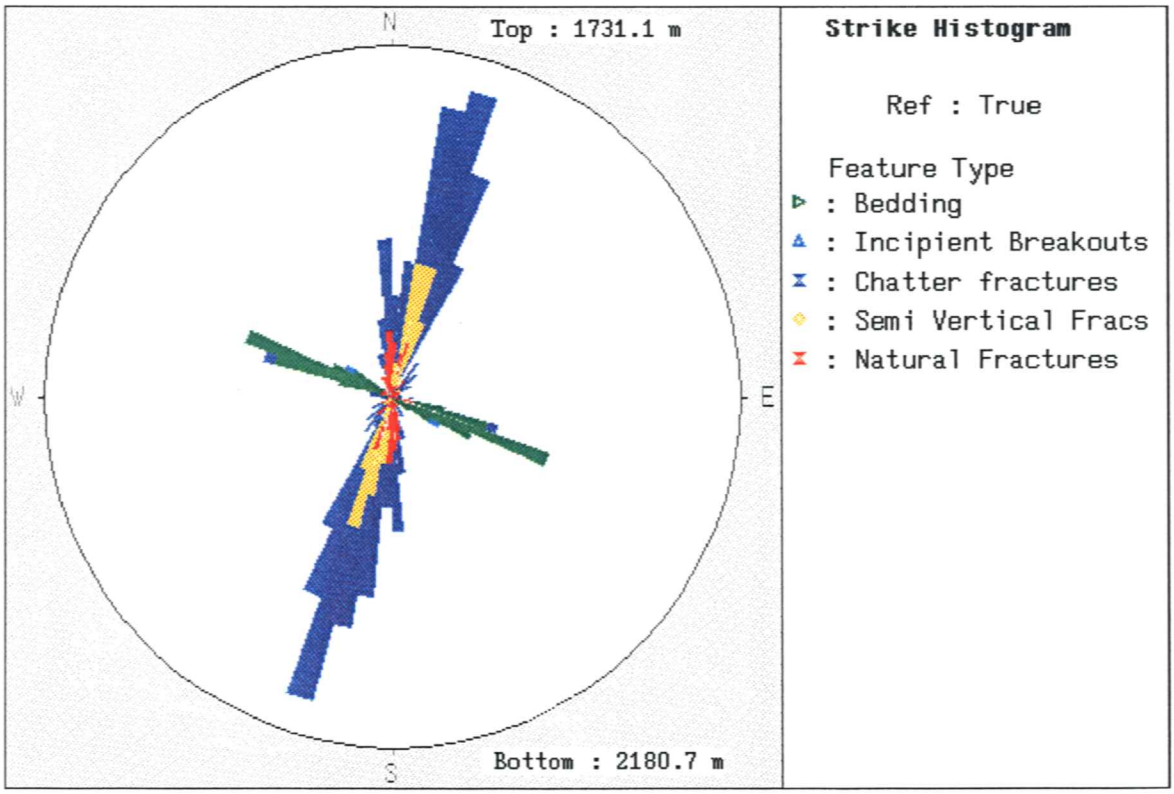
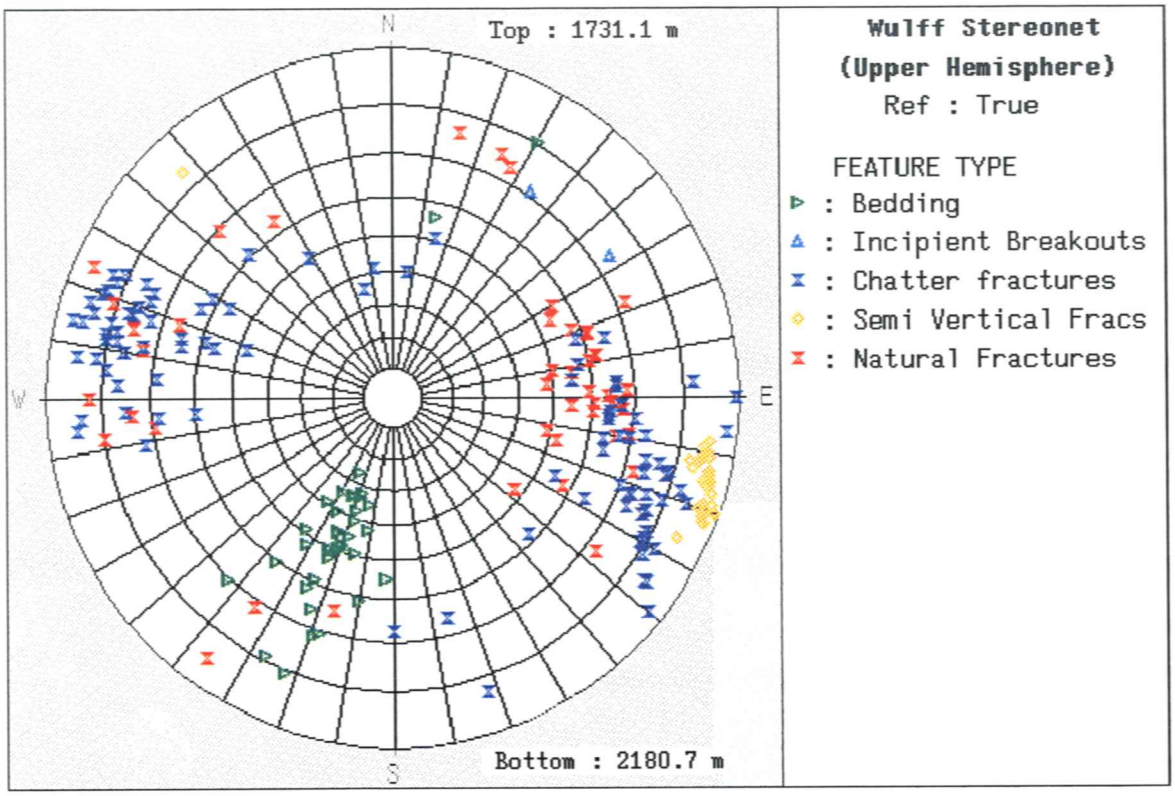

N
W
E
S
Top : 1731.1 m
Bottom : 2180.7 m
Strike Histogram
Ref : True
Feature Type
▷ : Bedding
△ : Incipient Breakouts
⧗ : Chatter fractures
◇ : Semi Vertical Fracs
⧗ : Natural Fractures

Figure 21. Wulf stereonet summary diagram of all features measured in Murray River c-40-H/93-I-14.


N
Top : 1731.1 m
W
E
S
Bottom : 2180.7 m
Wulff Stereonet
(Upper Hemisphere)
Ref : True
FEATURE TYPE
: Bedding
: Incipient Breakouts
: Chatter fractures
: Semi Vertical Fracs
: Natural Fractures

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	Well Name: MURRAY RIVER c-40-H/93-I-14 Semi-vertical Fractures						
Depth KB m	Azimuth of feature	Sin Azi	Cumulative Total Sin Azi	Cos Azi	Cos Azi corrected for zero values	Cumulative Total Cos Azi	Measurement made or not 1 or 0 entered
1735.6	0	0.000	0.000	1.000	0.000	0.000	0
1736.2	202	-0.375	-0.375	-0.927	-0.927	-0.927	1
1739.0	202	-0.375	-0.749	-0.927	-0.927	-1.854	1
1739.8	0	0.000	-0.749	1.000	0.000	-1.854	0
1739.9	0	0.000	-0.749	1.000	0.000	-1.854	0
1740.2	0	0.000	-0.749	1.000	0.000	-1.854	0
1740.3	0	0.000	-0.749	1.000	0.000	-1.854	0
1740.5	0	0.000	-0.749	1.000	0.000	-1.854	0
1741.4	0	0.000	-0.749	1.000	0.000	-1.854	0
1741.9	0	0.000	-0.749	1.000	0.000	-1.854	0
1742.0	0	0.000	-0.749	1.000	0.000	-1.854	0
1742.2	0	0.000	-0.749	1.000	0.000	-1.854	0
1747.6	0	0.000	-0.749	1.000	0.000	-1.854	0
1749.0	0	0.000	-0.749	1.000	0.000	-1.854	0
1749.6	0	0.000	-0.749	1.000	0.000	-1.854	0
1750.4	0	0.000	-0.749	1.000	0.000	-1.854	0
1751.4	200	-0.342	-1.091	-0.940	-0.940	-2.794	1
1752.2	192	-0.208	-1.299	-0.978	-0.978	-3.772	1
1755.2	200	-0.342	-1.641	-0.940	-0.940	-4.712	1
1758.4	0	0.000	-1.641	1.000	0.000	-4.712	0
1758.6	0	0.000	-1.641	1.000	0.000	-4.712	0
1761.4	207	-0.454	-2.095	-0.891	-0.891	-5.603	1
1762.6	0	0.000	-2.095	1.000	0.000	-5.603	0
1764.0	0	0.000	-2.095	1.000	0.000	-5.603	0
1772.2	0	0.000	-2.095	1.000	0.000	-5.603	0
1777.2	0	0.000	-2.095	1.000	0.000	-5.603	0
1778.4	0	0.000	-2.095	1.000	0.000	-5.603	0
1780.4	199	-0.326	-2.421	-0.946	-0.946	-6.548	1
1782.6	0	0.000	-2.421	1.000	0.000	-6.548	0
1782.8	0	0.000	-2.421	1.000	0.000	-6.548	0
1783.2	0	0.000	-2.421	1.000	0.000	-6.548	0
1783.4	0	0.000	-2.421	1.000	0.000	-6.548	0
1783.6	0	0.000	-2.421	1.000	0.000	-6.548	0
1783.8	0	0.000	-2.421	1.000	0.000	-6.548	0
1784.0	0	0.000	-2.421	1.000	0.000	-6.548	0
1784.2	0	0.000	-2.421	1.000	0.000	-6.548	0
1784.4	0	0.000	-2.421	1.000	0.000	-6.548	0
1784.6	0	0.000	-2.421	1.000	0.000	-6.548	0
1784.8	0	0.000	-2.421	1.000	0.000	-6.548	0
1785.0	0	0.000	-2.421	1.000	0.000	-6.548	0
1785.2	0	0.000	-2.421	1.000	0.000	-6.548	0
1785.6	0	0.000	-2.421	1.000	0.000	-6.548	0
1785.7	0	0.000	-2.421	1.000	0.000	-6.548	0
1786.1	0	0.000	-2.421	1.000	0.000	-6.548	0
1787.0	0	0.000	-2.421	1.000	0.000	-6.548	0
1787.2	0	0.000	-2.421	1.000	0.000	-6.548	0
1788.0	0	0.000	-2.421	1.000	0.000	-6.548	0
1788.8	0	0.000	-2.421	1.000	0.000	-6.548	0
1789.3	0	0.000	-2.421	1.000	0.000	-6.548	0
1789.4	0	0.000	-2.421	1.000	0.000	-6.548	0
1789.6	0	0.000	-2.421	1.000	0.000	-6.548	0
1790.2	0	0.000	-2.421	1.000	0.000	-6.548	0
1790.4	0	0.000	-2.421	1.000	0.000	-6.548	0

1790.6	0	0.000	-2.421	1.000	0.000	-6.548	0
1792.4	0	0.000	-2.421	1.000	0.000	-6.548	0
1792.5	0	0.000	-2.421	1.000	0.000	-6.548	0
1792.8	0	0.000	-2.421	1.000	0.000	-6.548	0
1793.4	0	0.000	-2.421	1.000	0.000	-6.548	0
1794.7	0	0.000	-2.421	1.000	0.000	-6.548	0
1795.7	0	0.000	-2.421	1.000	0.000	-6.548	0
1797.0	0	0.000	-2.421	1.000	0.000	-6.548	0
1798.8	201	-0.358	-2.779	-0.934	-0.934	-7.482	1
1801.1	0	0.000	-2.779	1.000	0.000	-7.482	0
1809.9	0	0.000	-2.779	1.000	0.000	-7.482	0
1811.4	0	0.000	-2.779	1.000	0.000	-7.482	0
1811.5	228	-0.743	-3.522	-0.669	-0.669	-8.151	1
1811.8	0	0.000	-3.522	1.000	0.000	-8.151	0
1812.5	0	0.000	-3.522	1.000	0.000	-8.151	0
1814.6	0	0.000	-3.522	1.000	0.000	-8.151	0
1814.7	0	0.000	-3.522	1.000	0.000	-8.151	0
1815.3	0	0.000	-3.522	1.000	0.000	-8.151	0
1818.2	0	0.000	-3.522	1.000	0.000	-8.151	0
1819.8	0	0.000	-3.522	1.000	0.000	-8.151	0
1822.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1822.9	0	0.000	-3.522	1.000	0.000	-8.151	0
1823.2	0	0.000	-3.522	1.000	0.000	-8.151	0
1823.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1823.5	0	0.000	-3.522	1.000	0.000	-8.151	0
1823.8	0	0.000	-3.522	1.000	0.000	-8.151	0
1824.0	0	0.000	-3.522	1.000	0.000	-8.151	0
1824.2	0	0.000	-3.522	1.000	0.000	-8.151	0
1824.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1824.8	0	0.000	-3.522	1.000	0.000	-8.151	0
1825.6	0	0.000	-3.522	1.000	0.000	-8.151	0
1827.0	0	0.000	-3.522	1.000	0.000	-8.151	0
1828.2	0	0.000	-3.522	1.000	0.000	-8.151	0
1828.9	0	0.000	-3.522	1.000	0.000	-8.151	0
1830.1	0	0.000	-3.522	1.000	0.000	-8.151	0
1830.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1830.8	0	0.000	-3.522	1.000	0.000	-8.151	0
1831.1	0	0.000	-3.522	1.000	0.000	-8.151	0
1831.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1831.5	0	0.000	-3.522	1.000	0.000	-8.151	0
1831.8	0	0.000	-3.522	1.000	0.000	-8.151	0
1832.0	0	0.000	-3.522	1.000	0.000	-8.151	0
1832.1	0	0.000	-3.522	1.000	0.000	-8.151	0
1832.2	0	0.000	-3.522	1.000	0.000	-8.151	0
1832.6	0	0.000	-3.522	1.000	0.000	-8.151	0
1832.7	0	0.000	-3.522	1.000	0.000	-8.151	0
1832.8	0	0.000	-3.522	1.000	0.000	-8.151	0
1832.9	0	0.000	-3.522	1.000	0.000	-8.151	0
1833.1	0	0.000	-3.522	1.000	0.000	-8.151	0
1833.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1833.6	0	0.000	-3.522	1.000	0.000	-8.151	0
1833.7	0	0.000	-3.522	1.000	0.000	-8.151	0
1833.9	0	0.000	-3.522	1.000	0.000	-8.151	0
1834.3	0	0.000	-3.522	1.000	0.000	-8.151	0
1834.5	0	0.000	-3.522	1.000	0.000	-8.151	0
1834.6	0	0.000	-3.522	1.000	0.000	-8.151	0
1834.7	0	0.000	-3.522	1.000	0.000	-8.151	0
1835.0	0	0.000	-3.522	1.000	0.000	-8.151	0

1835.2	0	0.000	-3.522	1.000	0.000	-8.151	0
1835.3	0	0.000	-3.522	1.000	0.000	-8.151	0
1835.9	0	0.000	-3.522	1.000	0.000	-8.151	0
1836.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1836.5	0	0.000	-3.522	1.000	0.000	-8.151	0
1836.6	0	0.000	-3.522	1.000	0.000	-8.151	0
1837.3	0	0.000	-3.522	1.000	0.000	-8.151	0
1837.6	0	0.000	-3.522	1.000	0.000	-8.151	0
1838.1	0	0.000	-3.522	1.000	0.000	-8.151	0
1838.2	0	0.000	-3.522	1.000	0.000	-8.151	0
1838.4	0	0.000	-3.522	1.000	0.000	-8.151	0
1839.5	191	-0.191	-3.713	-0.982	-0.982	-9.133	1
1841.0	0	0.000	-3.713	1.000	0.000	-9.133	0
1841.3	0	0.000	-3.713	1.000	0.000	-9.133	0
1841.5	0	0.000	-3.713	1.000	0.000	-9.133	0
1843.6	0	0.000	-3.713	1.000	0.000	-9.133	0
1844.6	0	0.000	-3.713	1.000	0.000	-9.133	0
1845.5	0	0.000	-3.713	1.000	0.000	-9.133	0
1845.6	0	0.000	-3.713	1.000	0.000	-9.133	0
1846.9	0	0.000	-3.713	1.000	0.000	-9.133	0
1848.4	0	0.000	-3.713	1.000	0.000	-9.133	0
1850.3	0	0.000	-3.713	1.000	0.000	-9.133	0
1850.9	0	0.000	-3.713	1.000	0.000	-9.133	0
1851.2	0	0.000	-3.713	1.000	0.000	-9.133	0
1851.6	0	0.000	-3.713	1.000	0.000	-9.133	0
1852.5	0	0.000	-3.713	1.000	0.000	-9.133	0
1853.9	0	0.000	-3.713	1.000	0.000	-9.133	0
1854.1	0	0.000	-3.713	1.000	0.000	-9.133	0
1856.3	201	-0.358	-4.071	-0.934	-0.934	-10.066	1
1858.2	0	0.000	-4.071	1.000	0.000	-10.066	0
1863.7	0	0.000	-4.071	1.000	0.000	-10.066	0
1867.0	0	0.000	-4.071	1.000	0.000	-10.066	0
1869.0	200	-0.342	-4.413	-0.940	-0.940	-11.006	1
1872.2	0	0.000	-4.413	1.000	0.000	-11.006	0
1874.2	0	0.000	-4.413	1.000	0.000	-11.006	0
1875.3	0	0.000	-4.413	1.000	0.000	-11.006	0
1875.8	0	0.000	-4.413	1.000	0.000	-11.006	0
1875.9	195	-0.259	-4.672	-0.966	-0.966	-11.972	1
1877.2	0	0.000	-4.672	1.000	0.000	-11.972	0
1877.5	0	0.000	-4.672	1.000	0.000	-11.972	0
1880.0	0	0.000	-4.672	1.000	0.000	-11.972	0
1881.0	0	0.000	-4.672	1.000	0.000	-11.972	0
1881.7	0	0.000	-4.672	1.000	0.000	-11.972	0
1881.8	0	0.000	-4.672	1.000	0.000	-11.972	0
1882.9	0	0.000	-4.672	1.000	0.000	-11.972	0
1883.2	0	0.000	-4.672	1.000	0.000	-11.972	0
1885.3	189	-0.156	-4.829	-0.988	-0.988	-12.960	1
1895.1	190	-0.174	-5.002	-0.985	-0.985	-13.944	1
1915.3	0	0.000	-5.002	1.000	0.000	-13.944	0
1923.8	195	-0.259	-5.261	-0.966	-0.966	-14.910	1
1931.0	198	-0.309	-5.570	-0.951	-0.951	-15.861	1
1934.4	193	-0.225	-5.795	-0.974	-0.974	-16.836	1
1944.2	195	-0.259	-6.054	-0.966	-0.966	-17.802	1
1951.0	0	0.000	-6.054	1.000	0.000	-17.802	0
1951.4	0	0.000	-6.054	1.000	0.000	-17.802	0
1951.7	0	0.000	-6.054	1.000	0.000	-17.802	0
1952.0	195	-0.259	-6.313	-0.966	-0.966	-18.768	1
1961.9	0	0.000	-6.313	1.000	0.000	-18.768	0

1962.1	191	-0.191	-6.504	-0.982	-0.982	-19.749	1
1962.4	0	0.000	-6.504	1.000	0.000	-19.749	0
1962.9	0	0.000	-6.504	1.000	0.000	-19.749	0
1968.0	0	0.000	-6.504	1.000	0.000	-19.749	0
1968.2	0	0.000	-6.504	1.000	0.000	-19.749	0
1971.9	191	-0.191	-6.694	-0.982	-0.982	-20.731	1
1981.2	0	0.000	-6.694	1.000	0.000	-20.731	0
1981.4	0	0.000	-6.694	1.000	0.000	-20.731	0
1981.8	0	0.000	-6.694	1.000	0.000	-20.731	0
1982.1	0	0.000	-6.694	1.000	0.000	-20.731	0
1982.3	0	0.000	-6.694	1.000	0.000	-20.731	0
1985.4	0	0.000	-6.694	1.000	0.000	-20.731	0
1985.7	0	0.000	-6.694	1.000	0.000	-20.731	0
1988.1	0	0.000	-6.694	1.000	0.000	-20.731	0
1988.4	0	0.000	-6.694	1.000	0.000	-20.731	0
1988.7	0	0.000	-6.694	1.000	0.000	-20.731	0
1989.4	0	0.000	-6.694	1.000	0.000	-20.731	0
1996.7	0	0.000	-6.694	1.000	0.000	-20.731	0
2007.4	0	0.000	-6.694	1.000	0.000	-20.731	0
2007.5	0	0.000	-6.694	1.000	0.000	-20.731	0
2018.2	0	0.000	-6.694	1.000	0.000	-20.731	0
2018.6	0	0.000	-6.694	1.000	0.000	-20.731	0
2020.2	0	0.000	-6.694	1.000	0.000	-20.731	0
2024.2	0	0.000	-6.694	1.000	0.000	-20.731	0
2059.1	0	0.000	-6.694	1.000	0.000	-20.731	0
2059.2	0	0.000	-6.694	1.000	0.000	-20.731	0
2065.3	0	0.000	-6.694	1.000	0.000	-20.731	0
2065.5	0	0.000	-6.694	1.000	0.000	-20.731	0
2065.7	0	0.000	-6.694	1.000	0.000	-20.731	0
2071.3	0	0.000	-6.694	1.000	0.000	-20.731	0
2077.0	0	0.000	-6.694	1.000	0.000	-20.731	0
2115.0	192	-0.208	-6.902	-0.978	-0.978	-21.709	1
2117.2	0	0.000	-6.902	1.000	0.000	-21.709	0
2127.0	0	0.000	-6.902	1.000	0.000	-21.709	0
2142.8	194	-0.242	-7.144	-0.970	-0.970	-22.679	1
2150.1	196	-0.276	-7.420	-0.961	-0.961	-23.641	1
2172.8	0	0.000	-7.420	1.000	0.000	-23.641	0

Arithmetic mean of strike values (col 2) = 197.5 Total measurements taken = 25

Feature Orientation measurements **Well: MURRAY RIVER c-40-H/93-I-14 Semi-vertical Fractures**

Reference Mardia 1972 for statistics of directional data

Total Sin x thick	Total Cos x thick	Total Thickness	S Col A/ColC	C ColB/ColC	R x R	R	S/R	C/R	Azimuth from S/R	Azimuth from C/R	Standard Deviation
-7.42	-23.641	25	-0.2968	-0.9456	0.9823	0.9911	-0.2995	-0.9541	197.4	197.4	7.7

Well Name: MURRAY RIVER c-40-H/93-I-14
Chatter fractures

Depth KB m	Azimuth of feature	Sin Azi	Cumulative Total Sin Azi	Cos Azi	Cos Azi corrected for zero values	Cumulative Total Cos Azi	Measurement made or not 1 or 0 entered
1735.6	0	0.000	0.000	1.000	0.000	0.000	0
1736.2	0	0.000	0.000	1.000	0.000	0.000	0
1739.0	0	0.000	0.000	1.000	0.000	0.000	0
1739.8	0	0.000	0.000	1.000	0.000	0.000	0
1739.9	0	0.000	0.000	1.000	0.000	0.000	0
1740.2	0	0.000	0.000	1.000	0.000	0.000	0
1740.3	0	0.000	0.000	1.000	0.000	0.000	0
1740.5	0	0.000	0.000	1.000	0.000	0.000	0
1741.4	0	0.000	0.000	1.000	0.000	0.000	0
1741.9	0	0.000	0.000	1.000	0.000	0.000	0
1742.0	0	0.000	0.000	1.000	0.000	0.000	0
1742.2	0	0.000	0.000	1.000	0.000	0.000	0
1747.6	196	-0.276	-0.276	-0.961	-0.961	-0.961	1
1749.0	192	-0.208	-0.484	-0.978	-0.978	-1.939	1
1749.6	205	-0.423	-0.906	-0.906	-0.906	-2.846	1
1750.4	201	-0.358	-1.265	-0.934	-0.934	-3.779	1
1751.4	0	0.000	-1.265	1.000	0.000	-3.779	0
1752.2	0	0.000	-1.265	1.000	0.000	-3.779	0
1755.2	0	0.000	-1.265	1.000	0.000	-3.779	0
1758.4	0	0.000	-1.265	1.000	0.000	-3.779	0
1758.6	0	0.000	-1.265	1.000	0.000	-3.779	0
1761.4	0	0.000	-1.265	1.000	0.000	-3.779	0
1762.6	0	0.000	-1.265	1.000	0.000	-3.779	0
1764.0	0	0.000	-1.265	1.000	0.000	-3.779	0
1772.2	190	-0.174	-1.438	-0.985	-0.985	-4.764	1
1777.2	0	0.000	-1.438	1.000	0.000	-4.764	0
1778.4	0	0.000	-1.438	1.000	0.000	-4.764	0
1780.4	0	0.000	-1.438	1.000	0.000	-4.764	0
1782.6	198	-0.309	-1.747	-0.951	-0.951	-5.715	1
1782.8	198	-0.309	-2.056	-0.951	-0.951	-6.666	1
1783.2	202	-0.375	-2.431	-0.927	-0.927	-7.593	1
1783.4	201	-0.358	-2.789	-0.934	-0.934	-8.527	1
1783.6	0	0.000	-2.789	1.000	0.000	-8.527	0
1783.8	193	-0.225	-3.014	-0.974	-0.974	-9.501	1
1784.0	0	0.000	-3.014	1.000	0.000	-9.501	0
1784.2	194	-0.242	-3.256	-0.970	-0.970	-10.472	1
1784.4	194	-0.242	-3.498	-0.970	-0.970	-11.442	1
1784.6	195	-0.259	-3.757	-0.966	-0.966	-12.408	1
1784.8	0	0.000	-3.757	1.000	0.000	-12.408	0
1785.0	186	-0.105	-3.861	-0.995	-0.995	-13.402	1
1785.2	204	-0.407	-4.268	-0.914	-0.914	-14.316	1
1785.6	205	-0.423	-4.691	-0.906	-0.906	-15.222	1
1785.7	198	-0.309	-5.000	-0.951	-0.951	-16.173	1
1786.1	0	0.000	-5.000	1.000	0.000	-16.173	0
1787.0	0	0.000	-5.000	1.000	0.000	-16.173	0
1787.2	205	-0.423	-5.422	-0.906	-0.906	-17.080	1
1788.0	204	-0.407	-5.829	-0.914	-0.914	-17.993	1
1788.8	197	-0.292	-6.121	-0.956	-0.956	-18.949	1
1789.3	209	-0.485	-6.606	-0.875	-0.875	-19.824	1
1789.4	199	-0.326	-6.932	-0.946	-0.946	-20.770	1
1789.6	209	-0.485	-7.417	-0.875	-0.875	-21.644	1
1790.2	200	-0.342	-7.759	-0.940	-0.940	-22.584	1
1790.4	197	-0.292	-8.051	-0.956	-0.956	-23.540	1

1790.6	197	-0.292	-8.343	-0.956	-0.956	-24.497	1
1792.4	0	0.000	-8.343	1.000	0.000	-24.497	0
1792.5	203	-0.391	-8.734	-0.921	-0.921	-25.417	1
1792.8	188	-0.139	-8.873	-0.990	-0.990	-26.407	1
1793.4	185	-0.087	-8.960	-0.996	-0.996	-27.403	1
1794.7	199	-0.326	-9.286	-0.946	-0.946	-28.349	1
1795.7	192	-0.208	-9.494	-0.978	-0.978	-29.327	1
1797.0	0	0.000	-9.494	1.000	0.000	-29.327	0
1798.8	0	0.000	-9.494	1.000	0.000	-29.327	0
1801.1	184	-0.070	-9.564	-0.998	-0.998	-30.325	1
1809.9	0	0.000	-9.564	1.000	0.000	-30.325	0
1811.4	0	0.000	-9.564	1.000	0.000	-30.325	0
1811.5	0	0.000	-9.564	1.000	0.000	-30.325	0
1811.8	0	0.000	-9.564	1.000	0.000	-30.325	0
1812.5	239	-0.857	-10.421	-0.515	-0.515	-30.840	1
1814.6	0	0.000	-10.421	1.000	0.000	-30.840	0
1814.7	0	0.000	-10.421	1.000	0.000	-30.840	0
1815.3	0	0.000	-10.421	1.000	0.000	-30.840	0
1818.2	0	0.000	-10.421	1.000	0.000	-30.840	0
1819.8	178	0.035	-10.386	-0.999	-0.999	-31.839	1
1822.4	0	0.000	-10.386	1.000	0.000	-31.839	0
1822.9	0	0.000	-10.386	1.000	0.000	-31.839	0
1823.2	0	0.000	-10.386	1.000	0.000	-31.839	0
1823.4	191	-0.191	-10.577	-0.982	-0.982	-32.821	1
1823.5	0	0.000	-10.577	1.000	0.000	-32.821	0
1823.8	0	0.000	-10.577	1.000	0.000	-32.821	0
1824.0	207	-0.454	-11.031	-0.891	-0.891	-33.712	1
1824.2	226	-0.719	-11.750	-0.695	-0.695	-34.406	1
1824.4	256	-0.970	-12.720	-0.242	-0.242	-34.648	1
1824.8	270	-1.000	-13.720	0.000	0.000	-34.648	1
1825.6	0	0.000	-13.720	1.000	0.000	-34.648	0
1827.0	0	0.000	-13.720	1.000	0.000	-34.648	0
1828.2	253	-0.956	-14.677	-0.292	-0.292	-34.941	1
1828.9	0	0.000	-14.677	1.000	0.000	-34.941	0
1830.1	0	0.000	-14.677	1.000	0.000	-34.941	0
1830.4	0	0.000	-14.677	1.000	0.000	-34.941	0
1830.8	0	0.000	-14.677	1.000	0.000	-34.941	0
1831.1	171	0.156	-14.520	-0.988	-0.988	-35.928	1
1831.4	0	0.000	-14.520	1.000	0.000	-35.928	0
1831.5	163	0.292	-14.228	-0.956	-0.956	-36.885	1
1831.8	194	-0.242	-14.470	-0.970	-0.970	-37.855	1
1832.0	191	-0.191	-14.661	-0.982	-0.982	-38.837	1
1832.1	187	-0.122	-14.782	-0.993	-0.993	-39.829	1
1832.2	0	0.000	-14.782	1.000	0.000	-39.829	0
1832.6	0	0.000	-14.782	1.000	0.000	-39.829	0
1832.7	191	-0.191	-14.973	-0.982	-0.982	-40.811	1
1832.8	186	-0.105	-15.078	-0.995	-0.995	-41.805	1
1832.9	0	0.000	-15.078	1.000	0.000	-41.805	0
1833.1	185	-0.087	-15.165	-0.996	-0.996	-42.802	1
1833.4	0	0.000	-15.165	1.000	0.000	-42.802	0
1833.6	178	0.035	-15.130	-0.999	-0.999	-43.801	1
1833.7	0	0.000	-15.130	1.000	0.000	-43.801	0
1833.9	176	0.070	-15.060	-0.998	-0.998	-44.798	1
1834.3	0	0.000	-15.060	1.000	0.000	-44.798	0
1834.5	0	0.000	-15.060	1.000	0.000	-44.798	0
1834.6	194	-0.242	-15.302	-0.970	-0.970	-45.769	1
1834.7	0	0.000	-15.302	1.000	0.000	-45.769	0
1835.0	0	0.000	-15.302	1.000	0.000	-45.769	0

1835.2	186	-0.105	-15.407	-0.995	-0.995	-46.763	1
1835.3	0	0.000	-15.407	1.000	0.000	-46.763	0
1835.9	0	0.000	-15.407	1.000	0.000	-46.763	0
1836.4	164	0.276	-15.131	-0.961	-0.961	-47.725	1
1836.5	200	-0.342	-15.473	-0.940	-0.940	-48.664	1
1836.6	0	0.000	-15.473	1.000	0.000	-48.664	0
1837.3	213	-0.545	-16.018	-0.839	-0.839	-49.503	1
1837.6	197	-0.292	-16.310	-0.956	-0.956	-50.459	1
1838.1	197	-0.292	-16.603	-0.956	-0.956	-51.416	1
1838.2	201	-0.358	-16.961	-0.934	-0.934	-52.349	1
1838.4	201	-0.358	-17.319	-0.934	-0.934	-53.283	1
1839.5	0	0.000	-17.319	1.000	0.000	-53.283	0
1841.0	98	0.990	-16.329	-0.139	-0.139	-53.422	1
1841.3	106	0.961	-15.368	-0.276	-0.276	-53.698	1
1841.5	0	0.000	-15.368	1.000	0.000	-53.698	0
1843.6	0	0.000	-15.368	1.000	0.000	-53.698	0
1844.6	208	-0.469	-15.837	-0.883	-0.883	-54.580	1
1845.5	182	-0.035	-15.872	-0.999	-0.999	-55.580	1
1845.6	194	-0.242	-16.114	-0.970	-0.970	-56.550	1
1846.9	0	0.000	-16.114	1.000	0.000	-56.550	0
1848.4	0	0.000	-16.114	1.000	0.000	-56.550	0
1850.3	0	0.000	-16.114	1.000	0.000	-56.550	0
1850.9	0	0.000	-16.114	1.000	0.000	-56.550	0
1851.2	0	0.000	-16.114	1.000	0.000	-56.550	0
1851.6	0	0.000	-16.114	1.000	0.000	-56.550	0
1852.5	0	0.000	-16.114	1.000	0.000	-56.550	0
1853.9	0	0.000	-16.114	1.000	0.000	-56.550	0
1854.1	0	0.000	-16.114	1.000	0.000	-56.550	0
1856.3	0	0.000	-16.114	1.000	0.000	-56.550	0
1858.2	0	0.000	-16.114	1.000	0.000	-56.550	0
1863.7	0	0.000	-16.114	1.000	0.000	-56.550	0
1867.0	0	0.000	-16.114	1.000	0.000	-56.550	0
1869.0	0	0.000	-16.114	1.000	0.000	-56.550	0
1872.2	0	0.000	-16.114	1.000	0.000	-56.550	0
1874.2	0	0.000	-16.114	1.000	0.000	-56.550	0
1875.3	201	-0.358	-16.472	-0.934	-0.934	-57.484	1
1875.8	0	0.000	-16.472	1.000	0.000	-57.484	0
1875.9	0	0.000	-16.472	1.000	0.000	-57.484	0
1877.2	195	-0.259	-16.731	-0.966	-0.966	-58.450	1
1877.5	195	-0.259	-16.990	-0.966	-0.966	-59.416	1
1880.0	0	0.000	-16.990	1.000	0.000	-59.416	0
1881.0	0	0.000	-16.990	1.000	0.000	-59.416	0
1881.7	0	0.000	-16.990	1.000	0.000	-59.416	0
1881.8	0	0.000	-16.990	1.000	0.000	-59.416	0
1882.9	0	0.000	-16.990	1.000	0.000	-59.416	0
1883.2	0	0.000	-16.990	1.000	0.000	-59.416	0
1885.3	0	0.000	-16.990	1.000	0.000	-59.416	0
1895.1	0	0.000	-16.990	1.000	0.000	-59.416	0
1915.3	0	0.000	-16.990	1.000	0.000	-59.416	0
1923.8	0	0.000	-16.990	1.000	0.000	-59.416	0
1931.0	0	0.000	-16.990	1.000	0.000	-59.416	0
1934.4	0	0.000	-16.990	1.000	0.000	-59.416	0
1944.2	0	0.000	-16.990	1.000	0.000	-59.416	0
1951.0	169	0.191	-16.799	-0.982	-0.982	-60.397	1
1951.4	189	-0.156	-16.956	-0.988	-0.988	-61.385	1
1951.7	192	-0.208	-17.164	-0.978	-0.978	-62.363	1
1952.0	0	0.000	-17.164	1.000	0.000	-62.363	0
1961.9	217	-0.602	-17.765	-0.799	-0.799	-63.162	1

1962.1	0	0.000	-17.765	1.000	0.000	-63.162	0
1962.4	216	-0.588	-18.353	-0.809	-0.809	-63.971	1
1962.9	209	-0.485	-18.838	-0.875	-0.875	-64.845	1
1968.0	180	0.000	-18.838	-1.000	-1.000	-65.845	1
1968.2	187	-0.122	-18.960	-0.993	-0.993	-66.838	1
1971.9	0	0.000	-18.960	1.000	0.000	-66.838	0
1981.2	202	-0.375	-19.334	-0.927	-0.927	-67.765	1
1981.4	190	-0.174	-19.508	-0.985	-0.985	-68.750	1
1981.8	205	-0.423	-19.931	-0.906	-0.906	-69.656	1
1982.1	211	-0.515	-20.446	-0.857	-0.857	-70.513	1
1982.3	202	-0.375	-20.820	-0.927	-0.927	-71.441	1
1985.4	204	-0.407	-21.227	-0.914	-0.914	-72.354	1
1985.7	211	-0.515	-21.742	-0.857	-0.857	-73.211	1
1988.1	210	-0.500	-22.242	-0.866	-0.866	-74.077	1
1988.4	205	-0.423	-22.665	-0.906	-0.906	-74.984	1
1988.7	196	-0.276	-22.940	-0.961	-0.961	-75.945	1
1989.4	220	-0.643	-23.583	-0.766	-0.766	-76.711	1
1996.7	0	0.000	-23.583	1.000	0.000	-76.711	0
2007.4	262	-0.990	-24.573	-0.139	-0.139	-76.850	1
2007.5	257	-0.974	-25.548	-0.225	-0.225	-77.075	1
2018.2	0	0.000	-25.548	1.000	0.000	-77.075	0
2018.6	0	0.000	-25.548	1.000	0.000	-77.075	0
2020.2	0	0.000	-25.548	1.000	0.000	-77.075	0
2024.2	0	0.000	-25.548	1.000	0.000	-77.075	0
2059.1	176	0.070	-25.478	-0.998	-0.998	-78.073	1
2059.2	175	0.087	-25.391	-0.996	-0.996	-79.069	1
2065.3	175	0.087	-25.304	-0.996	-0.996	-80.065	1
2065.5	177	0.052	-25.251	-0.999	-0.999	-81.064	1
2065.7	176	0.070	-25.182	-0.998	-0.998	-82.061	1
2071.3	0	0.000	-25.182	1.000	0.000	-82.061	0
2077.0	0	0.000	-25.182	1.000	0.000	-82.061	0
2115.0	0	0.000	-25.182	1.000	0.000	-82.061	0
2117.2	177	0.052	-25.129	-0.999	-0.999	-83.060	1
2127.0	199	-0.326	-25.455	-0.946	-0.946	-84.005	1
2142.8	0	0.000	-25.455	1.000	0.000	-84.005	0
2150.1	0	0.000	-25.455	1.000	0.000	-84.005	0
2172.8	0	0.000	-25.455	1.000	0.000	-84.005	0
2172.9	226	-0.719	-26.174	-0.695	-0.695	-84.700	1

Arithmetic mean of strike values (col 2) = 197.0 Total measurements taken = 96

Feature Orientation measurements **Well: MURRAY RIVER c-40-H/93-I-14 Chatter Fractures**

Reference Mardia 1972 for statistics of directional data

Total Sin x thick	Total Cos x thick	Total Thickness	S Col A/ColC	C ColB/ColC	R x R	R	S/R	C/R	Azimuth from S/R	Azimuth from C/R	Standard Deviation
-26.174	-84.7	96	-0.2726	-0.8823	0.8528	0.9235	-0.2952	-0.9554	197.2	197.2	22.9

Well Name: MURRAY RIVER c-40-H/93-I-14
Natural Fractures

Depth KB m	Azimuth of feature	Sin Azi	Cumulative Total Sin Azi	Cos Azi	Cos Azi corrected for zero values	Cumulative Total Cos Azi	Measurement made or not 1 or 0 entered
1735.6	0	0.000	0.000	1.000	0.000	0.000	0
1736.2	0	0.000	0.000	1.000	0.000	0.000	0
1739.0	0	0.000	0.000	1.000	0.000	0.000	0
1739.8	0	0.000	0.000	1.000	0.000	0.000	0
1739.9	192	-0.208	-0.208	-0.978	-0.978	-0.978	1
1740.2	0	0.000	-0.208	1.000	0.000	-0.978	0
1740.3	0	0.000	-0.208	1.000	0.000	-0.978	0
1740.5	0	0.000	-0.208	1.000	0.000	-0.978	0
1741.4	0	0.000	-0.208	1.000	0.000	-0.978	0
1741.9	0	0.000	-0.208	1.000	0.000	-0.978	0
1742.0	178	0.035	-0.173	-0.999	-0.999	-1.978	1
1742.2	0	0.000	-0.173	1.000	0.000	-1.978	0
1747.6	0	0.000	-0.173	1.000	0.000	-1.978	0
1749.0	0	0.000	-0.173	1.000	0.000	-1.978	0
1749.6	0	0.000	-0.173	1.000	0.000	-1.978	0
1750.4	0	0.000	-0.173	1.000	0.000	-1.978	0
1751.4	0	0.000	-0.173	1.000	0.000	-1.978	0
1752.2	0	0.000	-0.173	1.000	0.000	-1.978	0
1755.2	0	0.000	-0.173	1.000	0.000	-1.978	0
1758.4	195	-0.259	-0.432	-0.966	-0.966	-2.943	1
1758.6	178	0.035	-0.397	-0.999	-0.999	-3.943	1
1761.4	0	0.000	-0.397	1.000	0.000	-3.943	0
1762.6	124	0.829	0.432	-0.559	-0.559	-4.502	1
1764.0	126	0.809	1.241	-0.588	-0.588	-5.090	1
1772.2	0	0.000	1.241	1.000	0.000	-5.090	0
1777.2	176	0.070	1.311	-0.998	-0.998	-6.087	1
1778.4	172	0.139	1.450	-0.990	-0.990	-7.078	1
1780.4	0	0.000	1.450	1.000	0.000	-7.078	0
1782.6	0	0.000	1.450	1.000	0.000	-7.078	0
1782.8	0	0.000	1.450	1.000	0.000	-7.078	0
1783.2	0	0.000	1.450	1.000	0.000	-7.078	0
1783.4	0	0.000	1.450	1.000	0.000	-7.078	0
1783.6	199	-0.326	1.124	-0.946	-0.946	-8.023	1
1783.8	0	0.000	1.124	1.000	0.000	-8.023	0
1784.0	191	-0.191	0.934	-0.982	-0.982	-9.005	1
1784.2	0	0.000	0.934	1.000	0.000	-9.005	0
1784.4	0	0.000	0.934	1.000	0.000	-9.005	0
1784.6	0	0.000	0.934	1.000	0.000	-9.005	0
1784.8	173	0.122	1.056	-0.993	-0.993	-9.997	1
1785.0	0	0.000	1.056	1.000	0.000	-9.997	0
1785.2	0	0.000	1.056	1.000	0.000	-9.997	0
1785.6	0	0.000	1.056	1.000	0.000	-9.997	0
1785.7	0	0.000	1.056	1.000	0.000	-9.997	0
1786.1	180	0.000	1.056	-1.000	-1.000	-10.997	1
1787.0	204	-0.407	0.649	-0.914	-0.914	-11.911	1
1787.2	0	0.000	0.649	1.000	0.000	-11.911	0
1788.0	0	0.000	0.649	1.000	0.000	-11.911	0
1788.8	0	0.000	0.649	1.000	0.000	-11.911	0
1789.3	0	0.000	0.649	1.000	0.000	-11.911	0
1789.4	0	0.000	0.649	1.000	0.000	-11.911	0
1789.6	0	0.000	0.649	1.000	0.000	-11.911	0
1790.2	0	0.000	0.649	1.000	0.000	-11.911	0
1790.4	0	0.000	0.649	1.000	0.000	-11.911	0

1790.6	0	0.000	0.649	1.000	0.000	-11.911	0
1792.4	195	-0.259	0.390	-0.966	-0.966	-12.877	1
1792.5	0	0.000	0.390	1.000	0.000	-12.877	0
1792.8	0	0.000	0.390	1.000	0.000	-12.877	0
1793.4	0	0.000	0.390	1.000	0.000	-12.877	0
1794.7	0	0.000	0.390	1.000	0.000	-12.877	0
1795.7	0	0.000	0.390	1.000	0.000	-12.877	0
1797.0	225	-0.707	-0.317	-0.707	-0.707	-13.584	1
1798.8	0	0.000	-0.317	1.000	0.000	-13.584	0
1801.1	0	0.000	-0.317	1.000	0.000	-13.584	0
1809.9	237	-0.839	-1.156	-0.545	-0.545	-14.129	1
1811.4	0	0.000	-1.156	1.000	0.000	-14.129	0
1811.5	0	0.000	-1.156	1.000	0.000	-14.129	0
1811.8	0	0.000	-1.156	1.000	0.000	-14.129	0
1812.5	0	0.000	-1.156	1.000	0.000	-14.129	0
1814.6	0	0.000	-1.156	1.000	0.000	-14.129	0
1814.7	106	0.961	-0.195	-0.276	-0.276	-14.404	1
1815.3	0	0.000	-0.195	1.000	0.000	-14.404	0
1818.2	0	0.000	-0.195	1.000	0.000	-14.404	0
1819.8	0	0.000	-0.195	1.000	0.000	-14.404	0
1822.4	0	0.000	-0.195	1.000	0.000	-14.404	0
1822.9	218	-0.616	-0.810	-0.788	-0.788	-15.192	1
1823.2	183	-0.052	-0.863	-0.999	-0.999	-16.191	1
1823.4	0	0.000	-0.863	1.000	0.000	-16.191	0
1823.5	0	0.000	-0.863	1.000	0.000	-16.191	0
1823.8	207	-0.454	-1.317	-0.891	-0.891	-17.082	1
1824.0	0	0.000	-1.317	1.000	0.000	-17.082	0
1824.2	0	0.000	-1.317	1.000	0.000	-17.082	0
1824.4	0	0.000	-1.317	1.000	0.000	-17.082	0
1824.8	0	0.000	-1.317	1.000	0.000	-17.082	0
1825.6	0	0.000	-1.317	1.000	0.000	-17.082	0
1827.0	217	-0.602	-1.918	-0.799	-0.799	-17.880	1
1828.2	0	0.000	-1.918	1.000	0.000	-17.880	0
1828.9	0	0.000	-1.918	1.000	0.000	-17.880	0
1830.1	0	0.000	-1.918	1.000	0.000	-17.880	0
1830.4	173	0.122	-1.796	-0.993	-0.993	-18.873	1
1830.8	154	0.438	-1.358	-0.899	-0.899	-19.772	1
1831.1	0	0.000	-1.358	1.000	0.000	-19.772	0
1831.4	150	0.500	-0.858	-0.866	-0.866	-20.638	1
1831.5	0	0.000	-0.858	1.000	0.000	-20.638	0
1831.8	0	0.000	-0.858	1.000	0.000	-20.638	0
1832.0	0	0.000	-0.858	1.000	0.000	-20.638	0
1832.1	0	0.000	-0.858	1.000	0.000	-20.638	0
1832.2	183	-0.052	-0.910	-0.999	-0.999	-21.636	1
1832.6	182	-0.035	-0.945	-0.999	-0.999	-22.636	1
1832.7	0	0.000	-0.945	1.000	0.000	-22.636	0
1832.8	0	0.000	-0.945	1.000	0.000	-22.636	0
1832.9	184	-0.070	-1.015	-0.998	-0.998	-23.633	1
1833.1	0	0.000	-1.015	1.000	0.000	-23.633	0
1833.4	168	0.208	-0.807	-0.978	-0.978	-24.612	1
1833.6	0	0.000	-0.807	1.000	0.000	-24.612	0
1833.7	168	0.208	-0.599	-0.978	-0.978	-25.590	1
1833.9	0	0.000	-0.599	1.000	0.000	-25.590	0
1834.3	197	-0.292	-0.892	-0.956	-0.956	-26.546	1
1834.5	190	-0.174	-1.065	-0.985	-0.985	-27.531	1
1834.6	0	0.000	-1.065	1.000	0.000	-27.531	0
1834.7	190	-0.174	-1.239	-0.985	-0.985	-28.516	1
1835.0	190	-0.174	-1.413	-0.985	-0.985	-29.500	1

1835.2	0	0.000	-1.413	1.000	0.000	-29.500	0
1835.3	183	-0.052	-1.465	-0.999	-0.999	-30.499	1
1835.9	161	0.326	-1.139	-0.946	-0.946	-31.445	1
1836.4	0	0.000	-1.139	1.000	0.000	-31.445	0
1836.5	0	0.000	-1.139	1.000	0.000	-31.445	0
1836.6	0	0.000	-1.139	1.000	0.000	-31.445	0
1837.3	0	0.000	-1.139	1.000	0.000	-31.445	0
1837.6	0	0.000	-1.139	1.000	0.000	-31.445	0
1838.1	0	0.000	-1.139	1.000	0.000	-31.445	0
1838.2	0	0.000	-1.139	1.000	0.000	-31.445	0
1838.4	0	0.000	-1.139	1.000	0.000	-31.445	0
1839.5	0	0.000	-1.139	1.000	0.000	-31.445	0
1841.0	0	0.000	-1.139	1.000	0.000	-31.445	0
1841.3	0	0.000	-1.139	1.000	0.000	-31.445	0
1841.5	0	0.000	-1.139	1.000	0.000	-31.445	0
1843.6	175	0.087	-1.052	-0.996	-0.996	-32.441	1
1844.6	0	0.000	-1.052	1.000	0.000	-32.441	0
1845.5	0	0.000	-1.052	1.000	0.000	-32.441	0
1845.6	0	0.000	-1.052	1.000	0.000	-32.441	0
1846.9	171	0.156	-0.896	-0.988	-0.988	-33.428	1
1848.4	0	0.000	-0.896	1.000	0.000	-33.428	0
1850.3	0	0.000	-0.896	1.000	0.000	-33.428	0
1850.9	0	0.000	-0.896	1.000	0.000	-33.428	0
1851.2	0	0.000	-0.896	1.000	0.000	-33.428	0
1851.6	0	0.000	-0.896	1.000	0.000	-33.428	0
1852.5	0	0.000	-0.896	1.000	0.000	-33.428	0
1853.9	0	0.000	-0.896	1.000	0.000	-33.428	0
1854.1	0	0.000	-0.896	1.000	0.000	-33.428	0
1856.3	0	0.000	-0.896	1.000	0.000	-33.428	0
1858.2	0	0.000	-0.896	1.000	0.000	-33.428	0
1863.7	0	0.000	-0.896	1.000	0.000	-33.428	0
1867.0	0	0.000	-0.896	1.000	0.000	-33.428	0
1869.0	0	0.000	-0.896	1.000	0.000	-33.428	0
1872.2	0	0.000	-0.896	1.000	0.000	-33.428	0
1874.2	0	0.000	-0.896	1.000	0.000	-33.428	0
1875.3	0	0.000	-0.896	1.000	0.000	-33.428	0
1875.8	199	-0.326	-1.221	-0.946	-0.946	-34.374	1
1875.9	0	0.000	-1.221	1.000	0.000	-34.374	0
1877.2	0	0.000	-1.221	1.000	0.000	-34.374	0
1877.5	0	0.000	-1.221	1.000	0.000	-34.374	0
1880.0	0	0.000	-1.221	1.000	0.000	-34.374	0
1881.0	179	0.017	-1.204	-1.000	-1.000	-35.374	1
1881.7	169	0.191	-1.013	-0.982	-0.982	-36.355	1
1881.8	0	0.000	-1.013	1.000	0.000	-36.355	0
1882.9	162	0.309	-0.704	-0.951	-0.951	-37.307	1
1883.2	160	0.342	-0.362	-0.940	-0.940	-38.246	1
1885.3	0	0.000	-0.362	1.000	0.000	-38.246	0
1895.1	0	0.000	-0.362	1.000	0.000	-38.246	0
1915.3	0	0.000	-0.362	1.000	0.000	-38.246	0
1923.8	0	0.000	-0.362	1.000	0.000	-38.246	0
1931.0	0	0.000	-0.362	1.000	0.000	-38.246	0
1934.4	0	0.000	-0.362	1.000	0.000	-38.246	0
1944.2	0	0.000	-0.362	1.000	0.000	-38.246	0
1951.0	0	0.000	-0.362	1.000	0.000	-38.246	0
1951.4	0	0.000	-0.362	1.000	0.000	-38.246	0
1951.7	0	0.000	-0.362	1.000	0.000	-38.246	0
1952.0	0	0.000	-0.362	1.000	0.000	-38.246	0
1961.9	0	0.000	-0.362	1.000	0.000	-38.246	0

1962.1	0	0.000	-0.362	1.000	0.000	-38.246	0
1962.4	0	0.000	-0.362	1.000	0.000	-38.246	0
1962.9	0	0.000	-0.362	1.000	0.000	-38.246	0
1968.0	0	0.000	-0.362	1.000	0.000	-38.246	0
1968.2	0	0.000	-0.362	1.000	0.000	-38.246	0
1971.9	0	0.000	-0.362	1.000	0.000	-38.246	0
1981.2	0	0.000	-0.362	1.000	0.000	-38.246	0
1981.4	0	0.000	-0.362	1.000	0.000	-38.246	0
1981.8	0	0.000	-0.362	1.000	0.000	-38.246	0
1982.1	0	0.000	-0.362	1.000	0.000	-38.246	0
1982.3	0	0.000	-0.362	1.000	0.000	-38.246	0
1985.4	0	0.000	-0.362	1.000	0.000	-38.246	0
1985.7	0	0.000	-0.362	1.000	0.000	-38.246	0
1988.1	0	0.000	-0.362	1.000	0.000	-38.246	0
1988.4	0	0.000	-0.362	1.000	0.000	-38.246	0
1988.7	0	0.000	-0.362	1.000	0.000	-38.246	0
1989.4	0	0.000	-0.362	1.000	0.000	-38.246	0
1996.7	0	0.000	-0.362	1.000	0.000	-38.246	0
2007.4	0	0.000	-0.362	1.000	0.000	-38.246	0
2007.5	0	0.000	-0.362	1.000	0.000	-38.246	0
2018.2	105	0.966	0.604	-0.259	-0.259	-38.505	1
2018.6	115	0.906	1.510	-0.423	-0.423	-38.928	1
2020.2	118	0.883	2.393	-0.469	-0.469	-39.397	1
2024.2	0	0.000	2.393	1.000	0.000	-39.397	0
2059.1	0	0.000	2.393	1.000	0.000	-39.397	0
2059.2	0	0.000	2.393	1.000	0.000	-39.397	0
2065.3	0	0.000	2.393	1.000	0.000	-39.397	0
2065.5	0	0.000	2.393	1.000	0.000	-39.397	0
2065.7	0	0.000	2.393	1.000	0.000	-39.397	0
2071.3	0	0.000	2.393	1.000	0.000	-39.397	0
2077.0	0	0.000	2.393	1.000	0.000	-39.397	0
2115.0	0	0.000	2.393	1.000	0.000	-39.397	0
2117.2	0	0.000	2.393	1.000	0.000	-39.397	0
2127.0	0	0.000	2.393	1.000	0.000	-39.397	0
2142.8	0	0.000	2.393	1.000	0.000	-39.397	0
2150.1	0	0.000	2.393	1.000	0.000	-39.397	0
2172.8	159	0.358	2.752	-0.934	-0.934	-40.331	1
2172.9	0	0.000	2.752	1.000	0.000	-40.331	0

Arithmetic mean of strike values (Col 2) = 175.2 Total measurements taken = 46

Feature Orientation measurements **Well: MURRAY RIVER c-40-H/93-I-14 Natural Fractures**

Reference Mardia 1972 for statistics of directional data

Total Sin x thick	Total Cos x thick	Total Thickness	S Col A/ColC	C ColB/ColC	R x R	R	S/R	C/R	Azimuth from S/R	Azimuth from C/R	Standard Deviation
2.752	-40.331	46	0.0598	-0.8768	0.7723	0.8788	0.0681	-0.9977	176.1	183.9	29.1

Well Murray River c-40-H/93-I-14 orientation calculations

Well Name: MURRAY RIVER c-40-H/93-I-14
Incipient Breakouts

Depth KB m	Azimuth of feature	Sin Azi	Cumulative Total Sin Azi	Cos Azi	Cos Azi corrected for zero values	Cumulative Total Cos Azi	Measurement made or not 1 or 0 entered
1735.6	0	0.000	0.000	1.000	0.000	0.000	0
1736.2	0	0.000	0.000	1.000	0.000	0.000	0
1739.0	0	0.000	0.000	1.000	0.000	0.000	0
1739.8	0	0.000	0.000	1.000	0.000	0.000	0
1739.9	0	0.000	0.000	1.000	0.000	0.000	0
1740.2	0	0.000	0.000	1.000	0.000	0.000	0
1740.3	0	0.000	0.000	1.000	0.000	0.000	0
1740.5	0	0.000	0.000	1.000	0.000	0.000	0
1741.4	0	0.000	0.000	1.000	0.000	0.000	0
1741.9	0	0.000	0.000	1.000	0.000	0.000	0
1742.0	0	0.000	0.000	1.000	0.000	0.000	0
1742.2	0	0.000	0.000	1.000	0.000	0.000	0
1747.6	0	0.000	0.000	1.000	0.000	0.000	0
1749.0	0	0.000	0.000	1.000	0.000	0.000	0
1749.6	0	0.000	0.000	1.000	0.000	0.000	0
1750.4	0	0.000	0.000	1.000	0.000	0.000	0
1751.4	0	0.000	0.000	1.000	0.000	0.000	0
1752.2	0	0.000	0.000	1.000	0.000	0.000	0
1755.2	0	0.000	0.000	1.000	0.000	0.000	0
1758.4	0	0.000	0.000	1.000	0.000	0.000	0
1758.6	0	0.000	0.000	1.000	0.000	0.000	0
1761.4	0	0.000	0.000	1.000	0.000	0.000	0
1762.6	0	0.000	0.000	1.000	0.000	0.000	0
1764.0	0	0.000	0.000	1.000	0.000	0.000	0
1772.2	0	0.000	0.000	1.000	0.000	0.000	0
1777.2	0	0.000	0.000	1.000	0.000	0.000	0
1778.4	0	0.000	0.000	1.000	0.000	0.000	0
1780.4	0	0.000	0.000	1.000	0.000	0.000	0
1782.6	0	0.000	0.000	1.000	0.000	0.000	0
1782.8	0	0.000	0.000	1.000	0.000	0.000	0
1783.2	0	0.000	0.000	1.000	0.000	0.000	0
1783.4	0	0.000	0.000	1.000	0.000	0.000	0
1783.6	0	0.000	0.000	1.000	0.000	0.000	0
1783.8	0	0.000	0.000	1.000	0.000	0.000	0
1784.0	0	0.000	0.000	1.000	0.000	0.000	0
1784.2	0	0.000	0.000	1.000	0.000	0.000	0
1784.4	0	0.000	0.000	1.000	0.000	0.000	0
1784.6	0	0.000	0.000	1.000	0.000	0.000	0
1784.8	0	0.000	0.000	1.000	0.000	0.000	0
1785.0	0	0.000	0.000	1.000	0.000	0.000	0
1785.2	0	0.000	0.000	1.000	0.000	0.000	0
1785.6	0	0.000	0.000	1.000	0.000	0.000	0
1785.7	0	0.000	0.000	1.000	0.000	0.000	0
1786.1	0	0.000	0.000	1.000	0.000	0.000	0
1787.0	0	0.000	0.000	1.000	0.000	0.000	0
1787.2	0	0.000	0.000	1.000	0.000	0.000	0
1788.0	0	0.000	0.000	1.000	0.000	0.000	0
1788.8	0	0.000	0.000	1.000	0.000	0.000	0
1789.3	0	0.000	0.000	1.000	0.000	0.000	0
1789.4	0	0.000	0.000	1.000	0.000	0.000	0
1789.6	0	0.000	0.000	1.000	0.000	0.000	0
1790.2	0	0.000	0.000	1.000	0.000	0.000	0
1790.4	0	0.000	0.000	1.000	0.000	0.000	0

1790.6	0	0.000	0.000	1.000	0.000	0.000	0
1792.4	0	0.000	0.000	1.000	0.000	0.000	0
1792.5	0	0.000	0.000	1.000	0.000	0.000	0
1792.8	0	0.000	0.000	1.000	0.000	0.000	0
1793.4	0	0.000	0.000	1.000	0.000	0.000	0
1794.7	0	0.000	0.000	1.000	0.000	0.000	0
1795.7	0	0.000	0.000	1.000	0.000	0.000	0
1797.0	0	0.000	0.000	1.000	0.000	0.000	0
1798.8	0	0.000	0.000	1.000	0.000	0.000	0
1801.1	0	0.000	0.000	1.000	0.000	0.000	0
1809.9	0	0.000	0.000	1.000	0.000	0.000	0
1811.4	148	0.530	0.530	-0.848	-0.848	-0.848	1
1811.5	0	0.000	0.530	1.000	0.000	-0.848	0
1811.8	0	0.000	0.530	1.000	0.000	-0.848	0
1812.5	0	0.000	0.530	1.000	0.000	-0.848	0
1814.6	0	0.000	0.530	1.000	0.000	-0.848	0
1814.7	0	0.000	0.530	1.000	0.000	-0.848	0
1815.3	0	0.000	0.530	1.000	0.000	-0.848	0
1818.2	0	0.000	0.530	1.000	0.000	-0.848	0
1819.8	0	0.000	0.530	1.000	0.000	-0.848	0
1822.4	0	0.000	0.530	1.000	0.000	-0.848	0
1822.9	0	0.000	0.530	1.000	0.000	-0.848	0
1823.2	0	0.000	0.530	1.000	0.000	-0.848	0
1823.4	0	0.000	0.530	1.000	0.000	-0.848	0
1823.5	0	0.000	0.530	1.000	0.000	-0.848	0
1823.8	0	0.000	0.530	1.000	0.000	-0.848	0
1824.0	0	0.000	0.530	1.000	0.000	-0.848	0
1824.2	0	0.000	0.530	1.000	0.000	-0.848	0
1824.4	0	0.000	0.530	1.000	0.000	-0.848	0
1824.8	0	0.000	0.530	1.000	0.000	-0.848	0
1825.6	0	0.000	0.530	1.000	0.000	-0.848	0
1827.0	0	0.000	0.530	1.000	0.000	-0.848	0
1828.2	0	0.000	0.530	1.000	0.000	-0.848	0
1828.9	0	0.000	0.530	1.000	0.000	-0.848	0
1830.1	124	0.829	1.359	-0.559	-0.559	-1.407	1
1830.4	0	0.000	1.359	1.000	0.000	-1.407	0
1830.8	0	0.000	1.359	1.000	0.000	-1.407	0
1831.1	0	0.000	1.359	1.000	0.000	-1.407	0
1831.4	0	0.000	1.359	1.000	0.000	-1.407	0
1831.5	0	0.000	1.359	1.000	0.000	-1.407	0
1831.8	0	0.000	1.359	1.000	0.000	-1.407	0
1832.0	0	0.000	1.359	1.000	0.000	-1.407	0
1832.1	0	0.000	1.359	1.000	0.000	-1.407	0
1832.2	0	0.000	1.359	1.000	0.000	-1.407	0
1832.6	0	0.000	1.359	1.000	0.000	-1.407	0
1832.7	0	0.000	1.359	1.000	0.000	-1.407	0
1832.8	0	0.000	1.359	1.000	0.000	-1.407	0
1832.9	0	0.000	1.359	1.000	0.000	-1.407	0
1833.1	0	0.000	1.359	1.000	0.000	-1.407	0
1833.4	0	0.000	1.359	1.000	0.000	-1.407	0
1833.6	0	0.000	1.359	1.000	0.000	-1.407	0
1833.7	0	0.000	1.359	1.000	0.000	-1.407	0
1833.9	0	0.000	1.359	1.000	0.000	-1.407	0
1834.3	0	0.000	1.359	1.000	0.000	-1.407	0
1834.5	0	0.000	1.359	1.000	0.000	-1.407	0
1834.6	0	0.000	1.359	1.000	0.000	-1.407	0
1834.7	0	0.000	1.359	1.000	0.000	-1.407	0
1835.0	0	0.000	1.359	1.000	0.000	-1.407	0

1835.2	0	0.000	1.359	1.000	0.000	-1.407	0
1835.3	0	0.000	1.359	1.000	0.000	-1.407	0
1835.9	0	0.000	1.359	1.000	0.000	-1.407	0
1836.4	0	0.000	1.359	1.000	0.000	-1.407	0
1836.5	0	0.000	1.359	1.000	0.000	-1.407	0
1836.6	0	0.000	1.359	1.000	0.000	-1.407	0
1837.3	0	0.000	1.359	1.000	0.000	-1.407	0
1837.6	0	0.000	1.359	1.000	0.000	-1.407	0
1838.1	0	0.000	1.359	1.000	0.000	-1.407	0
1838.2	0	0.000	1.359	1.000	0.000	-1.407	0
1838.4	0	0.000	1.359	1.000	0.000	-1.407	0
1839.5	0	0.000	1.359	1.000	0.000	-1.407	0
1841.0	0	0.000	1.359	1.000	0.000	-1.407	0
1841.3	0	0.000	1.359	1.000	0.000	-1.407	0
1841.5	0	0.000	1.359	1.000	0.000	-1.407	0
1843.6	0	0.000	1.359	1.000	0.000	-1.407	0
1844.6	0	0.000	1.359	1.000	0.000	-1.407	0
1845.5	0	0.000	1.359	1.000	0.000	-1.407	0
1845.6	0	0.000	1.359	1.000	0.000	-1.407	0
1846.9	0	0.000	1.359	1.000	0.000	-1.407	0
1848.4	0	0.000	1.359	1.000	0.000	-1.407	0
1850.3	0	0.000	1.359	1.000	0.000	-1.407	0
1850.9	0	0.000	1.359	1.000	0.000	-1.407	0
1851.2	0	0.000	1.359	1.000	0.000	-1.407	0
1851.6	0	0.000	1.359	1.000	0.000	-1.407	0
1852.5	0	0.000	1.359	1.000	0.000	-1.407	0
1853.9	0	0.000	1.359	1.000	0.000	-1.407	0
1854.1	0	0.000	1.359	1.000	0.000	-1.407	0
1856.3	0	0.000	1.359	1.000	0.000	-1.407	0
1858.2	0	0.000	1.359	1.000	0.000	-1.407	0
1863.7	0	0.000	1.359	1.000	0.000	-1.407	0
1867.0	0	0.000	1.359	1.000	0.000	-1.407	0
1869.0	0	0.000	1.359	1.000	0.000	-1.407	0
1872.2	0	0.000	1.359	1.000	0.000	-1.407	0
1874.2	0	0.000	1.359	1.000	0.000	-1.407	0
1875.3	0	0.000	1.359	1.000	0.000	-1.407	0
1875.8	0	0.000	1.359	1.000	0.000	-1.407	0
1875.9	0	0.000	1.359	1.000	0.000	-1.407	0
1877.2	0	0.000	1.359	1.000	0.000	-1.407	0
1877.5	0	0.000	1.359	1.000	0.000	-1.407	0
1880.0	0	0.000	1.359	1.000	0.000	-1.407	0
1881.0	0	0.000	1.359	1.000	0.000	-1.407	0
1881.7	0	0.000	1.359	1.000	0.000	-1.407	0
1881.8	0	0.000	1.359	1.000	0.000	-1.407	0
1882.9	0	0.000	1.359	1.000	0.000	-1.407	0
1883.2	0	0.000	1.359	1.000	0.000	-1.407	0
1885.3	0	0.000	1.359	1.000	0.000	-1.407	0
1895.1	0	0.000	1.359	1.000	0.000	-1.407	0
1915.3	0	0.000	1.359	1.000	0.000	-1.407	0
1923.8	0	0.000	1.359	1.000	0.000	-1.407	0
1931.0	0	0.000	1.359	1.000	0.000	-1.407	0
1934.4	0	0.000	1.359	1.000	0.000	-1.407	0
1944.2	0	0.000	1.359	1.000	0.000	-1.407	0
1951.0	0	0.000	1.359	1.000	0.000	-1.407	0
1951.4	0	0.000	1.359	1.000	0.000	-1.407	0
1951.7	0	0.000	1.359	1.000	0.000	-1.407	0
1952.0	0	0.000	1.359	1.000	0.000	-1.407	0
1961.9	0	0.000	1.359	1.000	0.000	-1.407	0

1962.1	0	0.000	1.359	1.000	0.000	-1.407	0
1962.4	0	0.000	1.359	1.000	0.000	-1.407	0
1962.9	0	0.000	1.359	1.000	0.000	-1.407	0
1968.0	0	0.000	1.359	1.000	0.000	-1.407	0
1968.2	0	0.000	1.359	1.000	0.000	-1.407	0
1971.9	0	0.000	1.359	1.000	0.000	-1.407	0
1981.2	0	0.000	1.359	1.000	0.000	-1.407	0
1981.4	0	0.000	1.359	1.000	0.000	-1.407	0
1981.8	0	0.000	1.359	1.000	0.000	-1.407	0
1982.1	0	0.000	1.359	1.000	0.000	-1.407	0
1982.3	0	0.000	1.359	1.000	0.000	-1.407	0
1985.4	0	0.000	1.359	1.000	0.000	-1.407	0
1985.7	0	0.000	1.359	1.000	0.000	-1.407	0
1988.1	0	0.000	1.359	1.000	0.000	-1.407	0
1988.4	0	0.000	1.359	1.000	0.000	-1.407	0
1988.7	0	0.000	1.359	1.000	0.000	-1.407	0
1989.4	0	0.000	1.359	1.000	0.000	-1.407	0
1996.7	0	0.000	1.359	1.000	0.000	-1.407	0
2007.4	0	0.000	1.359	1.000	0.000	-1.407	0
2007.5	0	0.000	1.359	1.000	0.000	-1.407	0
2018.2	0	0.000	1.359	1.000	0.000	-1.407	0
2018.6	0	0.000	1.359	1.000	0.000	-1.407	0
2020.2	0	0.000	1.359	1.000	0.000	-1.407	0
2024.2	0	0.000	1.359	1.000	0.000	-1.407	0
2059.1	0	0.000	1.359	1.000	0.000	-1.407	0
2059.2	0	0.000	1.359	1.000	0.000	-1.407	0
2065.3	0	0.000	1.359	1.000	0.000	-1.407	0
2065.5	0	0.000	1.359	1.000	0.000	-1.407	0
2065.7	0	0.000	1.359	1.000	0.000	-1.407	0
2071.3	0	0.000	1.359	1.000	0.000	-1.407	0
2077.0	0	0.000	1.359	1.000	0.000	-1.407	0
2115.0	0	0.000	1.359	1.000	0.000	-1.407	0
2117.2	0	0.000	1.359	1.000	0.000	-1.407	0
2127.0	0	0.000	1.359	1.000	0.000	-1.407	0
2142.8	0	0.000	1.359	1.000	0.000	-1.407	0
2150.1	0	0.000	1.359	1.000	0.000	-1.407	0
2172.8	0	0.000	1.359	1.000	0.000	-1.407	0
2172.9	0	0.000	1.359	1.000	0.000	-1.407	0

Arithmetic mean of strike values (Col 2) = 136.0 Total measurements taken = 2

Feature Orientation measurements **Well: MURRAY RIVER c-40-H/93-I-14 Incipient Breakouts**

Reference Mardia 1972 for statistics of directional data

Total Sin x thick	Total Cos x thick	Total Thickness	S Col A/ColC	C ColB/ColC	R x R	R	S/R	C/R	Azimuth from S/R	Azimuth from C/R	Standard Deviation
1.359	-1.407	2	0.6795	-0.7035	0.9566	0.9781	0.6947	-0.7193	136.0	224.0	12.1

Well Name: MURRAY RIVER c-40-H/93-I-14 Bedding							
Depth KB m	Azimuth of feature	Sin Azi	Cumulative Total Sin Azi	Cos Azi	Cos Azi corrected for zero values	Cumulative Total Cos Azi	Measurement made or not 1 or 0 entered
1735.6	109	0.946	0.946	-0.326	-0.326	-0.326	1
1736.2	0	0.000	0.946	1.000	0.000	-0.326	0
1739.0	0	0.000	0.946	1.000	0.000	-0.326	0
1739.8	104	0.970	1.916	-0.242	-0.242	-0.567	1
1739.9	0	0.000	1.916	1.000	0.000	-0.567	0
1740.2	210	-0.500	1.416	-0.866	-0.866	-1.434	1
1740.3	123	0.839	2.254	-0.545	-0.545	-1.978	1
1740.5	110	0.940	3.194	-0.342	-0.342	-2.320	1
1741.4	108	0.951	4.145	-0.309	-0.309	-2.629	1
1741.9	113	0.921	5.066	-0.391	-0.391	-3.020	1
1742.0	0	0.000	5.066	1.000	0.000	-3.020	0
1742.2	114	0.914	5.979	-0.407	-0.407	-3.427	1
1747.6	0	0.000	5.979	1.000	0.000	-3.427	0
1749.0	0	0.000	5.979	1.000	0.000	-3.427	0
1749.6	0	0.000	5.979	1.000	0.000	-3.427	0
1750.4	0	0.000	5.979	1.000	0.000	-3.427	0
1751.4	0	0.000	5.979	1.000	0.000	-3.427	0
1752.2	0	0.000	5.979	1.000	0.000	-3.427	0
1755.2	0	0.000	5.979	1.000	0.000	-3.427	0
1758.4	0	0.000	5.979	1.000	0.000	-3.427	0
1758.6	0	0.000	5.979	1.000	0.000	-3.427	0
1761.4	0	0.000	5.979	1.000	0.000	-3.427	0
1762.6	0	0.000	5.979	1.000	0.000	-3.427	0
1764.0	0	0.000	5.979	1.000	0.000	-3.427	0
1772.2	0	0.000	5.979	1.000	0.000	-3.427	0
1777.2	0	0.000	5.979	1.000	0.000	-3.427	0
1778.4	0	0.000	5.979	1.000	0.000	-3.427	0
1780.4	0	0.000	5.979	1.000	0.000	-3.427	0
1782.6	0	0.000	5.979	1.000	0.000	-3.427	0
1782.8	0	0.000	5.979	1.000	0.000	-3.427	0
1783.2	0	0.000	5.979	1.000	0.000	-3.427	0
1783.4	0	0.000	5.979	1.000	0.000	-3.427	0
1783.6	0	0.000	5.979	1.000	0.000	-3.427	0
1783.8	0	0.000	5.979	1.000	0.000	-3.427	0
1784.0	0	0.000	5.979	1.000	0.000	-3.427	0
1784.2	0	0.000	5.979	1.000	0.000	-3.427	0
1784.4	0	0.000	5.979	1.000	0.000	-3.427	0
1784.6	0	0.000	5.979	1.000	0.000	-3.427	0
1784.8	0	0.000	5.979	1.000	0.000	-3.427	0
1785.0	0	0.000	5.979	1.000	0.000	-3.427	0
1785.2	0	0.000	5.979	1.000	0.000	-3.427	0
1785.6	0	0.000	5.979	1.000	0.000	-3.427	0
1785.7	0	0.000	5.979	1.000	0.000	-3.427	0
1786.1	0	0.000	5.979	1.000	0.000	-3.427	0
1787.0	0	0.000	5.979	1.000	0.000	-3.427	0
1787.2	0	0.000	5.979	1.000	0.000	-3.427	0
1788.0	0	0.000	5.979	1.000	0.000	-3.427	0
1788.8	0	0.000	5.979	1.000	0.000	-3.427	0
1789.3	0	0.000	5.979	1.000	0.000	-3.427	0
1789.4	0	0.000	5.979	1.000	0.000	-3.427	0
1789.6	0	0.000	5.979	1.000	0.000	-3.427	0
1790.2	0	0.000	5.979	1.000	0.000	-3.427	0
1790.4	0	0.000	5.979	1.000	0.000	-3.427	0

1790.6	0	0.000	5.979	1.000	0.000	-3.427	0
1792.4	0	0.000	5.979	1.000	0.000	-3.427	0
1792.5	0	0.000	5.979	1.000	0.000	-3.427	0
1792.8	0	0.000	5.979	1.000	0.000	-3.427	0
1793.4	0	0.000	5.979	1.000	0.000	-3.427	0
1794.7	0	0.000	5.979	1.000	0.000	-3.427	0
1795.7	0	0.000	5.979	1.000	0.000	-3.427	0
1797.0	0	0.000	5.979	1.000	0.000	-3.427	0
1798.8	0	0.000	5.979	1.000	0.000	-3.427	0
1801.1	0	0.000	5.979	1.000	0.000	-3.427	0
1809.9	0	0.000	5.979	1.000	0.000	-3.427	0
1811.4	0	0.000	5.979	1.000	0.000	-3.427	0
1811.5	0	0.000	5.979	1.000	0.000	-3.427	0
1811.8	115	0.906	6.886	-0.423	-0.423	-3.849	1
1812.5	0	0.000	6.886	1.000	0.000	-3.849	0
1814.6	115	0.906	7.792	-0.423	-0.423	-4.272	1
1814.7	0	0.000	7.792	1.000	0.000	-4.272	0
1815.3	114	0.914	8.705	-0.407	-0.407	-4.679	1
1818.2	118	0.883	9.588	-0.469	-0.469	-5.148	1
1819.8	0	0.000	9.588	1.000	0.000	-5.148	0
1822.4	114	0.914	10.502	-0.407	-0.407	-5.555	1
1822.9	0	0.000	10.502	1.000	0.000	-5.555	0
1823.2	0	0.000	10.502	1.000	0.000	-5.555	0
1823.4	0	0.000	10.502	1.000	0.000	-5.555	0
1823.5	112	0.927	11.429	-0.375	-0.375	-5.929	1
1823.8	0	0.000	11.429	1.000	0.000	-5.929	0
1824.0	0	0.000	11.429	1.000	0.000	-5.929	0
1824.2	0	0.000	11.429	1.000	0.000	-5.929	0
1824.4	0	0.000	11.429	1.000	0.000	-5.929	0
1824.8	0	0.000	11.429	1.000	0.000	-5.929	0
1825.6	121	0.857	12.286	-0.515	-0.515	-6.444	1
1827.0	0	0.000	12.286	1.000	0.000	-6.444	0
1828.2	0	0.000	12.286	1.000	0.000	-6.444	0
1828.9	102	0.978	13.264	-0.208	-0.208	-6.652	1
1830.1	0	0.000	13.264	1.000	0.000	-6.652	0
1830.4	0	0.000	13.264	1.000	0.000	-6.652	0
1830.8	0	0.000	13.264	1.000	0.000	-6.652	0
1831.1	0	0.000	13.264	1.000	0.000	-6.652	0
1831.4	0	0.000	13.264	1.000	0.000	-6.652	0
1831.5	0	0.000	13.264	1.000	0.000	-6.652	0
1831.8	0	0.000	13.264	1.000	0.000	-6.652	0
1832.0	0	0.000	13.264	1.000	0.000	-6.652	0
1832.1	0	0.000	13.264	1.000	0.000	-6.652	0
1832.2	0	0.000	13.264	1.000	0.000	-6.652	0
1832.6	0	0.000	13.264	1.000	0.000	-6.652	0
1832.7	0	0.000	13.264	1.000	0.000	-6.652	0
1832.8	0	0.000	13.264	1.000	0.000	-6.652	0
1832.9	0	0.000	13.264	1.000	0.000	-6.652	0
1833.1	0	0.000	13.264	1.000	0.000	-6.652	0
1833.4	0	0.000	13.264	1.000	0.000	-6.652	0
1833.6	0	0.000	13.264	1.000	0.000	-6.652	0
1833.7	0	0.000	13.264	1.000	0.000	-6.652	0
1833.9	0	0.000	13.264	1.000	0.000	-6.652	0
1834.3	0	0.000	13.264	1.000	0.000	-6.652	0
1834.5	0	0.000	13.264	1.000	0.000	-6.652	0
1834.6	0	0.000	13.264	1.000	0.000	-6.652	0
1834.7	0	0.000	13.264	1.000	0.000	-6.652	0
1835.0	0	0.000	13.264	1.000	0.000	-6.652	0

1835.2	0	0.000	13.264	1.000	0.000	-6.652	0
1835.3	0	0.000	13.264	1.000	0.000	-6.652	0
1835.9	0	0.000	13.264	1.000	0.000	-6.652	0
1836.4	0	0.000	13.264	1.000	0.000	-6.652	0
1836.5	0	0.000	13.264	1.000	0.000	-6.652	0
1836.6	114	0.914	14.178	-0.407	-0.407	-7.059	1
1837.3	0	0.000	14.178	1.000	0.000	-7.059	0
1837.6	0	0.000	14.178	1.000	0.000	-7.059	0
1838.1	0	0.000	14.178	1.000	0.000	-7.059	0
1838.2	0	0.000	14.178	1.000	0.000	-7.059	0
1838.4	0	0.000	14.178	1.000	0.000	-7.059	0
1839.5	0	0.000	14.178	1.000	0.000	-7.059	0
1841.0	0	0.000	14.178	1.000	0.000	-7.059	0
1841.3	0	0.000	14.178	1.000	0.000	-7.059	0
1841.5	110	0.940	15.118	-0.342	-0.342	-7.401	1
1843.6	0	0.000	15.118	1.000	0.000	-7.401	0
1844.6	0	0.000	15.118	1.000	0.000	-7.401	0
1845.5	0	0.000	15.118	1.000	0.000	-7.401	0
1845.6	0	0.000	15.118	1.000	0.000	-7.401	0
1846.9	0	0.000	15.118	1.000	0.000	-7.401	0
1848.4	124	0.829	15.947	-0.559	-0.559	-7.960	1
1850.3	127	0.799	16.745	-0.602	-0.602	-8.562	1
1850.9	112	0.927	17.673	-0.375	-0.375	-8.937	1
1851.2	115	0.906	18.579	-0.423	-0.423	-9.359	1
1851.6	114	0.914	19.492	-0.407	-0.407	-9.766	1
1852.5	94	0.998	20.490	-0.070	-0.070	-9.836	1
1853.9	113	0.921	21.410	-0.391	-0.391	-10.227	1
1854.1	117	0.891	22.301	-0.454	-0.454	-10.681	1
1856.3	0	0.000	22.301	1.000	0.000	-10.681	0
1858.2	113	0.921	23.222	-0.391	-0.391	-11.071	1
1863.7	109	0.946	24.167	-0.326	-0.326	-11.397	1
1867.0	134	0.719	24.887	-0.695	-0.695	-12.092	1
1869.0	0	0.000	24.887	1.000	0.000	-12.092	0
1872.2	108	0.951	25.838	-0.309	-0.309	-12.401	1
1874.2	105	0.966	26.804	-0.259	-0.259	-12.659	1
1875.3	0	0.000	26.804	1.000	0.000	-12.659	0
1875.8	0	0.000	26.804	1.000	0.000	-12.659	0
1875.9	0	0.000	26.804	1.000	0.000	-12.659	0
1877.2	0	0.000	26.804	1.000	0.000	-12.659	0
1877.5	0	0.000	26.804	1.000	0.000	-12.659	0
1880.0	110	0.940	27.743	-0.342	-0.342	-13.001	1
1881.0	0	0.000	27.743	1.000	0.000	-13.001	0
1881.7	0	0.000	27.743	1.000	0.000	-13.001	0
1881.8	109	0.946	28.689	-0.326	-0.326	-13.327	1
1882.9	0	0.000	28.689	1.000	0.000	-13.327	0
1883.2	0	0.000	28.689	1.000	0.000	-13.327	0
1885.3	0	0.000	28.689	1.000	0.000	-13.327	0
1895.1	0	0.000	28.689	1.000	0.000	-13.327	0
1915.3	101	0.982	29.671	-0.191	-0.191	-13.518	1
1923.8	0	0.000	29.671	1.000	0.000	-13.518	0
1931.0	0	0.000	29.671	1.000	0.000	-13.518	0
1934.4	0	0.000	29.671	1.000	0.000	-13.518	0
1944.2	0	0.000	29.671	1.000	0.000	-13.518	0
1951.0	0	0.000	29.671	1.000	0.000	-13.518	0
1951.4	0	0.000	29.671	1.000	0.000	-13.518	0
1951.7	0	0.000	29.671	1.000	0.000	-13.518	0
1952.0	0	0.000	29.671	1.000	0.000	-13.518	0
1961.9	0	0.000	29.671	1.000	0.000	-13.518	0

1962.1	0	0.000	29.671	1.000	0.000	-13.518	0
1962.4	0	0.000	29.671	1.000	0.000	-13.518	0
1962.9	0	0.000	29.671	1.000	0.000	-13.518	0
1968.0	0	0.000	29.671	1.000	0.000	-13.518	0
1968.2	0	0.000	29.671	1.000	0.000	-13.518	0
1971.9	0	0.000	29.671	1.000	0.000	-13.518	0
1981.2	0	0.000	29.671	1.000	0.000	-13.518	0
1981.4	0	0.000	29.671	1.000	0.000	-13.518	0
1981.8	0	0.000	29.671	1.000	0.000	-13.518	0
1982.1	0	0.000	29.671	1.000	0.000	-13.518	0
1982.3	0	0.000	29.671	1.000	0.000	-13.518	0
1985.4	0	0.000	29.671	1.000	0.000	-13.518	0
1985.7	0	0.000	29.671	1.000	0.000	-13.518	0
1988.1	0	0.000	29.671	1.000	0.000	-13.518	0
1988.4	0	0.000	29.671	1.000	0.000	-13.518	0
1988.7	0	0.000	29.671	1.000	0.000	-13.518	0
1989.4	0	0.000	29.671	1.000	0.000	-13.518	0
1996.7	110	0.940	30.610	-0.342	-0.342	-13.860	1
2007.4	0	0.000	30.610	1.000	0.000	-13.860	0
2007.5	0	0.000	30.610	1.000	0.000	-13.860	0
2018.2	0	0.000	30.610	1.000	0.000	-13.860	0
2018.6	0	0.000	30.610	1.000	0.000	-13.860	0
2020.2	0	0.000	30.610	1.000	0.000	-13.860	0
2024.2	105	0.966	31.576	-0.259	-0.259	-14.119	1
2059.1	0	0.000	31.576	1.000	0.000	-14.119	0
2059.2	0	0.000	31.576	1.000	0.000	-14.119	0
2065.3	0	0.000	31.576	1.000	0.000	-14.119	0
2065.5	0	0.000	31.576	1.000	0.000	-14.119	0
2065.7	0	0.000	31.576	1.000	0.000	-14.119	0
2071.3	120	0.866	32.442	-0.500	-0.500	-14.619	1
2077.0	110	0.940	33.382	-0.342	-0.342	-14.961	1
2115.0	0	0.000	33.382	1.000	0.000	-14.961	0
2117.2	0	0.000	33.382	1.000	0.000	-14.961	0
2127.0	0	0.000	33.382	1.000	0.000	-14.961	0
2142.8	0	0.000	33.382	1.000	0.000	-14.961	0
2150.1	0	0.000	33.382	1.000	0.000	-14.961	0
2172.8	0	0.000	33.382	1.000	0.000	-14.961	0
2172.9	0	0.000	33.382	1.000	0.000	-14.961	0

arithmetic mean of strike values (col 2) = 115.2 Total measurements taken = 38

Feature Orientation measurements **Well: MURRAY RIVER c-40-H/93-I-14 Bedding**

Reference Mardia 1972 for statistics of directional data

Total Sin x thick	Total Cos x thick	Total Thickness	S Col A/ColC	C ColB/ColC	R x R	R	S/R	C/R	Azimuth from S/R	Azimuth from C/R	Standard Deviation
33.382	-14.961	38	0.8785	-0.3937	0.9267	0.9627	0.9125	-0.4090	114.1	245.9	15.8