Characterization of core extracted from the Olmos Formation (Cretaceous), Southwest Texas

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This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only, and does not imply endorsement by the U.S. Government.

INTRODUCTION

This preliminary report presents data from ongoing activities of the U.S. Geological Survey (USGS), Energy Resources Program, Gulf Coast Framework Studies Project (GCFSP). The purpose of the GCFSP is to conduct geologic framework studies that will aid in the evaluation of all fossil fuel energy commodities (coal, gas, and oil) in the Gulf Coast Region. The project will: (1) define the petroleum systems of the region; (2) conduct specific geologic framework studies and petroleum system analyses on selected priority intervals; (3) study the coal-bearing intervals to evaluate coal distribution and quality, and coal-bed methane, and source rock potential; (4) work in cooperation with the National Oil and Gas Assessment (NOGA) Project to conduct a focused assessment of the Gulf Region; and (5) contribute to the next phase of the National Coal Resource Assessment.

The USGS, through a Cooperative Research and Development Agreement (CRADA) with The Exploration Company (TXCO) of San Antonio, has drilled a series of wells to assess the coalbed methane potential in the South Texas portion of the Gulf Coast Region. This report presents lithologic descriptions, photographs, and x-ray prints of cored intervals from the Olmos Formation (Cretaceous) from two wells, 1-117CR and 1-613CR, located in Maverick County (Figure 1) . The cored interval for 1-117CR (from 1090.0 feet to 1212.5 feet below the surface) is 122.5 feet in length. For the 1-613CR well, the cored interval (from 1390.0 feet to 1525.7 feet below the surface) is 135.7 feet in length. The depths and lithology thicknesses for 1-117CR and 1-613CR were corrected based on comparison with borehole e-logs from the well locations. Due to depth correction of intervals for 1-613CR, information on cardboard or wood block labeled markers used in the core photographs to denote portions of the cores that were removed or missing, at the time of photography, do not reflect the corrected depth intervals.

X-ray radiographs were taken of the coal and carbonaceous shale portions of the cores to determine internal structural properties such as, partings, cleats, and burrows. For conversion to digital format the x-ray prints were scanned and, as a result, they appear as reversed images in this report. Additionally, in the scanned x-ray prints, carbonaceous shales or clays appear white and coals are black.

Initial analyses of sample data from cores 1-117CR and 1-613CR show average as-received ash yield values of 61.09 percent and 58.94 percent, respectively. Less than 50 percent ash yield occurs for five of the samples from 1-117CR and four of the samples from 1-613CR. Based on these initial results, intervals described as coal in 1-117CR and 1-613CR, in some cases, would be classified as carbonaceous shales and not coal (Wood and others, 1981).

REFERENCES

Wood,G.H. and others. 1983, Coal resource classification system of the U.S. Geological Survey: U.S. Geological Survey Circular 891, 65 p.

ACKNOWLEDGEMENTS

We wish to acknowledge The Exploration Company for their continuing assistance and collaboration. The radiographs were performed with the assistance of Jeff Halka and William Panageotou of the Maryland Geological Survey and we would like to thank them for their cooperation in this study. In addition, we wish to acknowledge Bryan Williams of Stata Log for his assistance in the field.

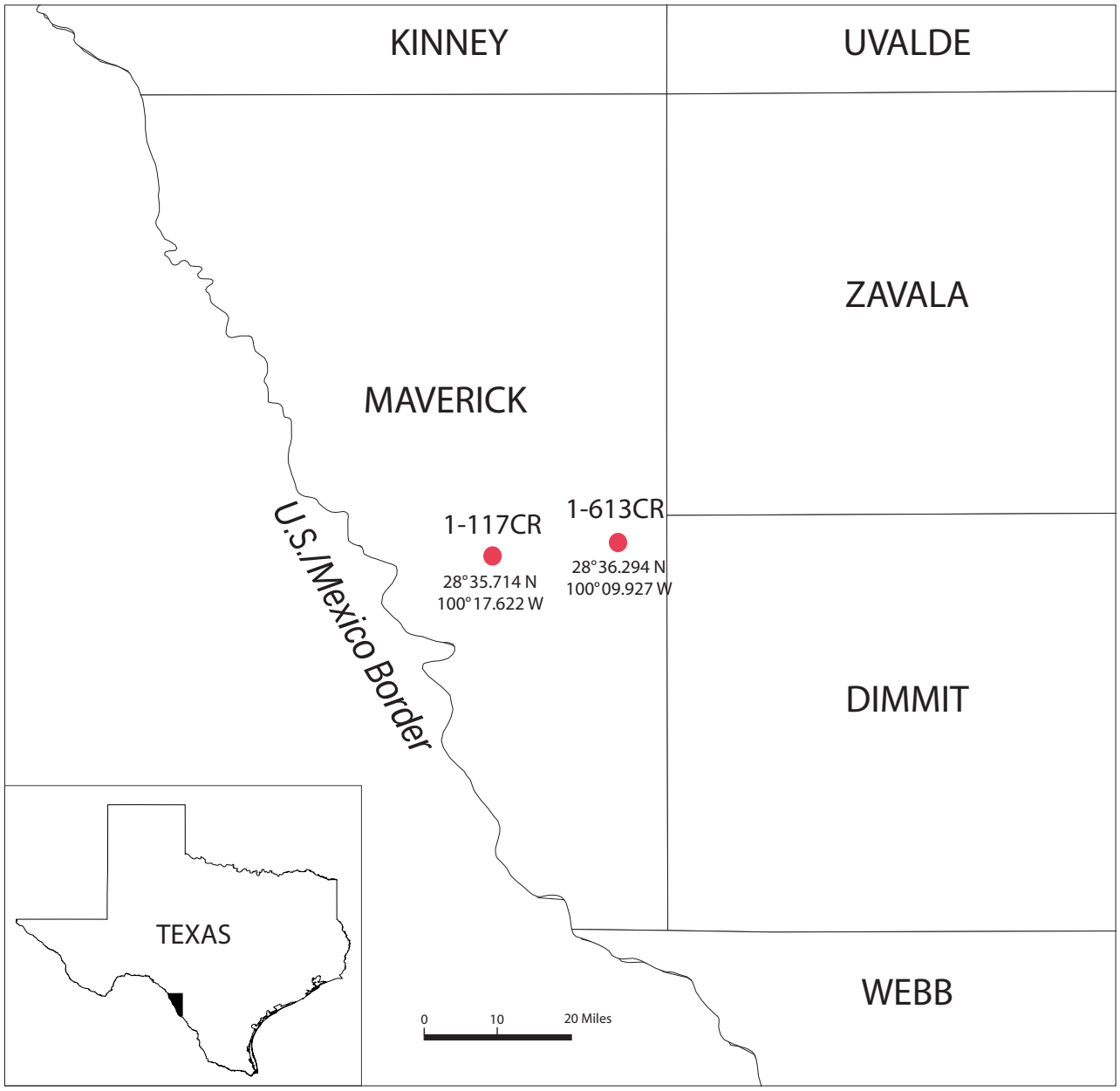

Figure 1. Locations of drill holes (red circles) in Maverick County, Texas. Click on the drill hole locations for core stratigraphy, photographs, and x-ray radiographs

Click here to return to core location map

Borehole: TXCOU-USGS 1-1117CR Comanche Ranch
Company or Agency: TXCO The Exploration Company,U.S. Geological Survey
Location: Comanche Ranch, Maverick County, TX
Coordinates: 28° 35.714' N, 100° 17.622' W (GPS)
Ground Elevation: 766 ± 25 ft. (GPS)
Coring Depth: 1090.0-1212.5' (122.5')
Total Borehole Depth: 1214.0'
Drilled by: A. Clark Geological Survey
Drill Rig: Core-mounted mobile drill rig
Drilling Method: Continuous wireline coring,10-ft spring loaded push tube with shoe
Bit type: Tungsten-carbide/diamond HC 4.75" OD,.3" ID core
Drilling Medium: Bentonite mud
Casing: None (PVC to 6ft)
Geophysical Logs: Natural gamma; caliper; gamma-gamma density; conductivity, resistivity
Dates Drilled: 6/2/01-6/10/01
Rock Descriptions by: P. Warwick, A. Karlsen

Stratigraphic Log Scale: 1 inch = 2.50 feet

Lithologic Symbols

Massive sandstone | Carbonaceous shale | Interbedded sandstone and shale | Limestone | Coal | Interbedded sandstone and shale | Bedded sandstone | Siltstone | Core loss or no record

Click on 🔬 located in the stratigraphic descriptions for x-ray radiographs of coal/carbonaceous shale samples

Click on 📷 located adjacent to the stratigraphic descriptions for core photos

Depth below surface, in feet
Depth below Mean Sea Level, in feet

Description

Thickness (Cumulative Depth), in feet

1090 -324

Siltstone, light grey, very fine grained; roots and burrows, shell fragments, coal spars; ironstone concretion (~ 0.10 inches diameter) near base, dark brown, slightly calcareous — 3.00 (1093.00)

1095 -329

Core loss — 4.25 (1097.25)

1096.00-1103.00

1100 -334

Siltstone, light to medium grey, fine grained, flaser bedding, coarsens upward, roots and burrows, some shell fragments; nodular ironstone concretion near top; dark brown, slightly calcareous — 2.75 (1100.00)

Sandstone, light grey, fine-grained, with shale streaks — 1.00 (1101.00)

Shale, dark grey, carbonaceous, visible gas bubbling on wetted core surface, sampled for gas desorption (sample #03-01-44, 1101.00'-1101.45' 🔬) — 0.45 (1101.45)

Siltstone, light to dark grey, coarsens upwards, burrows, coal spars ~0.25" diameter — 1.65 (1103.10)

1105 -339

Shale, medium to dark grey, carbonaceous; visible gas bubbling on wetted core surface, sampled for gas desorption (sample #03-01-45,1103.10'-1104.00' 🔬) — 0.95 (1104.00)

Siltstone, light to medium grey, coarsens upwards, coal spars ~0.50" diameter — 1.85 (1105.85)

1103.80-1113.75

1110 -344

Shale, light grey to black, carbonaceous; visible gas bubbling on wetted core surface, sampled for gas desorption (sample #03-01-46,1106.40'-1107.25' 🔬, sample #03-01-47,1107.25'-1108.35' 🔬, sample #03-01-48,1108.35'-1109.15' 🔬) — 6.60 (1112.45)

Core loss — 0.55 (1113.00)

Shale, medium grey to black, carbonaceous; no visible gas bubbling on wetted core surface — 0.40 (1113.40)

1115 -349

Sandstone, light grey, very fine-grained — 0.90 (1114.30)

Shale, light to dark grey, carbonaceous; visible vigorous gas bubbling on wetted core surface, sampled for gas desorption (sample #03-01-49,1114.30'-1115.50' 🔬) — 2.00 (1116.30)

1113.75-1124.20

1120 -354

1125 -359

Siltstone, light to dark grey, fine-grained, shaley, burrows; beds plastically deformed towards base; nodular ironstone concretion near base (1131.10'-1131.20'), light brown — 15.90 (1132.20)

1124.20-1133.00

1130 -364

Shale, light to medium grey, silty; interbedded with sandstone, light grey, fine-grained — 0.80 (1133.00)

1135 -369

Sandstone, grey, very fine-grained to fine-grained, faint bedding; flat shale streaks and burrows; small nodular ironstone concretions towards base — 7.50 (1140.50)

1133.00-1146.00

1140 -374

Core loss — 2.50 (1143.00)

Shale, dark grey, silty; interbedded with sandstone, light grey, fine-grained; interval was broken up in core barrel — 1.90 (1144.90)

1145 -379

Siltstone, light to dark grey, fine-grained, shaley, burrows; 45° fault at 1148.00' — 4.00 (1148.90)

1150 -384

Sandstone, light grey, fine-grained, calcareous (increases towards base),shale streaks — 3.70 (1152.60)

1146.00-1156.00

Shale, carbonaceous, with pyrite; visible gas bubbling on wetted core surface; sampled for gas desorption (sample #03-01-50,1152.60'-1153.00' 🔬) — 0.40 (1153.00)

1155 -389

Siltstone, medium grey, fine-grained, shaley, roots and burrows (~0.25-0.50" diameter); lenticular-shaped coal spars (~0.25" diameter); tidal banding near top; slightly calcareous towards base — 12.30 (1165.30)

1160 -394

1156.00-1166.00

1165 -399

Siltstone, medium to dark grey; interbedded with sandstone, light grey, very fine-grained; sand infilled burrows towards base; irregular shaped coal spars — 0.80 (1166.10)

Coal, black, non-banded, blocky; sampled for gas desorption (sample #03-01-53, 1166.10'-1167.40' 🔬) — 1.30 (1167.40)

Siltstone, light to medium grey, shaley, burrows; beds dipping 3-5° near base; 45° faults at 1168.20', 1168.50', 1169.30' — 2.50 (1169.90)

1170 -404

Coal, black, non-banded, blocky; sampled for gas desorption (sample #03-01-51, 1169.90'-1170.90' 🔬) — 1.00 (1170.90)

Shale, dark grey, carbonaceous, vitrain streaks; sampled for gas desorption (sample #03-01-52,1170.90'-1171.50' 🔬),45° fault at 1171.50' — 0.60 (1171.50)

1166.00-1178.00

Siltstone, medium grey, shaley, plant imprints — 0.70 (1172.20)

1175 -409

Shale, medium to dark grey, carbonaceous, vitrain streaks near top; sampled for gas desorption (sample #03-01-57,1173.60'-1174.60' 🔬, sample #03-01-55,1174.70'-1175.70' 🔬, sample #03-01-56,1175.70'-1176.80' 🔬) — 4.60 (1176.80)

Siltstone, light grey, shaley — 4.40 (1181.20)

1180 -414

1178.00-1187.00

1185 -419

Shale, medium grey, silty, carbonaceous; sampled for gas desorption (sample #03-01-54, 1181.20'-1182.20' 🔬, sample #03-01-60, 1184.50'-1185.50' 🔬) — 7.40 (1188.60)

Siltstone, medium to dark grey, shaley — 1.20 (1189.80)

1190 -424

Coal, banded; sampled for gas desorption (sample #03-01-58, 1189.80-1190.80' 🔬, sample #03-01-59, 1190.80-1191.80' 🔬) — 2.00 (1191.80)

Siltstone, medium to dark grey, shaley, burrows; beds inclined at ~15° near top; 45° faults at 1192.30' and 1194.10' — 3.20 (1195.00)

1195 -429

1187.00-1204.00

Core loss — 8.40 (1203.40)

1200 -434

Siltstone, light grey, burrows — 0.20 (1203.60)

Coal, banded, not sampled — 0.10 (1203.70)

Shale, dark grey, silty, carbonaceous; sandstone stringers towards base — 0.50 (1204.20)

1205 -439

Sandstone, grey, massive, glauconitic, roots, some carbonaceous streaks — 8.30 (1212.50)

1204.00-1212.50

1210 -444

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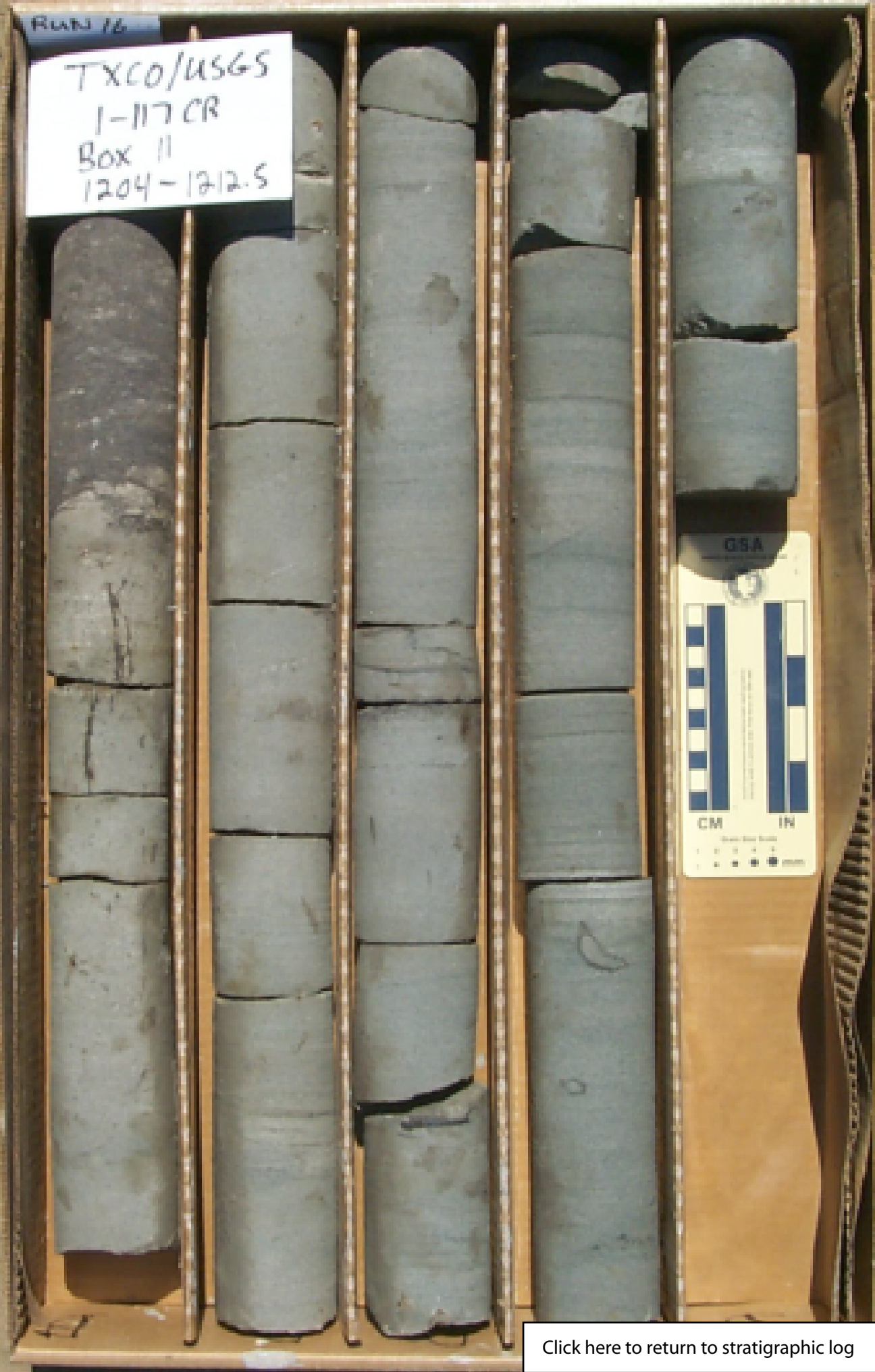

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X-ray radiograph

Well: Comanche 1-117CR
Sample: 03-01-44
Depth:1101.00 - 1101.45 ft
AR Ash: 81.72%

Carbonaceous shale, broken pieces

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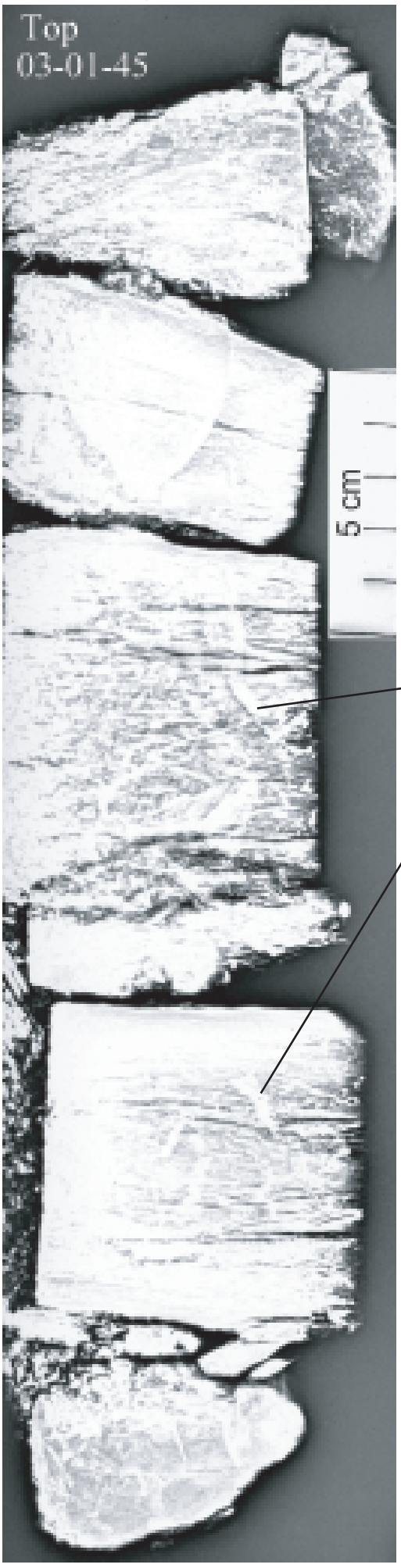
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-45
Depth:1103.10 - 1104.00 ft
AR Ash: 79.50%

Carbonaceous shale

Burrows

Coaly lenses

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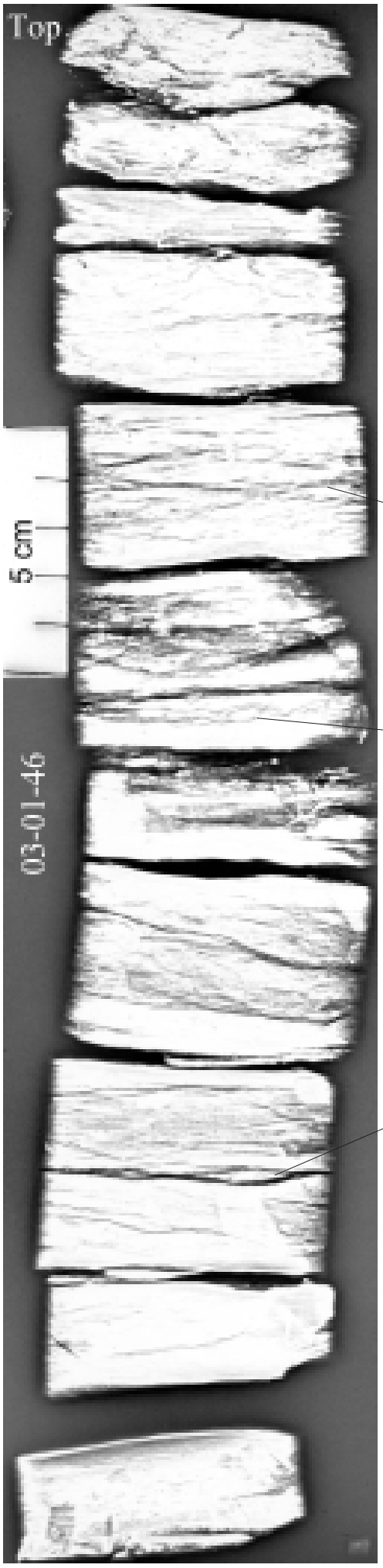
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-46
Depth:1106.40 - 1107.25 ft
AR Ash: 56.26%

Carbonaceous shale and mudstone

Coaly stringers

Burrows

Ripple laminations?

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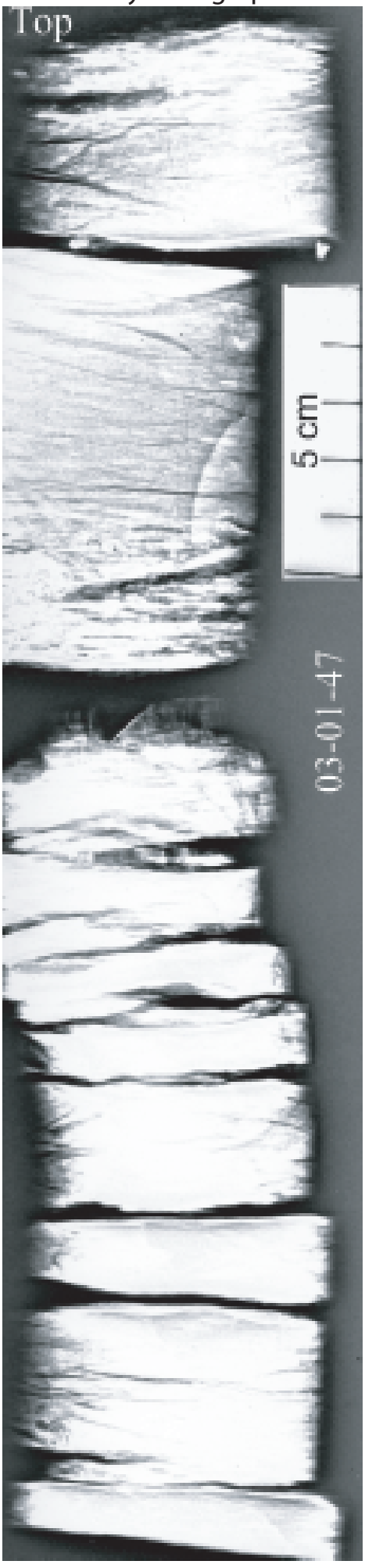
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-47
Depth:1107.25 - 1108.35 ft
AR Ash: not available

Carbonaceous shale
with coaly streaks

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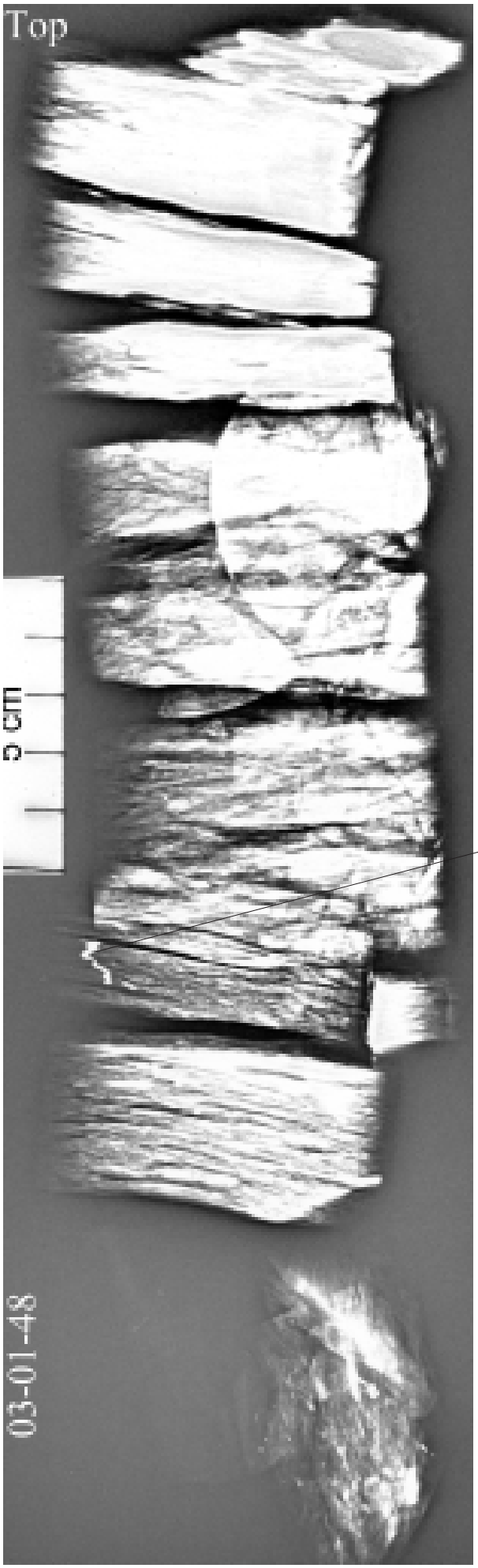
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-48
Depth:1108.35 - 1109.15 ft
AR Ash: 60.37%

Carbonaceous shale with coaly streaks

Clay-filled vertical burrow

Becoming more organic-rich towards the base

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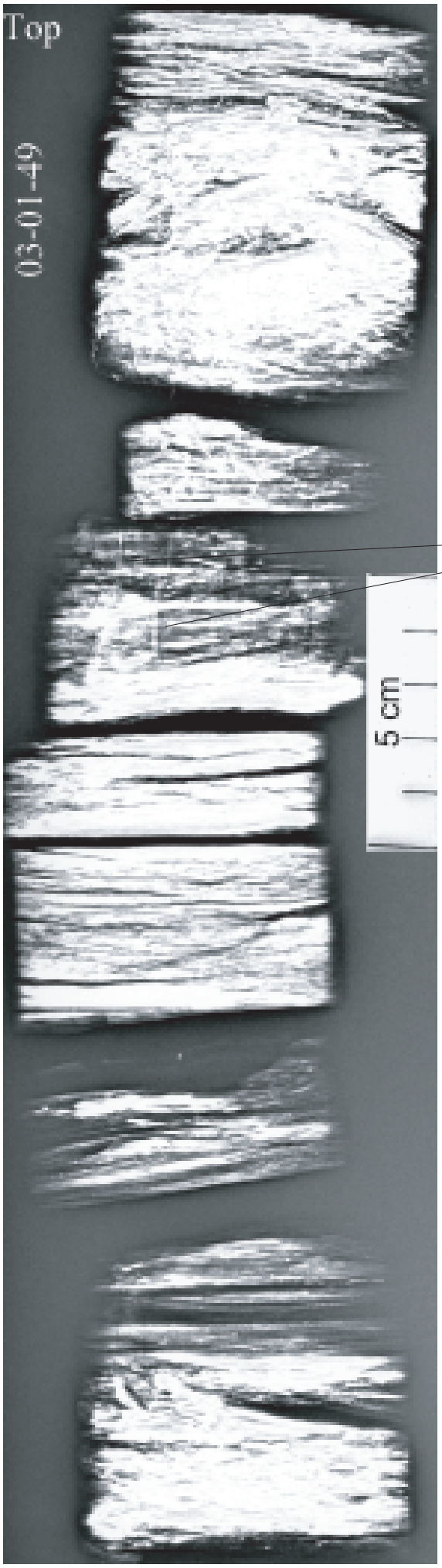
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-49
Depth:1114.70 - 1115.50 ft
AR Ash: 45.00%

Cleats, filled with mineralization? with approximately 1 cm spacing

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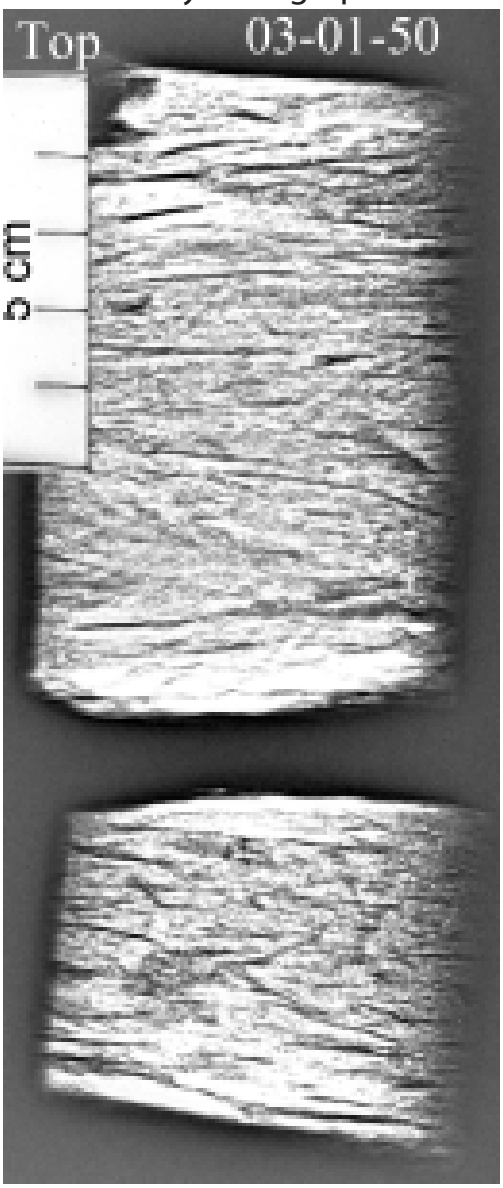
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-50
Depth:1152.60 - 1153.00 ft
AR Ash: 62.91%

Carbonaceous shale
with coaly lenses

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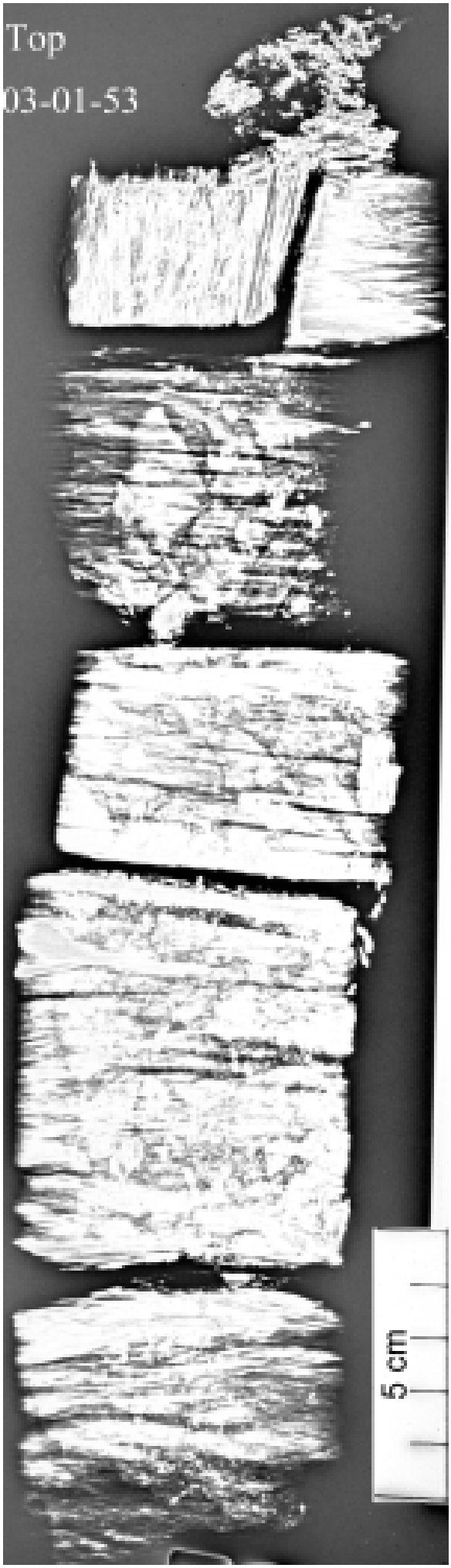
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-53
Depth:1166.10 - 1167.40 ft
AR Ash: 38.30%

Coal, shaley, with burrows and shale lenses

Zone with high ash content

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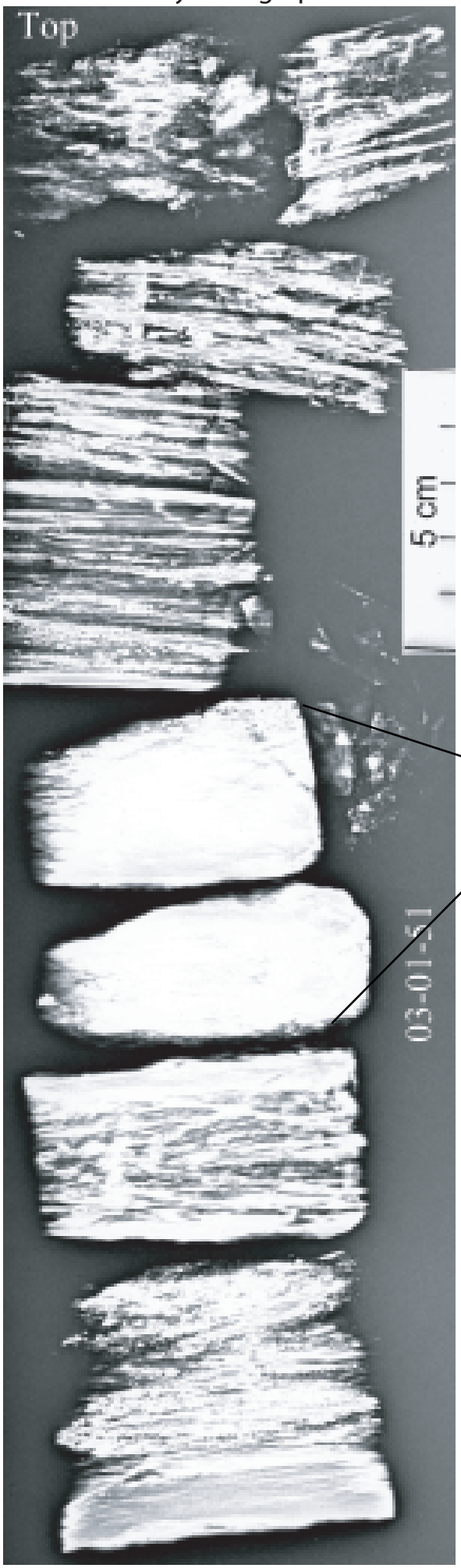
X-ray radiograph



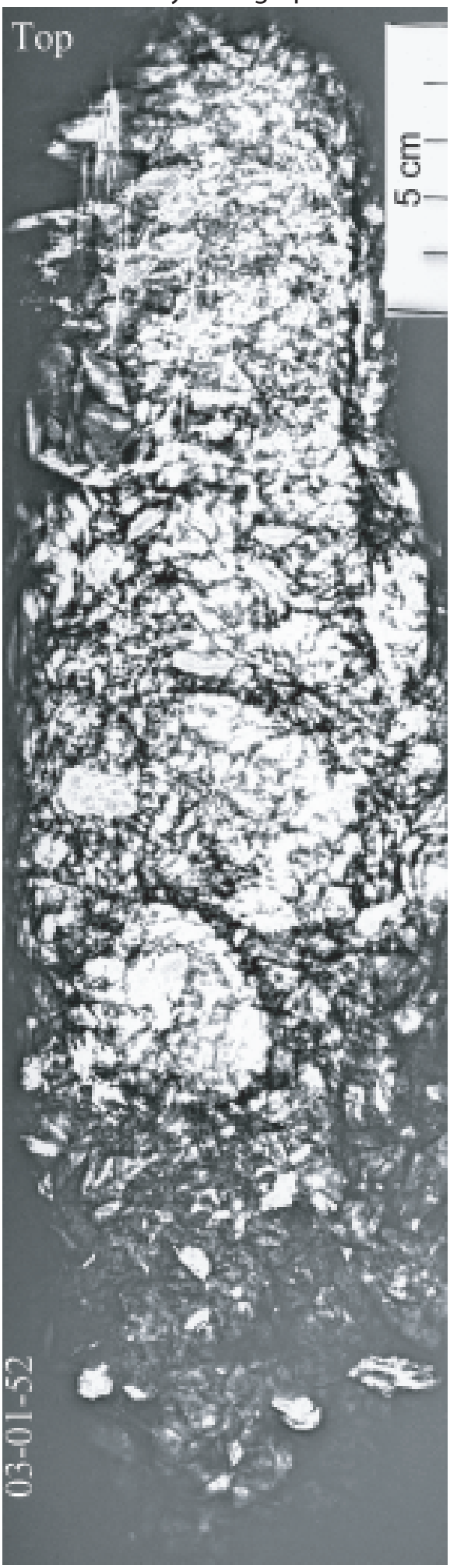
Well: Comanche 1-117CR
Sample: 03-01-51
Depth: 1169.90 - 1170.90 ft
AR Ash: 36.68%

Coal, shaley, with burrows and shale lenses

Zone with high ash content

Click here to return to stratigraphic log

X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-52
Depth:1170.90 - 1171.50 ft
AR Ash: 63.81%

Carbonaceous shale, broken pieces

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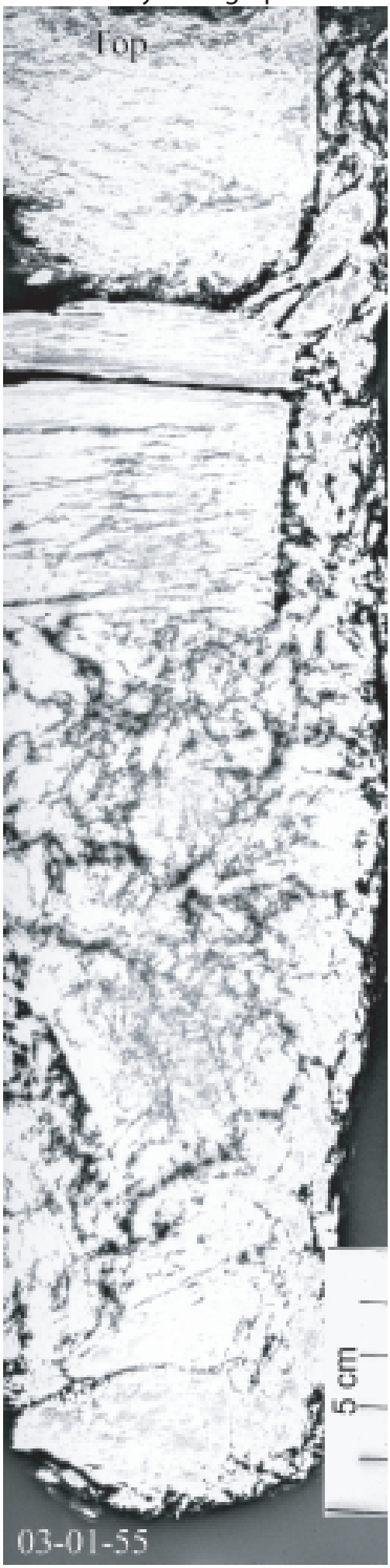
X-ray radiograph

Well: Comanche 1-117CR
Sample: 03-01-57
Depth:1173.60 - 1174.60 ft
AR Ash: 81.28%

Carbonaceous shale, broken pieces

Click here to return to stratigraphic log

X-ray radiograph

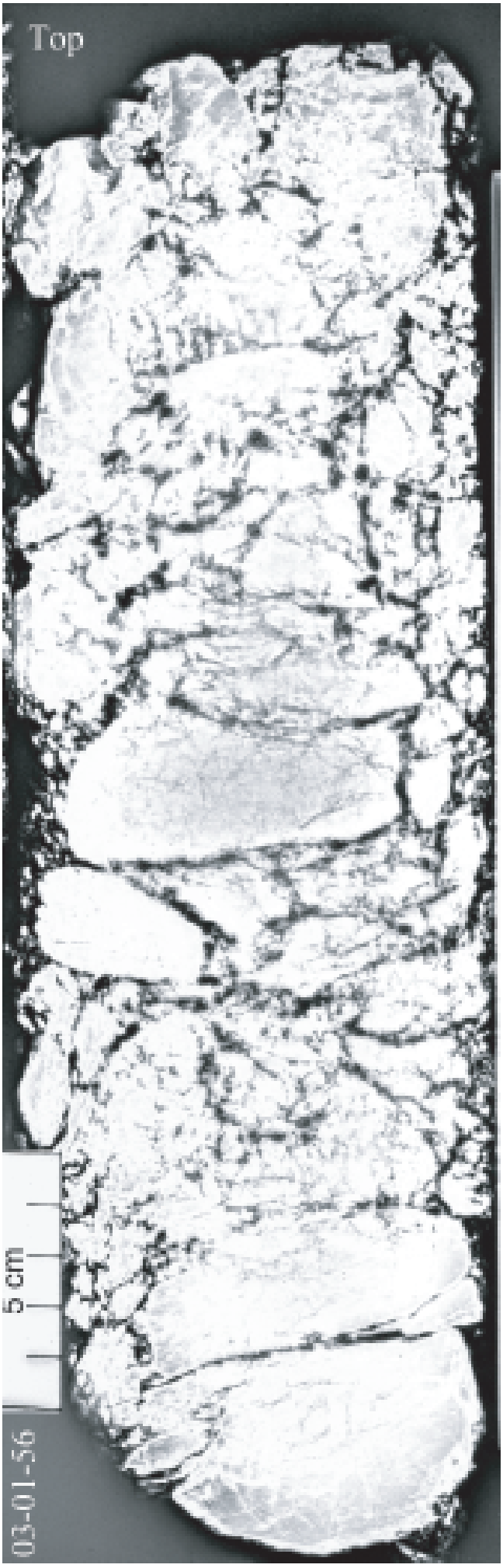


Well: Comanche 1-117CR
Sample: 03-01-55
Depth:1174.70 - 1175.70 ft
AR Ash: 71.61%

Carbonaceous shale with burrows and coaly lenses

Click here to return to stratigraphic log

X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-56
Depth:1175.70 - 1176.80 ft
AR Ash: 82.69%

Carbonaceous shale, broken pieces

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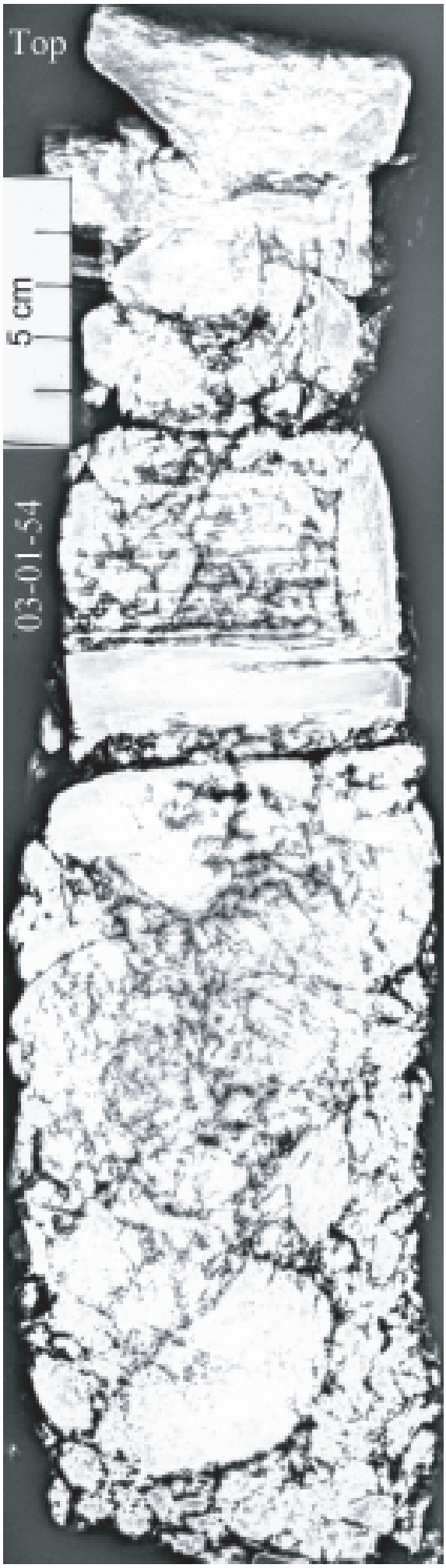
X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-54
Depth:1181.20 - 1182.20 ft
AR Ash: not available

Carbonaceous shale,
broken pieces

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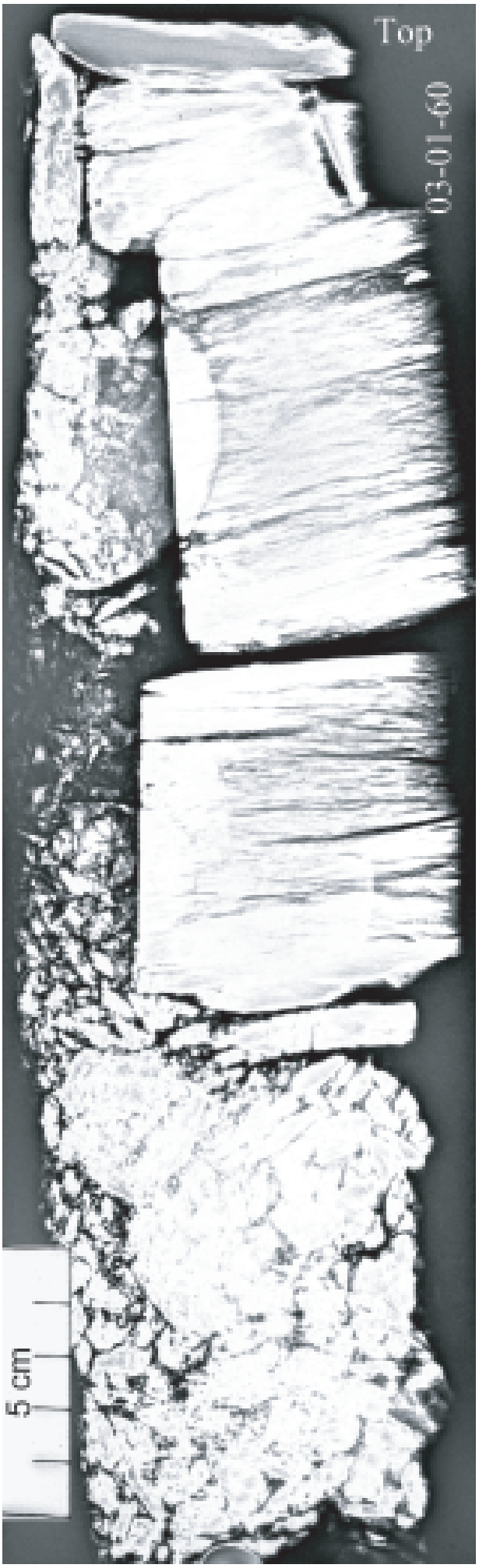
X-ray radiograph



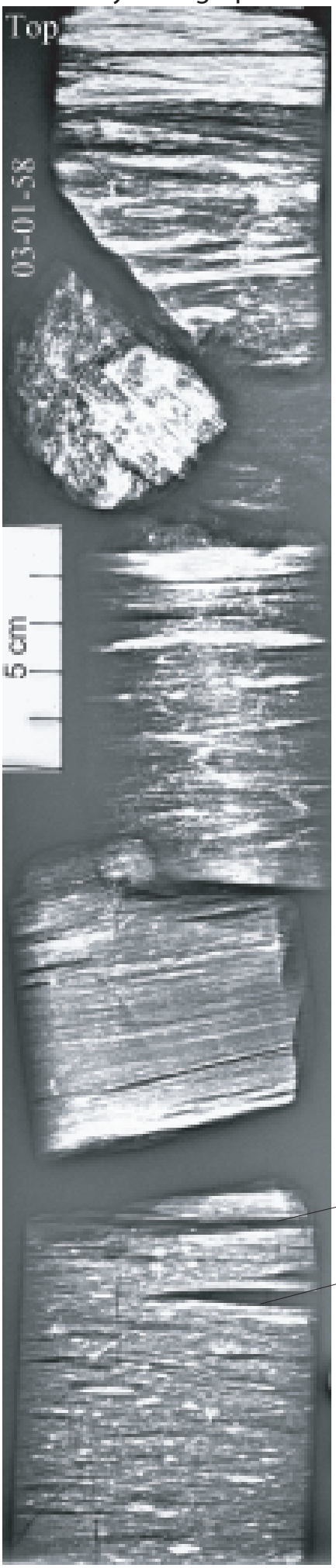
Well: Comanche 1-117CR
Sample: 03-01-60
Depth:1184.50 - 1185.50 ft
AR Ash: 69.53%

Carbonaceous shale with coaly lenses

Carbonaceous shale, broken pieces

Click here to return to stratigraphic log

X-ray radiograph



Well: Comanche 1-117CR
Sample: 03-01-58
Depth:1189.80 - 1190.80 ft
AR Ash: 16.37%

Coal with shale lenses

Coal with horizontal and vertical burrows

Coal, laminated with horizontal burrows

Woody lenses - compressed root? cross-sections

Coal with horizontal burrows and vertical cleat development

Click here to return to stratigraphic log

X-ray radiograph

Well: Comanche 1-117CR
Sample: 03-01-59
Depth:1190.80 - 1191.80 ft
AR Ash: 38.01%

Coal with shale lenses and burrows

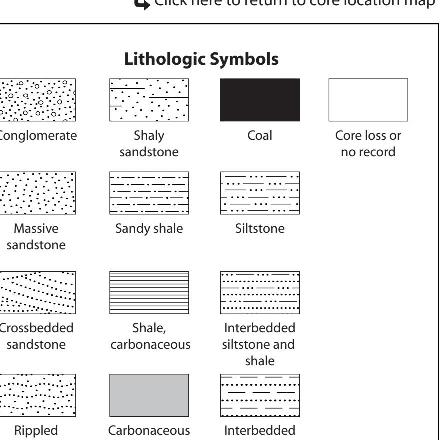
Carbonaceoous shale with coaly lenses

Click here to return to stratigraphic log

Click here to return to core location map

Borehole:	TXCO/USGS 1-613CR Comanche Ranch
Company or Agency:	TXCO The Exploration Company/U.S. Geological Survey
Location:	Comanche Ranch, Maverick County, TX
Coordinates:	28°36.294 N, 100°09.927 W (GPS)
Ground Elevation:	721 ± 25 ft. (GPS)
Coring Depth:	1390-1525.7' (135.7')
Total Borehole Depth:	1649.6'
Driller:	A. Clark, U.S. Geological Survey
Drill Rig:	Truck-mounted mobile drill rig
Drilling Method:	Continuous wireline coring, 10 ft spring loaded push tube with shoe
Bit type:	Tungsten-carbide/diamond HC 4.75" OD, 3" ID core
Drilling Medium:	Bentonite mud
Casing:	None (PVC to 6ft)
Geophysical Logs:	Natural gamma, caliper, gamma-gamma density, conductivity, resistivity
Dates Drilled:	4/28/01-5/6/01
Rock Descriptions by:	J.SanFilipo, R. Hook, P. Warwick
Stratigraphic Log Scale:	1 inch = 2.50 feet

Lithologic Symbols



* located to the left of the stratigraphic column indicates lithologic symbol for interval modified from "coal" to "carbonaceous shale" based on as-recieved ash yield >50 percent

Click on located in the stratigraphic descriptions for x-ray radiographs of coal/carbonaceous shale samples

Click on located adjacent to the stratigraphic descriptions for core photos

Description	Thickness (Cumulative Depth), in feet
Shale, dark grey, silty, carbonaceous flecks; interbedded with sandstone, very fine-grained, plant debris, burrows	1.00 (1391.00)
Core loss	1.05 (1392.05)
Shale, dark grey, silty, bioturbated; with sandstone stringers, fine-grained	1.20 (1393.25)
Sandstone, light grey, fine-grained to very fine-grained, low-angle cross-bedding, moderately calcareous	0.50 (1393.75)
Shale, dark grey, carbonaceous flecks; interbedded with sandstone, light grey, very fine-grained, burrows, repeated sets of fining-up sequences	1.30 (1395.05)
Sandstone, light grey, very fine-grained, massive	0.40 (1395.45)
Conglomerate, grey, pebbles; with shale rip-ups in fine-grained matrix	0.20 (1395.65)
Shale, dark grey, silty; interbedded with sandstone	0.55 (1396.20)
Sandstone, grey, fine-grained, burrows; cross-bedded and slightly calcareous towards base	2.80 (1399.05)
Siltstone, olive-grey, shaley, roots, burrows, carbonaceous streaks, plant debris; fault (?) at 1398.00', slickensides	3.60 (1402.65)
Coal, black, banded; visible gas bubbling on wetted core surface, not sampled	0.20 (1402.75)
Shale, medium to dark grey, carbonaceous, with pyrite; visible gas bubbling on wetted core surface; sampled for gas desorption (sample #03-01-19, 1402.90'-1403.90')	5.95(1409.90)
Coal, broken; sampled for gas desorption (sample #03-01-20, 1410.00'-1411.00' ; sample #03-01-21, 1411.00'-1412.05')	1.15 (1412.05)
Sandstone, medium grey, very fine-grained, silty, carbonaceous laminae	1.30 (1413.35)
Shale, dark grey, carbonaceous debris; possible 45° compressional faults towards base	0.90 (1414.25)
Core loss	0.25 (1414.50)
Coal; sampled for gas desorption (sample #03-01-22, 1414.50'-1415.30')	0.80 (1415.30)
Siltstone, medium grey, sandy; repeated fining-up sequences, numerous 45-60° faults	4.05 (1419.35)
Core loss	0.55 (1419.90)
Siltstone, dark grey, numerous burrows, fines up; 45° faults at 1420.90' and 1421.80'	2.70 (1422.60)
Sandstone, grey, very fine grained, burrows; with flat shale streaks near base	3.15 (1425.75)
Shale, dark grey, silty, carbonaceous; interbedded with sandstone, light grey, very fine grained, coarsens upwards; 45° fault at 1425.35'	0.60 (1426.35)
Conglomerate, grey, angular shale clasts in matrix of sandstone, very fine grained, calcareous	0.45 (1426.80)
Shale, light to dark grey, silty, carbonaceous; interbedded with sandstone, very fine grained, burrows	3.15(1429.95)
Sandstone, grey, fine to very fine grained, few burrows; with flat shale streaks near top	7.05 (1437.00)
Conglomerate, grey, angular coal spars and stringers in matrix of sandstone, fine to medium grained	0.20 (1437.20)
Sandstone, grey, very fine grained, shaley, carbonaceous streaks	0.20 (1437.40)
Shale, black, carbonaceous; sampled for gas desorbtion (sample #03-01-23, 1429.15-1429.95')	0.25(1437.65)
Core loss	0.20 (1438.65)
Coal, black, dull, banded, vitrain streaks; not sampled	0.35 (1439.00)
Core loss	0.70 (1439.70)
Siltstone, light to dark grey, roots	1.50 (1441.20)
Sandstone, grey, fine to very fine grained, flat shale streaks, burrows	1.60 (1442.80)
Coal; sampled for gas desorption (sample #03-01-25, 1442.80-1443.55' ; sample #03-01-24, 1443.55-1444.55')	1.75 (1444.55)
Siltstone, light to dark grey, shaley, roots, burrows; 45° fault at 1445.7	3.40 (1447.95)
Shale, dark grey, carbonaceous; possible 45° fault ?	0.25 (1448.20)
Siltstone, dark grey, roots, burrows	0.40 (1448.60)
Sandstone, grey, fine grained, rippled bedding; with shale streaks	1.50 (1450.10)
Siltstone, dark grey, roots, burrows, coarsens up	2.10 (1452.2)
Coal; sampled for gas desorption (sample #03-01-28, 1452.20-1453.10' ; sample #03-01-27, 1453.10-1454.10' ; sample #03-01-26, 1454.10-1455.10')	2.90 (1455.1)
Core loss	2.45 (1457.55)
Sandstone, grey, fine to very fine grained, flat shale streaks, burrows	1.40 (1459.40)
Shale, dark grey, silty, carbonaceous; interbedded with sandstone, very fine grained, burrows	1.40 (1460.80)
Siltstone, dark grey, burrows, carbonaceous, coarsens upward	0.50 (1461.30)
Shale, black, carbonaceous, vitrain streaks, pyrite flecks	0.50 (1461.80)
Core loss	0.15 (1461.95)
Shale, black, carbonaceous, vitrain streaks, pyrite flecks	0.20 (1462.15)
Sandstone, grey, fine to very fine grained, flat shale streaks, burrows, plant debris	1.85 (1464.00)
Shale, dark grey to black, silty, carbonaceous; interbedded with sandstone, very fine-grained, plant debris, burrows, coarsens upward	0.35 (1464.35)
Shale, dark grey, carbonaceous, vitrain streaks, pyrite	1.50 (1465.85)
Coal; sampled for gas desorption (sample #03-01-30, 1464.85-1465.85'; sample #03-01-29, 1465.85-1466.70')	0.85 (1466.70)
Siltstone, light grey to black, roots, burrows	1.85 (1468.55)
Shale, dark grey, silty; interbedded with sandstone, very fine grained, coarsens upward	1.25 (1469.8)
Core loss	0.60 (1470.40)
Coal, banded, cleated, rock streaks; not sampled	0.40 (1470.80)
Siltstone, dark grey to black, roots, burrows	1.20 (1472.00)
Shale, light grey, silty; with interbedded sandstone, very fine grained, plant debris	0.60 (1472.60)
Siltstone, dark grey, burrows, coarsens upward	0.70 (1473.3)
Sandstone, grey, fine to very fine grained, massive, carbonaceous stringers, burrows towards base	1.40 (1474.70)
Shale, dark grey, silty; interbedded with sandstone, very fine grained, burrows; 45° fault at 1477.00'	2.50 (1477.20)
Sandstone, grey, fine to very fine grained, shale streaks, burrows	2.00 (1479.20)
Sandstone, grey, fine to very fine grained, shale streaks, burrows	1.90 (1481.10)
Siltstone, dark grey, burrows	0.50 (1481.60)
Shale, dark grey, carbonaceous, sandstone streaks	0.15 (1481.75)
Coal, impure; sampled for gas desorption (sample #03-01-32, 1481.75-1482.20'; sample #03-01-31, 1482.20-1483.20')	1.45 (1483.20)
Core loss	0.35 (1483.55)
Siltstone, dark grey, shaley	0.45 (1484.00)
Sandstone, grey, very fine grained, burrows	0.55 (1484.55)
Shale, dark grey, silty, carbonaceous streaks; interbedded with flat and rippled sandstone, very fine grained, burrows	5.80 (1490.35)
Shale, dark grey, carbonaceous, pyrite flecks, some burrows	0.20 (1490.55)
Core loss	1.00 (1491.55)
Coal; sampled for gas desorption (sample #03-01-33, 1491.55-1492.40')	0.85 (1492.40)
Shale, dark grey, carbonaceous, vitrain bands	0.55 (1492.95)
Sandstone, grey, very fine grained, roots	1.00 (1493.95)
Sandstone, grey, very fine grained, carbonaceous shale streaks, burrows	1.05 (1495.00)
Shale, dark grey, silty, with sandstone stringers; 45° fault at 1495.25'	0.55 (1495.55)
Coal, banded; not sampled	0.15 (1495.70)
Shale, dark grey, carbonaceous	0.40 (1496.10)
Sandstone, grey, very fine grained, roots, fines upward	0.55 (1496.65)
Sandstone, grey, very fine grained, shale streaks, plastically deformed towards base	2.10 (1498.75)
Shale, dark gray, silty; interbedded with sandstone stringers, burrows; calcareous towards base	1.35 (1500.10)
Coal, impure; sampled for gas desorption (sample #03-01-36, 1500.10-1500.65')	0.55 (1500.65)
Shale, black, carbonaceous, vitrain streaks	0.15 (1500.80)
Siltstone, light grey, burrows, fines upward	0.35 (1501.15)
Sandstone, grey, very fine grained, flat shale streaks, burrows, plant debris, coarsens upwards	1.65 (1502.80)
Shale, dark grey, silty; interbedded with sandstone, very fine grained, burrows	0.45 (1503.25)
Shale, black, carbonaceous, plant debris	0.40 (1503.65)
Coal, impure; sampled for gas desorption (sample #03-01-35, 1503.65-1504.65')	1.00 (1504.65)
Core loss	1.75 (1506.40)
Coal, impure; sampled for gas desorption (sample #03-01-34, 1506.40-1507.40')	1.00 (1507.40)
Siltstone, light to dark grey, roots, burrows	2.60 (1510.00)
Shale, dark grey, silty, with sandstone stringers, beds inclined ~20°	2.65 (1512.65)
Shale, dark grey, carbonaceous, vitrain streaks	0.10 (1512.75)
Coal, banded; sampled for gas desorption (sample #03-01-40, 1512.75-1513.75' ; sample #03-01-39, 1514.05-1514.50' ; sample #03-01-38, 1514.50-1515.50' ; sample #03-01-37, 1515.50-1516.50')	3.75 (1516.50)
Shale, dark grey to black, carbonaceous, vitrain bands	0.85 (1517.35)
Siltstone, dark grey, roots, burrows, carbonaceous towards base; 45° fault @ 1519.30'	3.00 (1520.35)
Siltstone, dark grey, rigidly deformed, vitrain streaks; interbedded with sandstone, very fine grained, plastically deformed	3.50 (1523.85)
Shale, black, carbonaceous, pyrite flecks	0.15 (1524.00)
Sandstone, light grey-green, fine to medium grained, massive, glauconitic, carbonaceous streaks	1.70 (1527.70)

Core photo intervals:
1390.00-1400.00
1400.00-1410.00
1410.00-1419.50
1419.50-1428.90
1428.90-1437.45
1437.45-1447.60
1447.60-1456.80
1456.80-1466.80
1466.80-1476.80
1476.80-1486.80
1486.80-1497.00
1497.00-1507.00
1507.70-1517.50
1517.70-1525.70

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TXCO 1-613CR
1400.00-1410.00'

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TXCO 1-613CR
1410.00-1419.15'

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TXCO 1-613CR
1419.15-1428.90'

Click here to return to stratigraphic log

TXCO 1-613CR
1428.90-1437.45'

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TXCO 1-613CR
1447.60-1456.80'

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TXCO 1-613CR
1456.80-1466.80'

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TXCO 1-613CR
1466.80-1476.80'

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TXCO 1-613CR
1476.80-1486.80'

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TXCO 1-613CR
1486.80-1497.00'

Click here to return to stratigraphic log

TXCO 1-613CR
1497.00-1507.70'

Click here to return to stratigraphic log

TXCO 1-613CR
1507.70-1517.50'

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TXCO 1-613CR
1517.50-1525.70

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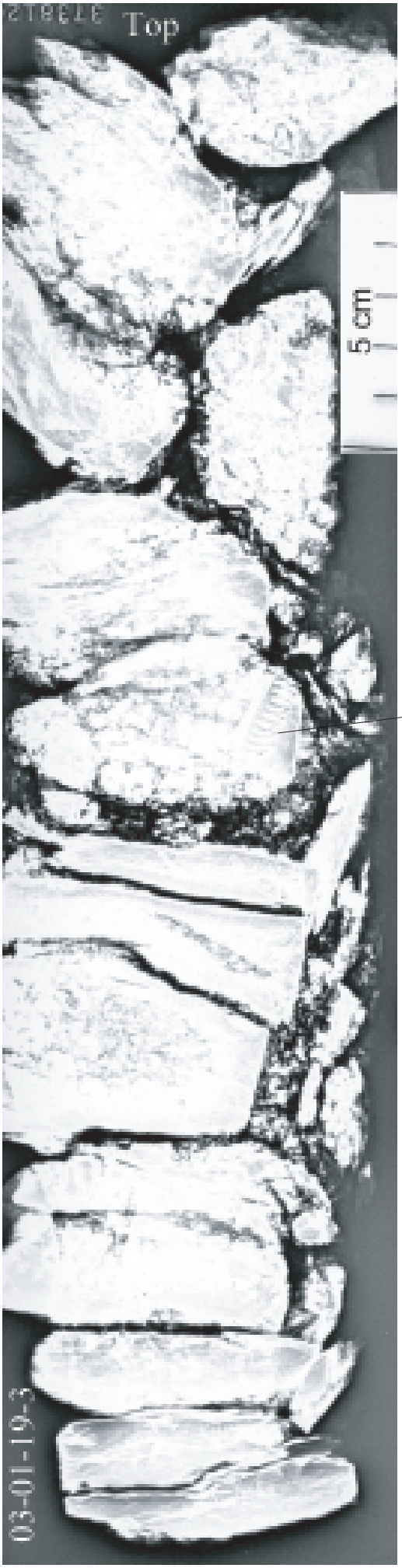
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-19
Depth:1402.90 - 1403.90 ft
AR Ash: not available

Carbonaceous shale
with coaly lenses

Transistor (not part of core)

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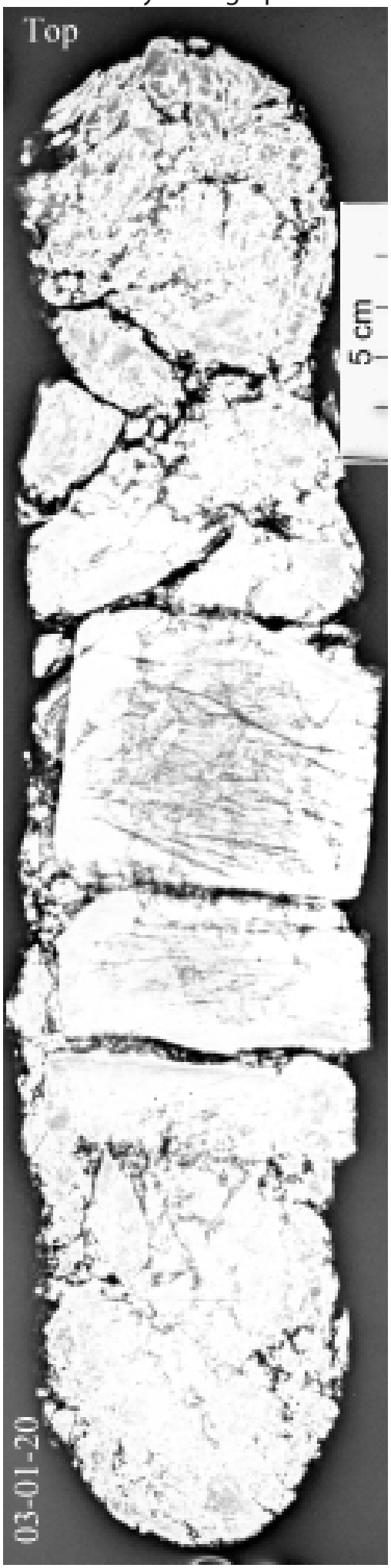
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-20
Depth:1410.00 - 1411.00 ft
AR Ash: 73.28 %

Carbonaceous shale with coaly lenses and burrows

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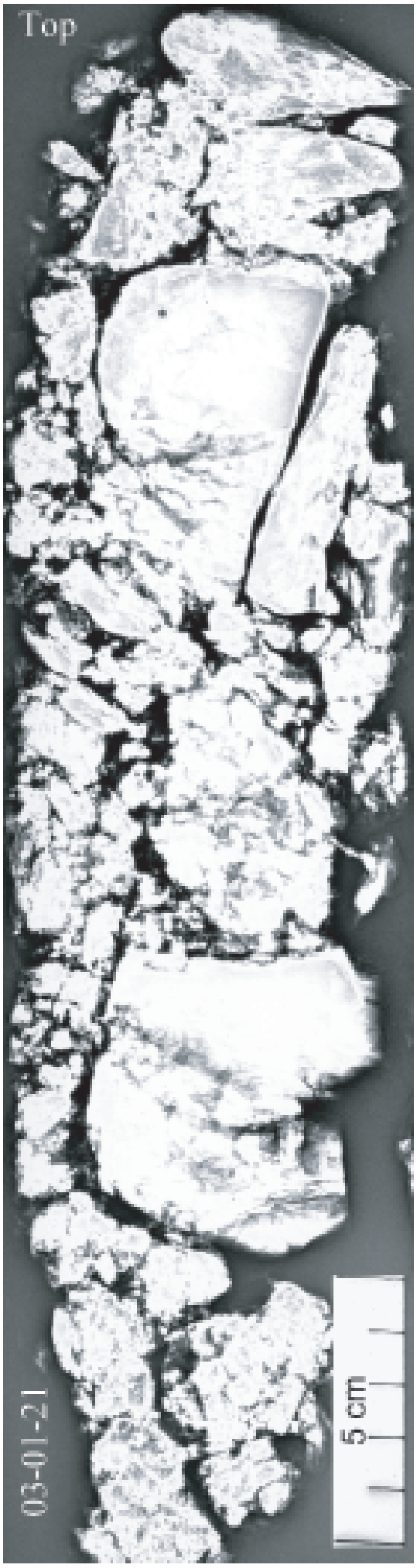
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-21
Depth:1411.00 - 1412.05 ft
AR Ash: 74.92 %

Carbonaceous shale,
broken pieces

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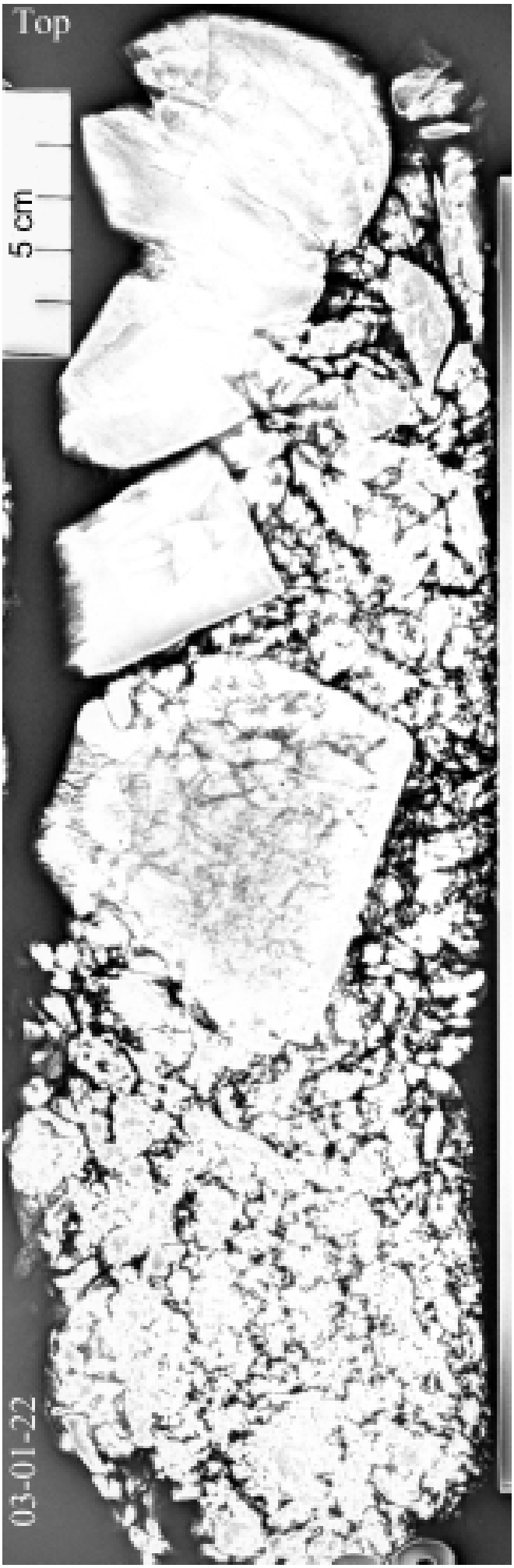
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-22
Depth:1414.50 - 1415.30 ft
AR Ash: 83.38 %

Carbonaceous shale, broken pieces

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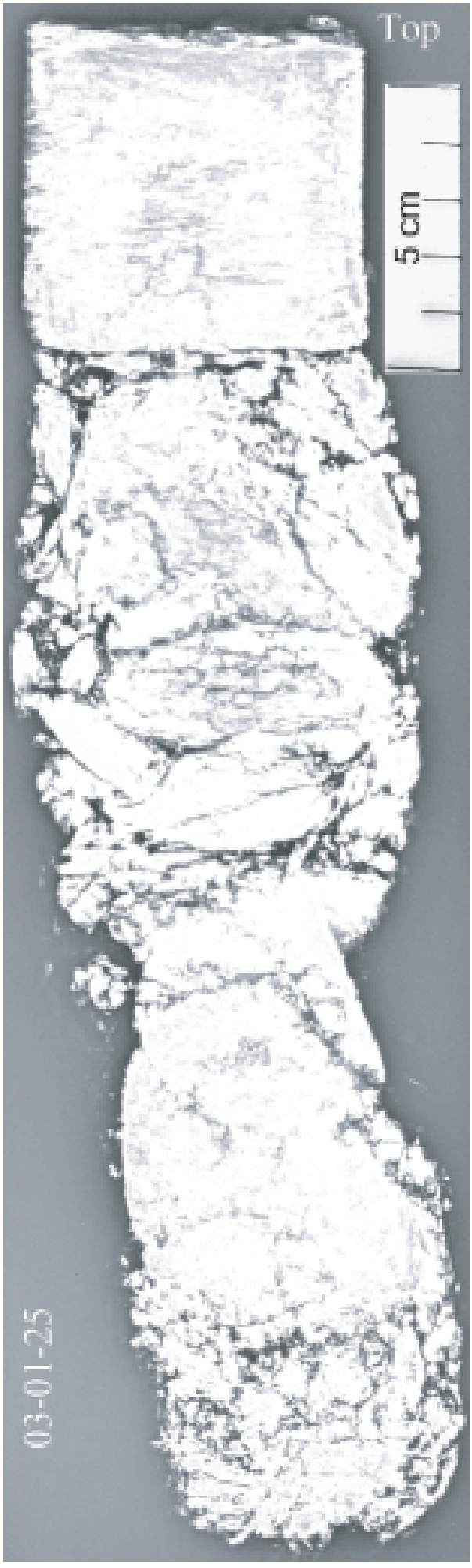
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-25
Depth: 1442.80 - 1443.55 ft
AR Ash: 64.59 %

Carbonaceous shale, broken pieces

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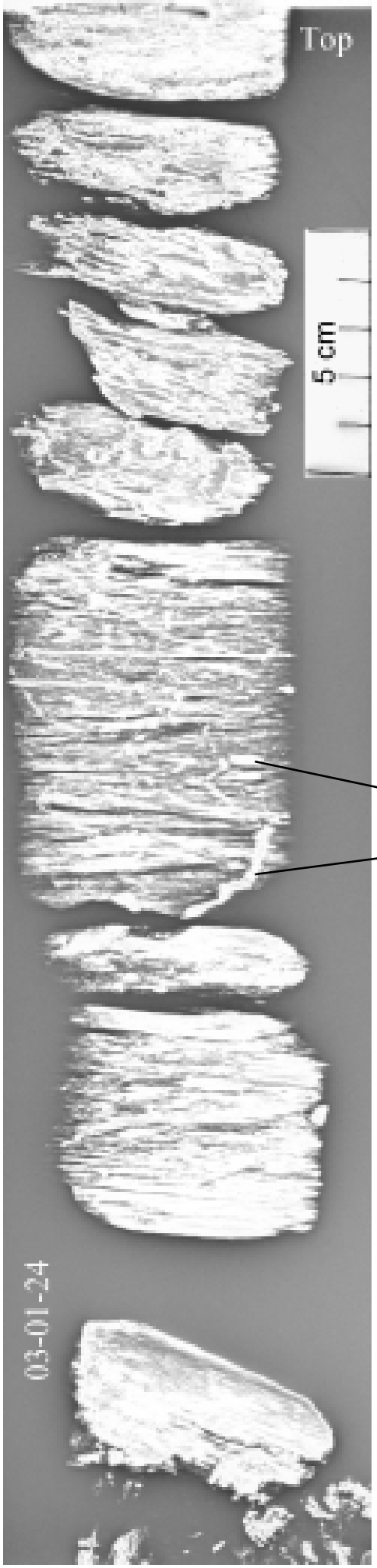
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-24
Depth: 1443.55 - 1444.55 ft
AR Ash: 41.65%

Coal with shale lenses, with many horizontal and near-vertical burrows

Burrows

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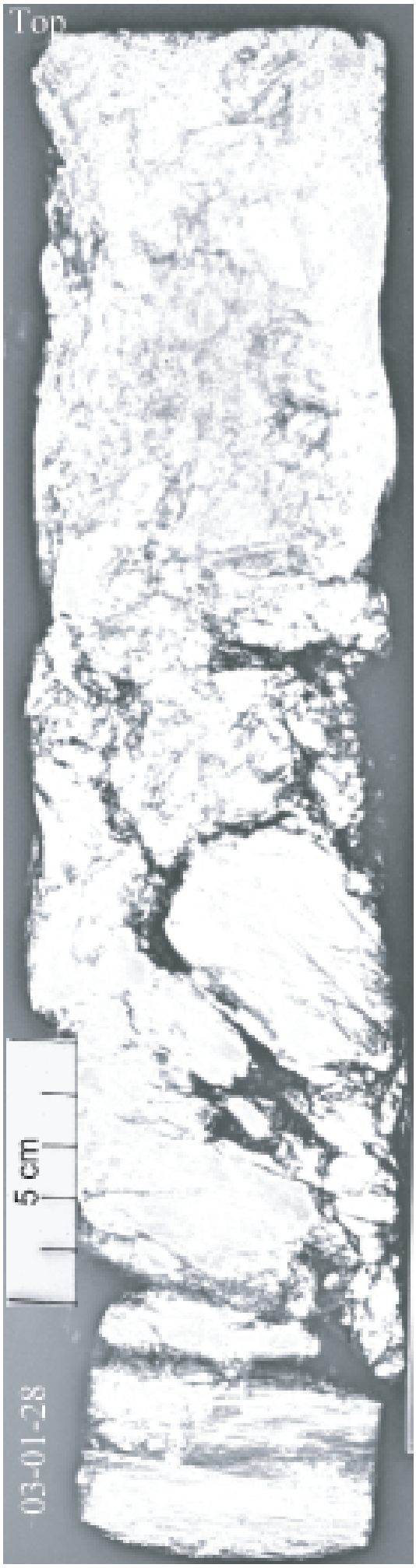
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-28
Depth:1452.20 - 1453.10 ft
AR Ash: 60.12 %

Carbonaceous shale,
broken pieces

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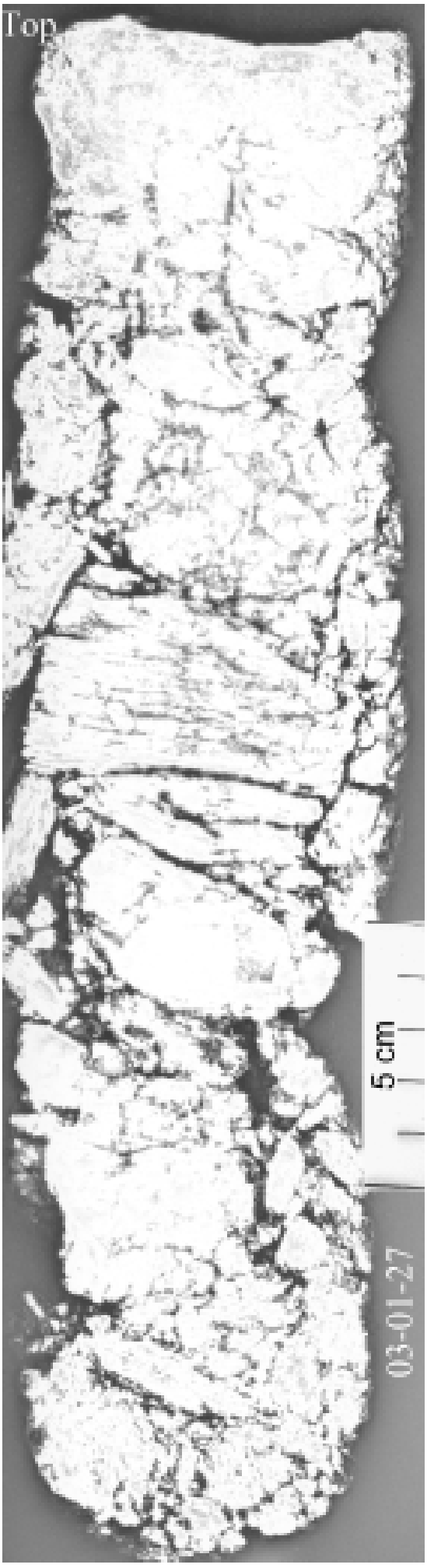
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-27
Depth:1453.10 - 1454.10 ft
AR Ash: 68.57 %

Carbonaceous shale, broken pieces

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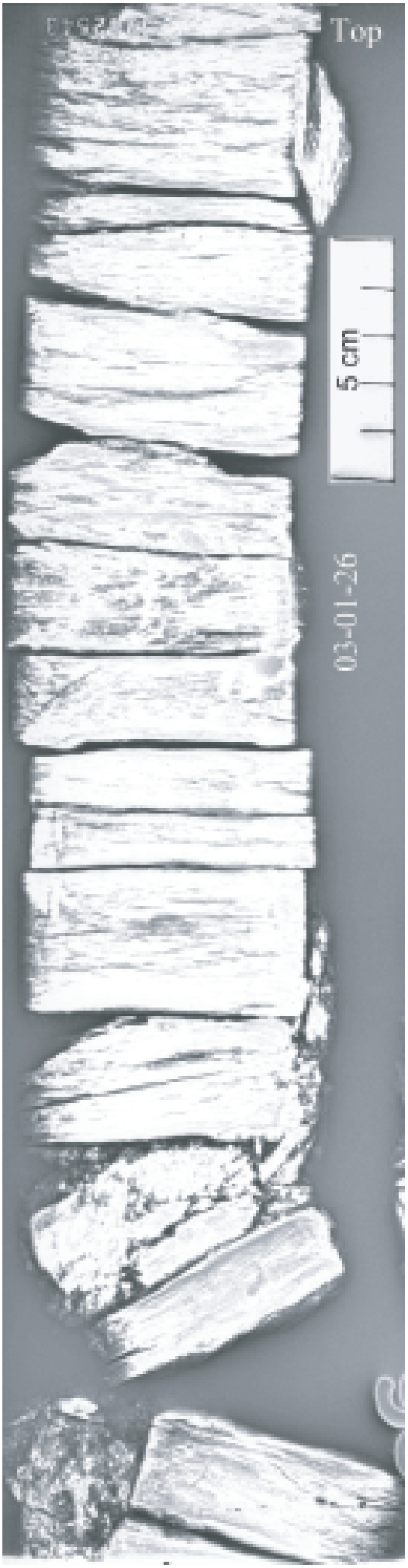
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-26
Depth:1454.10 - 1455.10 ft
AR Ash: 50.48 %

Carbonaceous shale, with coaly lenses and burrows

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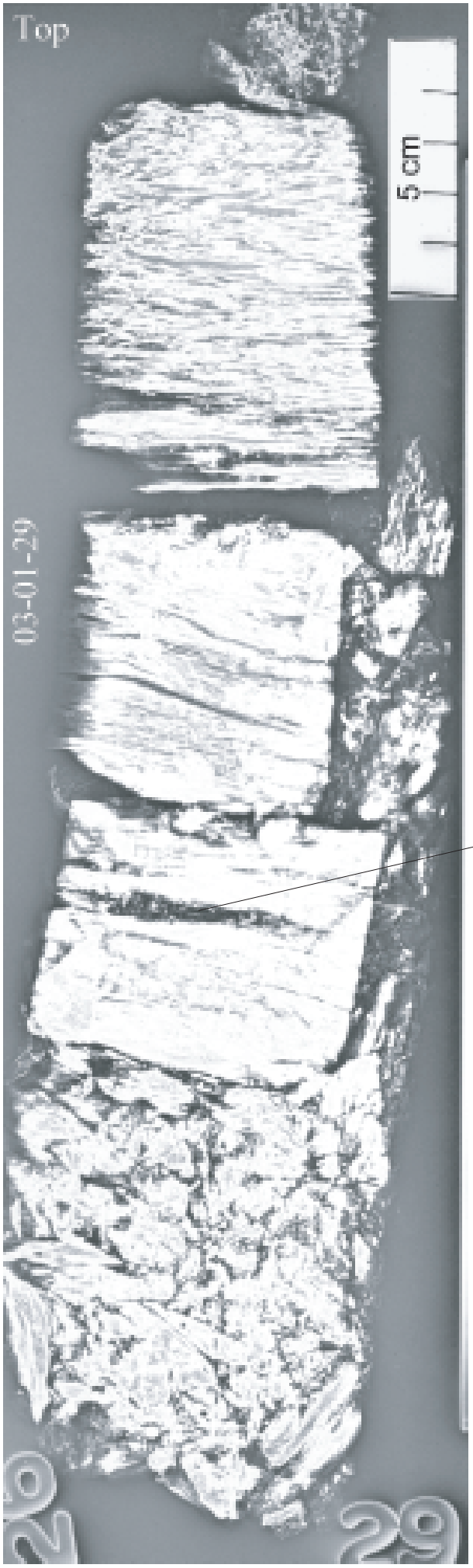
X-ray radiograph



Well: Comanche 1-613
Sample: 03-01-29
Depth: 1465.85 - 1466.70 ft
AR Ash: 42.82 %

Carbonaceous shale, with coaly lenses and burrows

Compressed woody lens, root?

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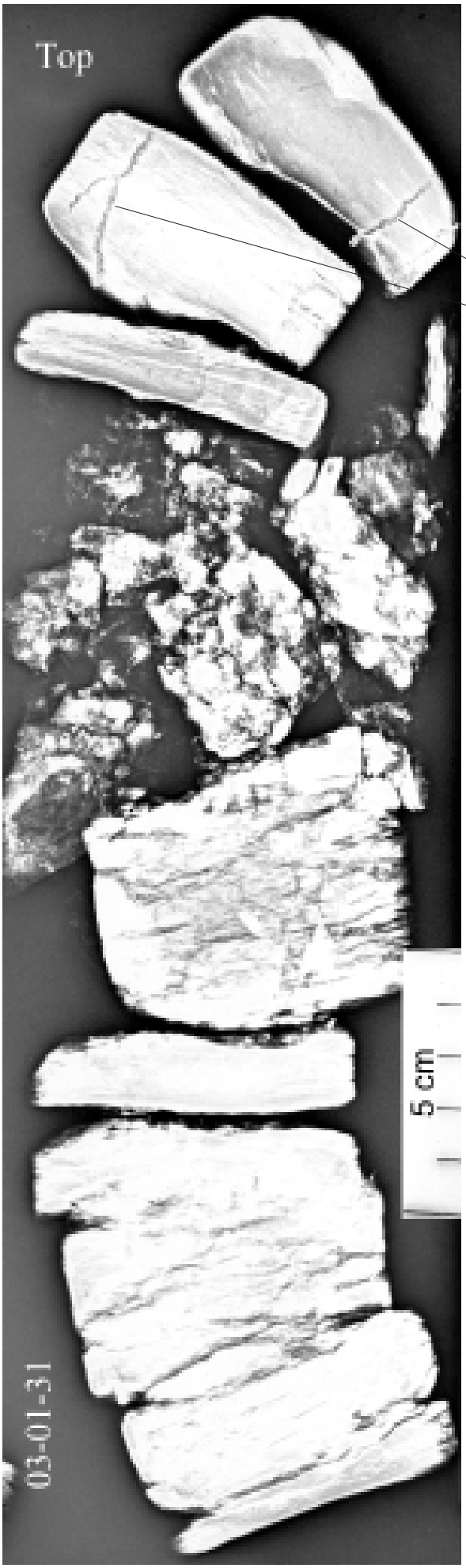
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-31
Depth: 1482.20 - 1483.20 ft
AR Ash: 65.69 %

Burrows, or roots (?)

Carbonaceous shale, with coaly lenses and burrows, broken pieces

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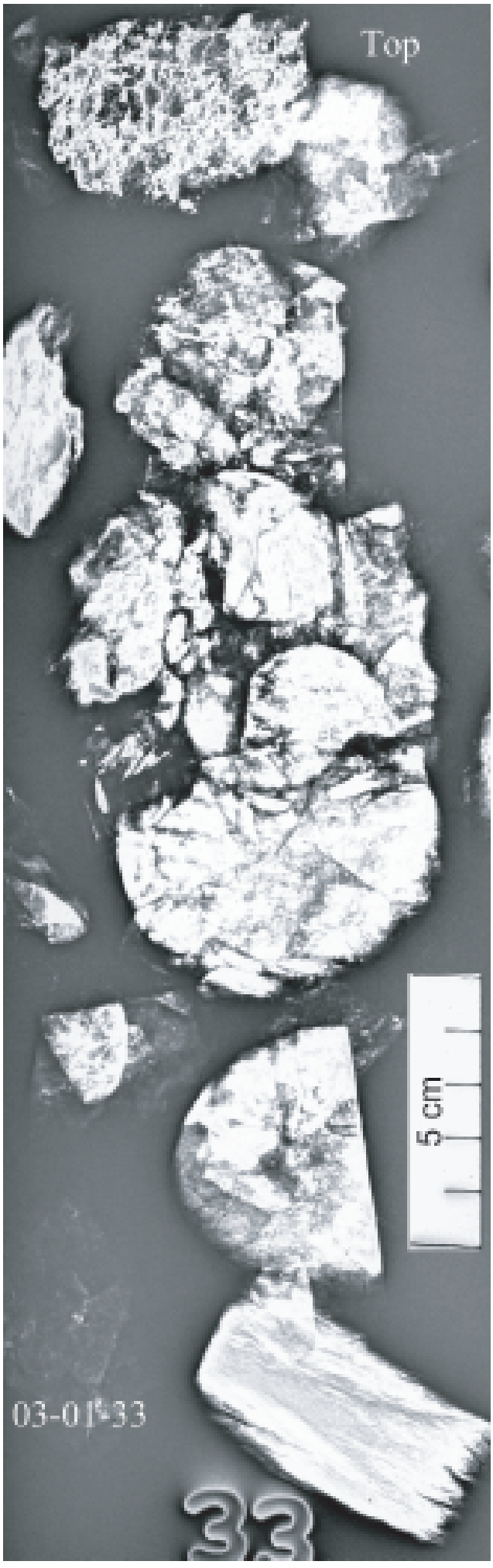
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-33
Depth: 1491.55 - 1492.40 ft
AR Ash: 39.83 %

Carbonaceous shale, with coaly lenses and burrows, broken pieces

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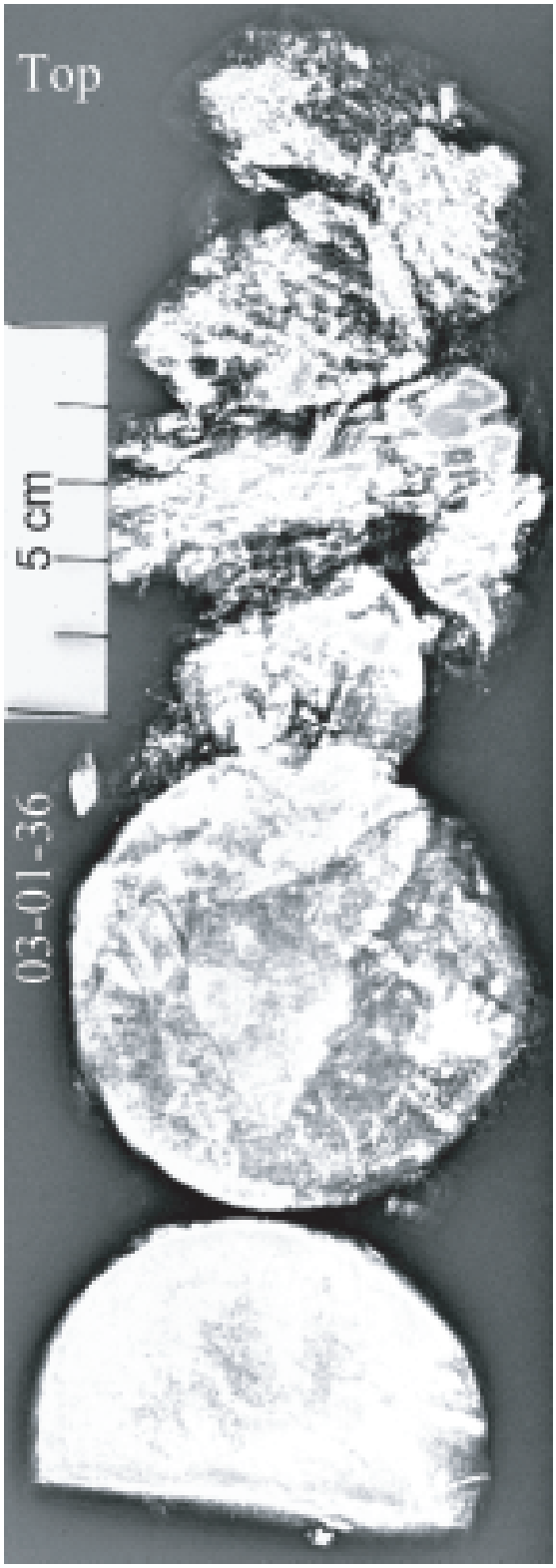
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-36
Depth:1500.10 - 1500.65 ft
AR Ash: 50.69 %

Carbonaceous shale, broken pieces with coaly lenses and burrows

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X-ray radiograph

Well: Comanche 1-613CR
Sample: 03-01-35
Depth:1503.65 - 1504.65 ft
AR Ash: 63.94 %

Carbonaceous shale, broken pieces with coaly lenses and burrows

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X-ray radiograph

Well: Comanche 1-613CR
Sample: 03-01-34
Depth: 1506.40 - 1507.40 ft
AR Ash: 61.77 %

Carbonaceous shale, broken pieces with coaly lenses and burrows

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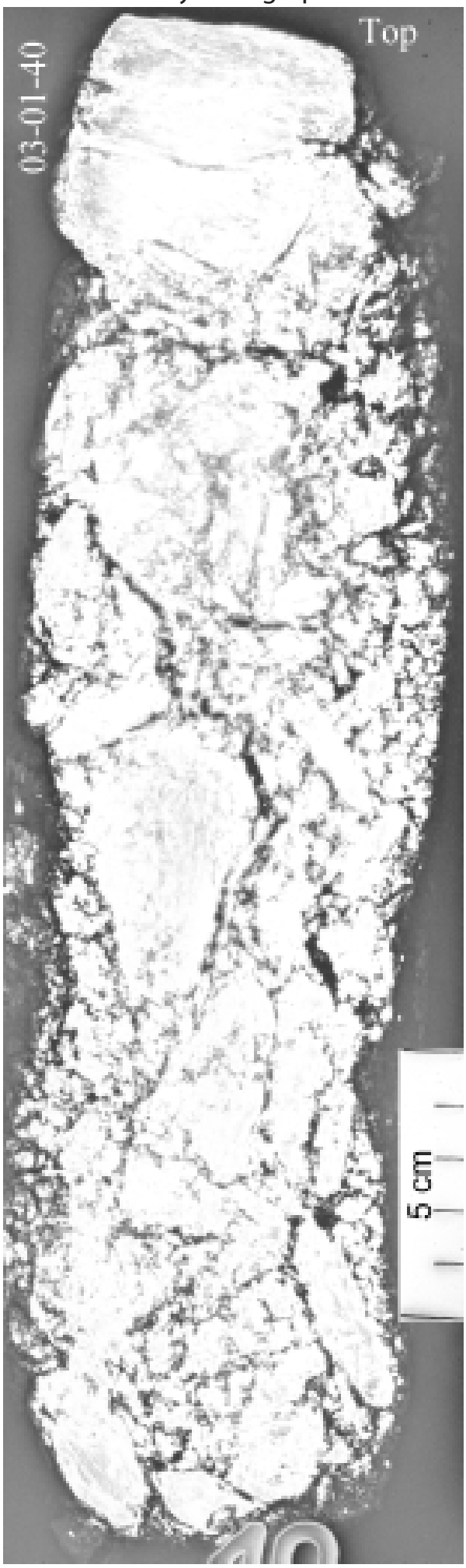
X-ray radiograph



Well: Comanche 1-613
Sample: 03-01-40
Depth:1512.78 - 1513.75 ft
AR Ash: 64.24 %

Carbonaceous shale,
broken pieces

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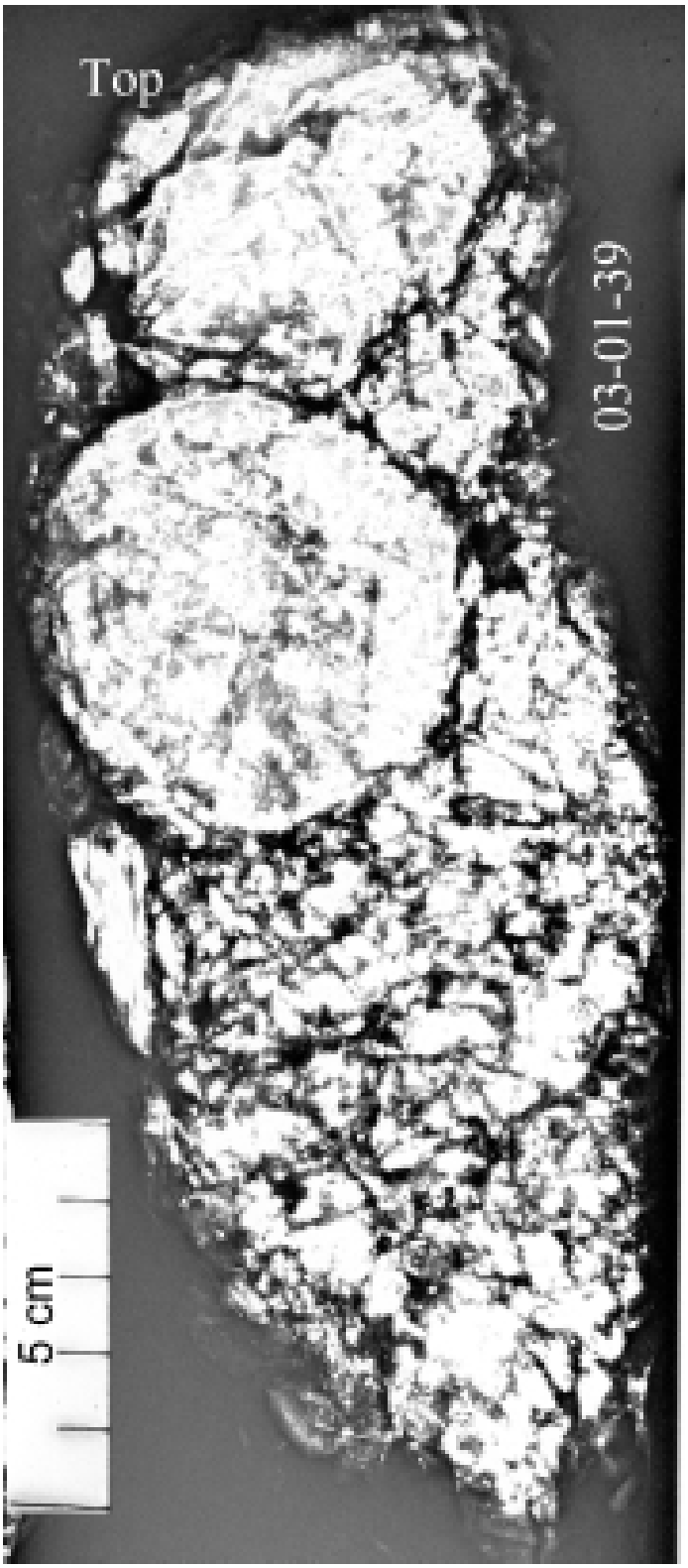
X-ray radiograph



Well: Comanche 1-613CR
Sample: 03-01-39
Depth:1514.05 - 1514.50 ft
AR Ash: 48.77 %

Carbonaceous shale, broken pieces

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X-ray radiograph

Well: Comanche 1-613CR
Sample: 03-01-38
Depth:1514.50 - 1515.50 ft
AR Ash: 72.31 %

Carbonaceous shale,
broken pieces

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X-ray radiograph

Well: Comanche 1-613CR
Sample: 03-01-37
Depth:1515.50 - 1516.50 ft
AR Ash: 68.66 %

Carbonaceous shale,
some coaly lenses

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