

UNITED STATES DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

COMPOSITE GEOPHYSICAL AND LITHOLOGIC LOGS AND COAL ANALYSES
FOR CORE-HOLE DRILLING IN THE KAIPAROWITS COAL FIELD,
GARFIELD COUNTY, UTAH

By

H. D. Zeller



Open-File Report 79-1529

1979

This report has not been edited for conformity
with U.S. Geological Survey editorial standards
or stratigraphic nomenclature.

CONTENTS

	Page
INTRODUCTION-----	1
DRILL-HOLE LOGS-----	2
COAL-ANALYSIS REPORT-----	5

CONVERSION TABLE

To convert ENGLISH UNITS	Multiply by	To obtain METRIC UNITS
Feet	0.3048	Meters
Miles	1.609	Kilometers

COMPOSITE GEOPHYSICAL AND LITHOLOGIC LOGS AND COAL ANALYSES FOR CORE-HOLE





DRILLING IN THE KAIPAROWITS COAL FIELD, GARFIELD COUNTY, UTAH

By H. D. Zeller

INTRODUCTION

Core-hole K-1-DR and offset hole K-1A-DR were drilled in the Kaiparowits coal field, Garfield County, Utah, for the U.S. Geological Survey in September 1978. Drilling was done by Himes Drilling Company, Grand Junction, Colo., under contract no. 14-08-0001-17342, awarded by the USGS. The holes were drilled about 18 miles southwest of Escalante, Utah, on Mossy Dell Ridge in the Death Ridge quadrangle. Coal beds cored are in the John Henry Member of the Straight Cliffs Formation of Late Cretaceous age. Hole K-1-DR was cored from 280 to 700 feet into the top of the Christensen coal bed. Because of drilling problems, it was necessary to drill an offset hole, K-1A-DR, immediately south of the first hole. This offset hole was plug-bit drilled to 680 feet and then cored through the Christensen coal zone to 804 feet. Coal zones penetrated were the Alvey, Rees, and Christensen, and core recovery was almost 100 percent in the coal beds. Natural gamma and gamma gamma density logs were run through the casing from 0 to 670 feet because of caving problems and only the resistivity log could be run on the remainder of the hole in the Christensen coal zone. All coal analyses were done by the Department of Energy laboratories in Pittsburgh, Pa.

Rock lithologies are identified on strip logs as follows:

	Siltstone
	Sandstone
	Shale
	Coal

DRILL-HOLE LOGS

Hole no. K-1-DR-K-1A-DR Date logged July 29, 1978 Surface elevation (ft) 7,360
(composite)

Loc.: State Utah Cty. Garfield T. 37 S., R. 2 E., Sec. 8 ; 2,000 FEL, 700 FSL

Drilled depth (ft) 804 Logged depth (ft) 800 Water level (ft) 666

Drilling fluid: ☐ Air ☒ Water ☐ Foam ☐ Mud

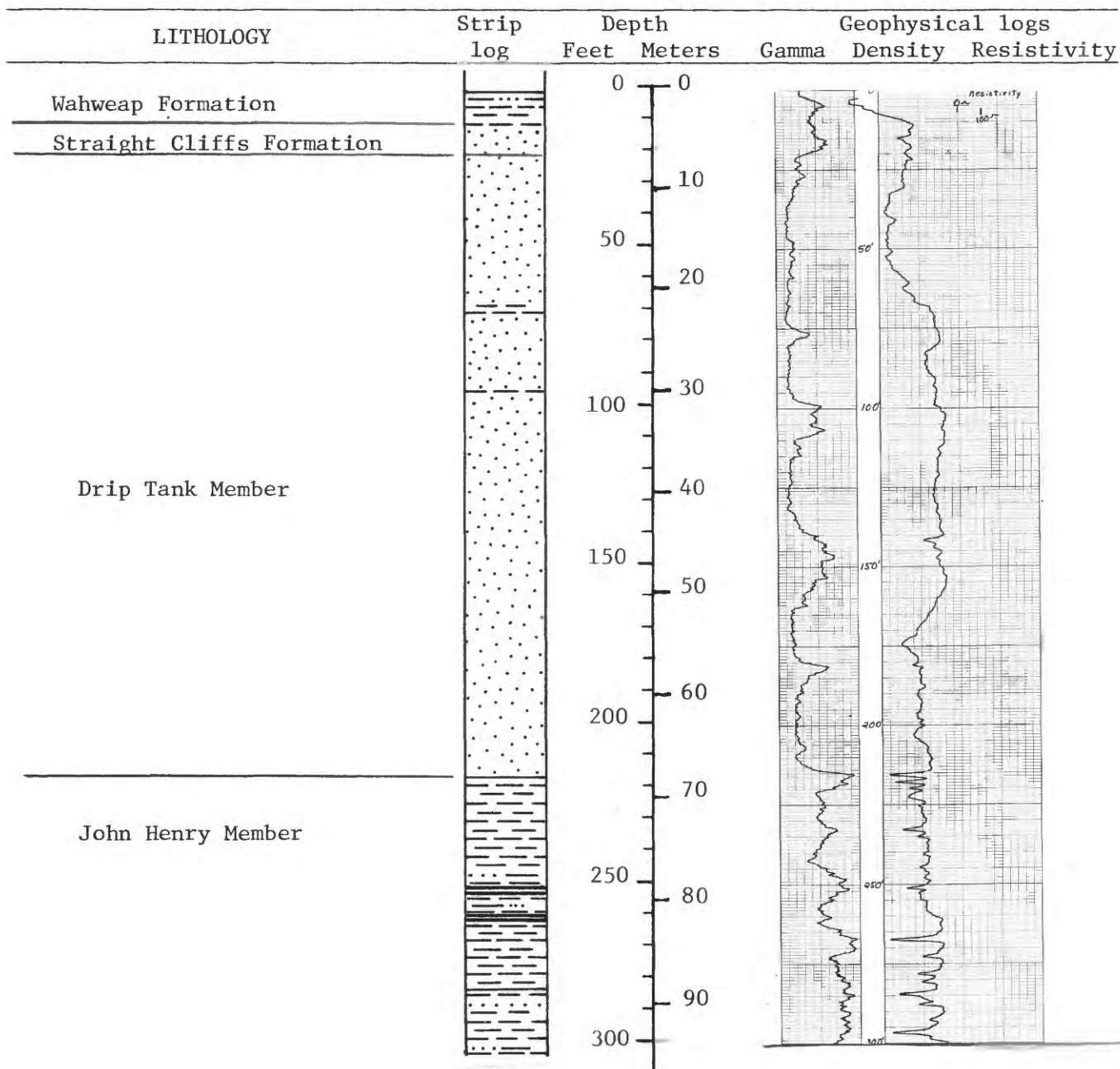
Geophysical logs: (Casing to 672 ft)

Spontaneous potential: Scale none Logging speed _____ ft/min

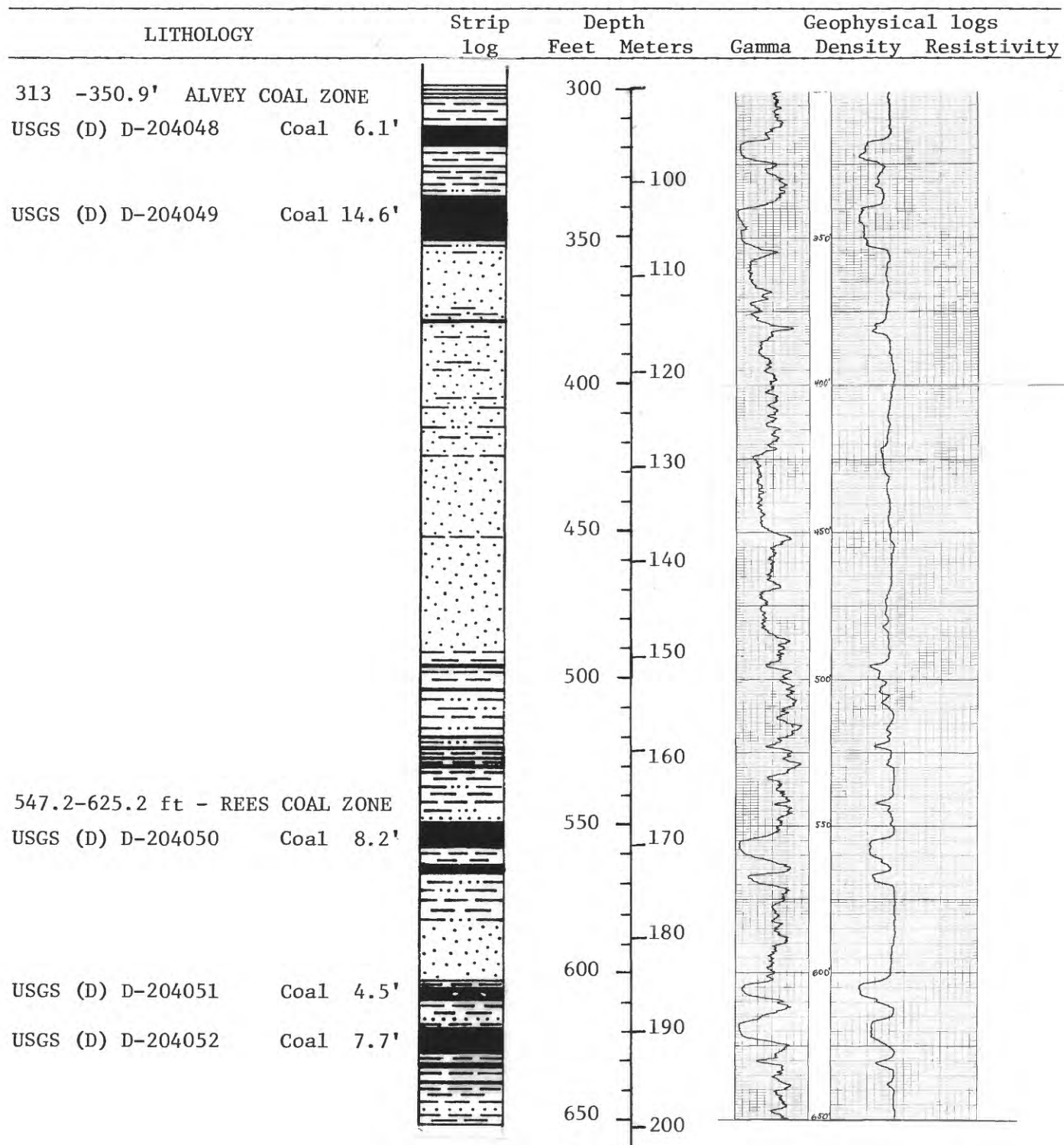
Resistivity: Scale 10 ft = 1 in. Logging speed 20 ft/min

Gamma: T.C. 16.6 cps Scale 10 ft = 1 in. Logging speed 20 ft/min

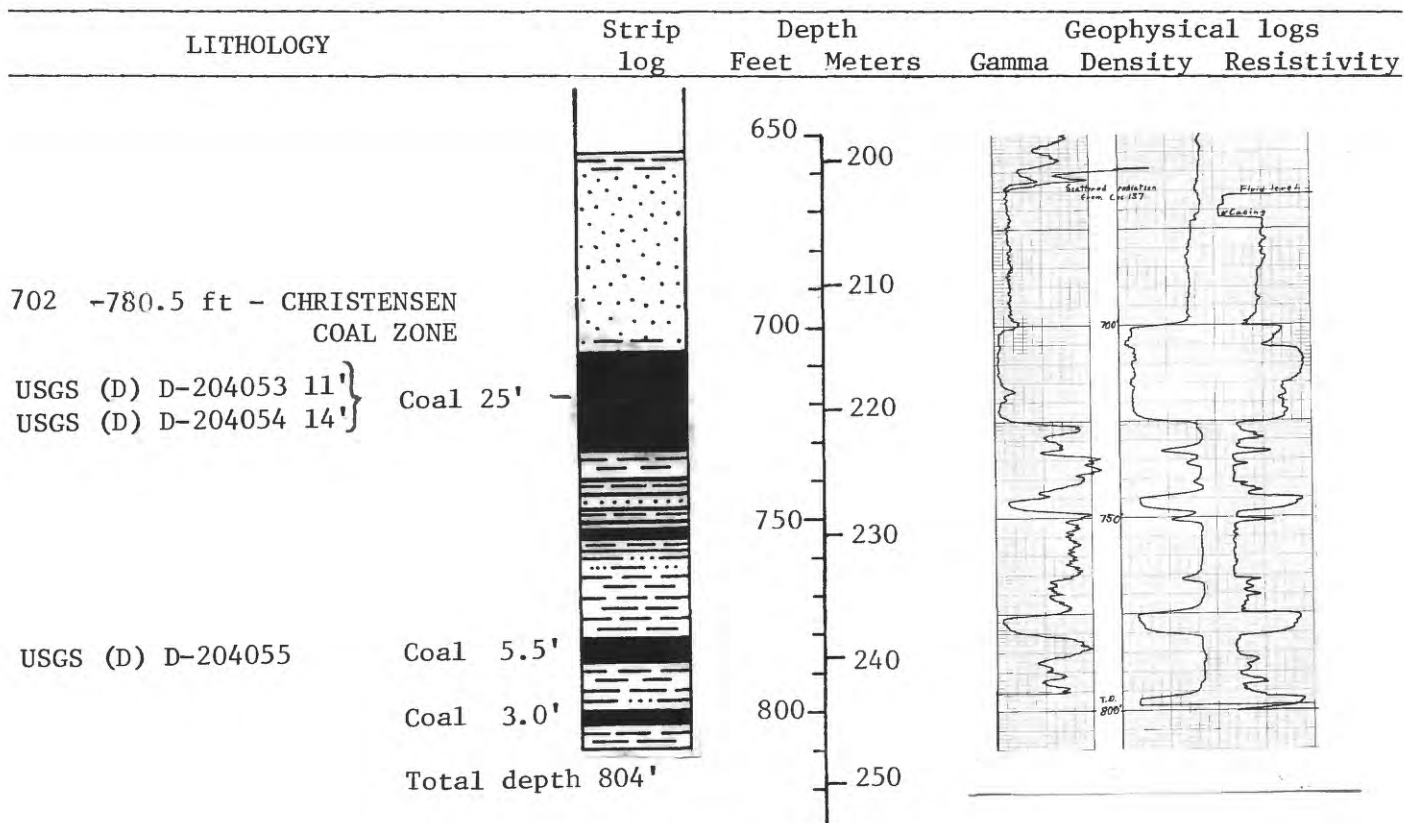
Gamma dens.: T.C. 125 cps Scale 10 ft = 1 in. Logging speed 20 ft/min



Hole no. K-1-DR-K-1A-Dr (continued)



Hole no. K-1-DR-K-1A-DR (continued)





COAL-ANALYSIS REPORT

LAB NO. K86361

ORGANIZATION: USGS, DENVER
SAMPLE ID: USGS(D), D204048, CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS FMTN, CRET. AGE
STATE: UT COUNTY: GARFIELD
TOWN: -MINE: DEPTH INT 313.0 TO 319.1 FT
BED: ~~UNKNOWN~~ Alvey zoneDATE OF SAMPLING: 9-8-78
COLLECTOR: JOSEPH R. HATCH

DATE RECEIVED: 10-11-78 DATE OF REPORT: 11-9-78

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST, ASH FREE]
--	--------------------	----------------------	---------------------------

AIR DRY LOSS 11.6

PROXIMATE ANALYSIS

MOISTURE	20.4	N/A	N/A
VOLATILE MATTER	34.7	43.6	47.9
FIXED CARBON	37.7	47.4	52.1
ASH	7.2	9.0	N/A

ULTIMATE ANALYSIS

HYDROGEN	6.1	4.8	5.3
CARBON	54.7	68.7	75.6
NITROGEN	.8	1.1	1.2
SULFUR	1.0	1.2	1.3
OXYGEN [IND]	30.1	15.1	16.6
ASH	7.2	9.0	N/A

HEATING VALUE [BTU/LB] 9445 11865 13042

ASH - INITIAL DEFORMATION 1960 F
SOFTENING TEMP 2060 F
FLUID TEMP 2170 F

SULFUR FORMS

SULFATE	.02	.02	.02
PYRITIC	.50	.63	.70
ORGANIC	.45	.57	.62

FREE SWELLING INDEX 0



COAL-ANALYSIS REPORT

LAB NO. K06362

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS(D),D204049,CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS FMTN,CRET.AGE

STATE: UT COUNTY: GARFIELD

TOWN: -

MINE: DEPTH INT 336.3 TO 350.9 FT

BED: ~~UNKNOWN~~ Alvey Zone

DATE OF SAMPLING: 9-8-78

DATE RECEIVED: 10-11-78

DATE OF REPORT: 11-17-78

COLLECTOR: JOSEPH R. HATCH

AIR DRY LOSS	11.2	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST,ASH FREE]
--------------	------	--------------------	----------------------	--------------------------

PROXIMATE ANALYSIS

MOISTURE	19.7	N/A	N/A
VOLATILE MATTER	35.1	43.7	48.7
FIXED CARBON	37.0	46.1	51.3
ASH	8.2	10.2	N/A

ULTIMATE ANALYSIS

HYDROGEN	6.1	4.9	5.5
CARBON	54.6	68.0	75.7
NITROGEN	.8	1.1	1.2
SULFUR	1.0	1.3	1.4
OXYGEN [IND]	29.3	14.6	16.3
ASH	8.2	10.2	N/A

HEATING VALUE[BTU/LB]	9510	11845	13188
-----------------------	------	-------	-------

ASH - INITIAL DEFORMATION	2060 F
SOFTENING TEMP	2170 F
FLUID TEMP	2250 F

SULFUR FORMS

SULFATE	.02	.02	.02
PYRITIC	.64	.80	.89
ORGANIC	.38	.48	.53

FREE SWELLING INDEX .0



COAL-ANALYSIS REPORT

LAB NO. K06363

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS(D), D204050, CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS FMTN, CRET. AGE

STATE: UT COUNTY: GARFIELD

TOWN: -

MINE: DEPTH INT 547.2 TO 555.4 FT

BED: ~~UNKNOWN~~ Rees zone

DATE OF SAMPLING: 9-8-78

DATE RECEIVED: 10-11-78

DATE OF REPORT: 11-9-78

COLLECTOR: JOSEPH R. HATCH

AIR DRY LOSS	10.5	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST, ASH FREE]
--------------	------	--------------------	----------------------	---------------------------

PROXIMATE ANALYSIS

MOISTURE	18.4	N/A	N/A
VOLATILE MATTER	35.0	42.8	49.0
FIXED CARBON	36.3	44.6	51.0
ASH	10.3	12.6	N/A

ULTIMATE ANALYSIS

HYDROGEN	6.1	4.9	5.6
CARBON	53.5	65.6	75.1
NITROGEN	.9	1.1	1.3
SULFUR	.6	.8	.9
OXYGEN [IND.]	28.6	15.0	17.1
ASH	10.3	12.6	N/A

HEATING VALUE [BTU/LB]	9281	11372	13016
------------------------	------	-------	-------

ASH - INITIAL DEFORMATION	2100 F
SOFTENING TEMP	2190 F
FLUID TEMP	2300 F

SULFUR FORMS

SULFATE	.01	.01	.01
PYRITIC	.19	.23	.26
ORGANIC	.43	.53	.60

FREE SWELLING INDEX .0



COAL-ANALYSIS REPORT

LAB NO. K86364

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS(D).D204051,CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS FMTN,CRET.AGE

STATE: UT COUNTY: GARFIELD

TOWN: -

MINE: DEPTH INT 603.1 TO 607.6 FT

BED: ~~UNNAMED~~ Rees zone

DATE OF SAMPLING: 9-8-78

DATE RECEIVED: 10-11-78

DATE OF REPORT: 11- 7-78

COLLECTOR: JOSEPH R. HATCH

AIR DRY LOSS	8.6	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST,ASH FREE]
--------------	-----	--------------------	----------------------	--------------------------

PROXIMATE ANALYSIS

MOISTURE	15.6	N/A	N/A
VOLATILE MATTER	29.6	35.1	49.8
FIXED CARBON	29.9	35.4	50.2
ASH	24.9	29.5	N/A

ULTIMATE ANALYSIS

HYDROGEN	5.0	3.9	5.6
CARBON	44.2	52.4	74.3
NITROGEN	.8	.9	1.3
SULFUR	.7	.8	1.2
OXYGEN [IND.]	24.5	12.5	17.8
ASH	24.9	29.5	N/A

HEATING VALUE[BTU/LB]	7644	9060	12854
-----------------------	------	------	-------

ASH - INITIAL DEFORMATION	2400 F
SOFTENING TEMP	2510 F
FLUID TEMP	2620 F

SULFUR FORMS

SULFATE	.01	.01	.02
PYRITIC	.25	.29	.42
ORGANIC	.44	.52	.74

FREE SWELLING INDEX .0

Coal interval 605.5-606.7 omitted for
gas emission test



COAL-ANALYSIS REPORT

LAB NO. K86365

ORGANIZATION: USGS, DENVER

SAMPLE ID: USGS(D).D204052.CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS FMTH. CRET. AGE

STATE: UT COUNTY: GARFIELD

TOWN: -

MINE: DEPTH INT 617.0 TO 625.2 FT

BED: ~~UNKNOWN~~ Rees zone

DATE OF SAMPLING: 9-8-78

DATE RECEIVED: 10-11-78

DATE OF REPORT: 11-7-78

COLLECTOR: JOSEPH R. HATCH

AIR DRY LOSS	9.7	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST, ASH FREE]
--------------	-----	--------------------	----------------------	---------------------------

PROXIMATE ANALYSIS

MOISTURE	17.2	N/A	N/A
VOLATILE MATTER	33.4	40.4	49.0
FIXED CARBON	34.8	42.0	51.0
ASH	14.6	17.6	N/A

ULTIMATE ANALYSIS

HYDROGEN	5.7	4.5	5.5
CARBON	51.5	62.2	75.6
NITROGEN	.8	1.0	1.2
SULFUR	.8	.9	1.1
OXYGEN [IND]	26.7	13.7	16.6
ASH	14.6	17.6	N/A

HEATING VALUE [BTU/LB]	8992	10866	13193
------------------------	------	-------	-------

ASH - INITIAL DEFORMATION	2190 F
SOFTENING TEMP	2310 F
FLUID TEMP	2400 F

SULFUR FORMS

SULFATE	.01	.01	.01
PYRITIC	.23	.27	.33
ORGANIC	.54	.66	.80

FREE SWELLING INDEX .0

Coal interval 619.1-620.1 omitted for
gas emission test



COAL-ANALYSIS REPORT

LAB NO. K86366

ORGANIZATION: USGS, DENVER
SAMPLE ID: USGS(D),D204053,CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS FMTH,CRET AGE
STATE: UT COUNTY: GARFIELD
TOWN: -MINE: DEPTH INT 702.0 TO 713.0 FT
BED: ~~UNKNOWN~~ Christensen zoneDATE OF SAMPLING: 9-8-78 DATE RECEIVED: 10-11-78 DATE OF REPORT: 11-17-78
COLLECTOR: JOSEPH R. HATCHAIR DRY LOSS 12.8
COAL [AS RECD.] COAL [MOIST FREE] COAL [MOIST,ASH FREE]

PROXIMATE ANALYSIS

MOISTURE	21.1	N/A	N/A
VOLATILE MATTER	34.7	44.0	46.6
FIXED CARBON	39.8	50.4	53.4
ASH	4.4	5.6	N/A

ULTIMATE ANALYSIS

HYDROGEN	6.2	4.9	5.2
CARBON	56.8	72.0	76.2
NITROGEN	.9	1.2	1.2
SULFUR	.5	.6	.6
OXYGEN [IND]	31.1	15.7	16.6
ASH	4.4	5.6	N/A

HEATING VALUE[BTU/LB] 9828 12449 13186

ASH - INITIAL DEFORMATION 2060 F
SOFTENING TEMP 2170 F
FLUID TEMP 2250 F

SULFUR FORMS

SULFATE	.01	.01	.01
PYRITIC	.10	.12	.13
ORGANIC	.37	.47	.50

FREE SWELLING INDEX .0

Coal interval 711.9-713.0 omitted for
gas emission test



COAL-ANALYSIS REPORT

LAB NO. K86367

ORGANIZATION: USGS, DENVER
SAMPLE ID: USGS(D), D204054, CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS FMTN, CRET. AGE
STATE: UT COUNTY: GARFIELD
TOWN: -MINE: DEPTH INT 713.0 TO 727.0 FT
BED: ~~UNNAMED~~ Christensen zoneDATE OF SAMPLING: 9-8-78
COLLECTOR: JOSEPH R. HATCH

DATE RECEIVED: 10-11-78 DATE OF REPORT: 11-9-78

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST, ASH FREE]
--	--------------------	----------------------	---------------------------

AIR DRY LOSS 12.0

PROXIMATE ANALYSIS

MOISTURE	20.1	N/A	N/A
VOLATILE MATTER	33.3	41.7	44.9
FIXED CARBON	40.9	51.2	55.1
ASH	5.7	7.1	N/A

ULTIMATE ANALYSIS

HYDROGEN	6.3	5.1	5.5
CARBON	56.6	70.8	76.2
NITROGEN	.9	1.1	1.2
SULFUR	.5	.7	.7
OXYGEN [IND]	30.0	15.2	16.3
ASH	5.7	7.1	N/A

HEATING VALUE [BTU/LB]	9837	12309	13248
------------------------	------	-------	-------

ASH - INITIAL DEFORMATION	2140 F
SOFTENING TEMP	2250 F
FLUID TEMP	2340 F

SULFUR FORMS

SULFATE	.01	.01	.01
PYRITIC	.17	.21	.23
ORGANIC	.36	.45	.49

FREE SWELLING INDEX 0

Coal interval 724.9-726.0 omitted for
gas emission test



COAL-ANALYSIS REPORT

LAB NO. K86368

ORGANIZATION: USGS, DENVER
SAMPLE ID: USGS(D), D204055, CORE SAMPLE COAL

CAN NO: -

OPR: STRAIGHT CLIFFS MTN, CRET AGE
STATE: UT COUNTY: GARFIELD
TOWN: -MINE: DEPTH INT 775.0 TO 780.5 FT
BED: ~~UNKNOWN~~ Christensen zoneDATE OF SAMPLING: 9-8-78
COLLECTOR: JOSEPH R. HATCH

DATE RECEIVED: 10-11-78 DATE OF REPORT: 11-7-78

	COAL [AS RECD.]	COAL [MOIST FREE]	COAL [MOIST, ASH FREE]
--	--------------------	----------------------	---------------------------

AIR DRY LOSS 11.6

PROXIMATE ANALYSIS

MOISTURE	19.7	N/A	N/A
VOLATILE MATTER	34.6	43.1	46.4
FIXED CARBON	39.9	49.7	53.6
ASH	5.8	7.2	N/A

ULTIMATE ANALYSIS

HYDROGEN	6.1	4.8	5.2
CARBON	56.6	70.4	75.9
NITROGEN	1.0	1.2	1.3
SULFUR	.6	.7	.7
OXYGEN [IND]	30.1	15.7	16.9
ASH	5.8	7.2	N/A

HEATING VALUE [BTU/LB]	9863	12275	13223
------------------------	------	-------	-------

ASH - INITIAL DEFORMATION	2155 F
SOFTENING TEMP	2255 F
FLUID TEMP	2360 F

SULFUR FORMS

SULFATE	.01	.01	.01
PYRITIC	.07	.09	.09
ORGANIC	.48	.59	.64

FREE SWELLING INDEX .0

Coal interval 778.5-780.0 omitted for
gas emission test