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GEOLOGICAL SURVEY

GEOPHYSICAL LOGS OF COAL TEST DRILL HOLES IN THE
GRAND MESA COAL FIELD, DELTA COUNTY, COLORADO

By

G. Philip Eager

**UNIVERSITY OF UTAH
RESEARCH INSTITUTE
EARTH SCIENCE LAB.**

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

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INTRODUCTION

In the summer of 1978, the U.S. Geological Survey relogged two holes drilled in 1977 and obtained geophysical logs for three holes drilled in trespass on Federal coal.

The coal occurs above the basal Rollins Sandstone Member of the Upper Cretaceous Mesaverde Formation. The strata dip gently to the north or north-northeast into the Piceance Creek Basin.

USGS holes CE-77-2 and CE-77-3, in the Cedaredge 7½-minute quadrangle, were drilled, logged, and cased, as ground-water observation wells, in November 1977. The original geophysical logs, reported by Eager (1978), had anomalously high natural-gamma radiation above the fluid level, caused by backscatter from the density-gamma source. The holes were relogged, through the PVC casing, for natural-gamma radiation in August 1978 by Strata Surveys of Steamboat Springs, Colorado.

Trespass holes WS-1 and WS-2, in the Dry Creek 7½-minute quadrangle, were drilled and logged in December 1977 for the Sundance Oil Company, Inc. of Denver, Colorado. The casing in these holes was HQ wireline drill rods.

Trespass hole Fairlamb 75-2, in the Hells Kitchen 7½-minute quadrangle, was drilled and logged in May 1975 for Utah International, Inc. of Salt Lake City, Utah.

The holes were drilled with truck-mounted rotary and diamond-core drilling rigs using air, air with biodegradable foam injection (foam), water, or mud as the drilling medium. All holes were logged for natural-gamma radiation (GAM) alone or in a suite with gamma-gamma density (DEN), single-point resistivity (RES), and caliper (CAL). In this report, the logged depth is considered the total depth (T.D.).

Beds of coal and impure coal have been interpreted to the nearest $\frac{1}{2}$ foot. To convert from feet to meters, multiply by .3048.

REFERENCE

Eager, G. P., 1978, Geophysical logs of coal test drill holes in the Grand Mesa coal field, Delta and Mesa Counties, Colorado: U.S. Geol. Survey Open-File Report 78-540, 97 p.

U.S. GEOLOGICAL SURVEY DRILL-HOLE LOG
 DRY CREEK 7½' QUADRANGLE, GRAND MESA COAL FIELD

Drill-hole no. WS-1 State Colorado County Delta

T. 13 S., R. 94 W., sec. 12, NW¼NE¼SW¼ Approx. elev. (ft) 6960

Drilled depth 179' Cored interval 92-179'

Logged Logging
 depth 179' company Strata Surveys Date logged 12-15-77

| Drilling media record | | Bore-hole record | | Casing record | |
|-----------------------|----------|------------------|----------|---------------|--------|
| Mud | 0- 92' | 4.75" | 0- 92' | 3.06" ID | 0- 92' |
| Water | 92- 179' | 2.98" | 92- 179' | | |

LOGGING DATA
 Gamma source Cs 137

| Run no. | Tool diam. | Log run | T.C. (sec) | Scale | Interval | Speed (fpm) |
|---------|------------|-----------------|------------|--------------|----------|-------------|
| 1 | 1.69" | Gamma | 3 | 434 cps/in. | 175- 0' | 20 |
| | | Density | 3 | 2000 cps/in. | 179- 5' | |
| | | Resistivity | | | 180- 90' | |
| 2 | 1.38" | Caliper (3-arm) | 1 | 20 ins./in. | 178- 80' | 25 |

Remarks:

U.S. GEOLOGICAL SURVEY
Drill-hole no. WS-1 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | | DEPTH | |
|---------------------------------|------------------|-----|-----|-----|-------|---|
| | GAM | CAL | DEN | RES | FT | M |
| 0-17' Surficial deposit | | | | | 0 | 0 |
| 17-95' Baked rock | | | | | 50 | |
| 131½-132' Impure coal | | | | | 100 | |
| 132-134' Coal | | | | | | |
| 134-136½' Impure coal | | | | | | |
| 158-158½' Impure coal | | | | | | |
| 158½-160½' Coal | | | | | | |
| 160½-162½' Impure coal | | | | | 150 | |
| 165½-167' Impure coal | | | | | 50 | |
| 167-T.D. Sandstone (Rollins) | | | | | 180 | |
| | | | | | T.D. | |

U.S. GEOLOGICAL SURVEY DRILL-HOLE LOG
 DRY CREEK 7½' QUADRANGLE, GRAND MESA COAL FIELD

Drill-hole no. WS-2 State Colorado County Delta

T. 13 S., R. 94 W., sec. 12, NW¼SE¼NW¼ Approx. elev. (ft) 7020

Drilled depth 311' Cored interval 121'-311'

Logged depth 310' Logging company Strata Surveys Date logged 12-19-77

| Drilling media record | | Bore-hole record | | Casing record | |
|-----------------------|-----------|------------------|-----------|---------------|---------|
| Mud | 0- 121' | 4.75" | 0- 121' | 3.06" ID | 0- 121' |
| Water | 121- 311' | 2.98" | 121- 311' | | |

LOGGING DATA

Gamma source Cs 137

| Run no. | Tool diam. | Log run | T.C. (sec) | Scale | Interval | Speed (fpm) |
|---------|------------|-----------------|------------|--------------|-----------|-------------|
| 1 | 1.69" | Gamma | 3 | 434 cps/in. | 305- 0' | 20 |
| | | Density | 3 | 2000 cps/in. | 309- 0' | |
| | | Resistivity | | | 310- 120' | |
| 2 | 1.38" | Caliper (3-arm) | 1 | 20 ins./in. | 310- 111' | 25 |
| 3 | 1.69" | Gamma | 3 | 434 cps/in. | 120- 50' | 20 |
| | | Density | 3 | 2000 cps/in. | 124- 50' | |
| | | Resistivity | | | 125- 73' | |

Remarks: Runs no. 1 and 3: Gamma and resistivity are 1½' too shallow; density is 1' too shallow.

U.S. GEOLOGICAL SURVEY
 Drill-hole no. WS-2 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | | DEPTH | |
|-------------------------|------------------|-----|-----|-----|-------|----|
| | GAM | CAL | DEN | RES | FT | M |
| 0-46' Surficial deposit | | | | | 0 | 0 |
| 92-93½' Impure coal | | | | | 50 | |
| 105-105½' Impure coal | | | | | 100 | |
| 105½-111' Coal | | | | | 150 | |
| 111-111½' Impure coal | | | | | 200 | 50 |
| 184½-190½' Coal | | | | | | |
| 190½-191½' Impure coal | | | | | | |

U.S. GEOLOGICAL SURVEY
Drill-hole no. WS-2 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | | DEPTH | |
|---------------------------------|------------------|-----|-----|-----|-------|------|
| | GAM | CAL | DEN | RES | FT | M |
| 211½-219½' Coal | | | | | | |
| 219½-220' Impure coal | | | | | | |
| 223-223½' Impure coal | | | | | | 70 |
| 223½-227½' Coal | | | | | | |
| 227½-229' Impure coal | | | | | | 250 |
| 233½-235½' Impure coal | | | | | | |
| 269½-270' Impure coal | | | | | | |
| 270-272½' Coal | | | | | | 300 |
| 272½-274' Impure coal | | | | | | |
| 288-288½' Impure coal | | | | | | 310 |
| 288½-289½' Coal | | | | | | T.D. |
| 289½-291' Impure coal | | | | | | 50 |
| 291-292' Coal | | | | | | |
| 292-293' Impure coal | | | | | | 20 |
| 294-295½' Impure coal | | | | | | |
| 296-298' Impure coal | | | | | | |
| 298-T.D. Sandstone (Rollins) | | | | | | 100 |
| 92-93½' Impure coal | | | | | | 125 |
| 105-105½' Impure coal | | | | | | |
| 105½-111' Coal | | | | | | |
| 111-111½' Impure coal | | | | | | |

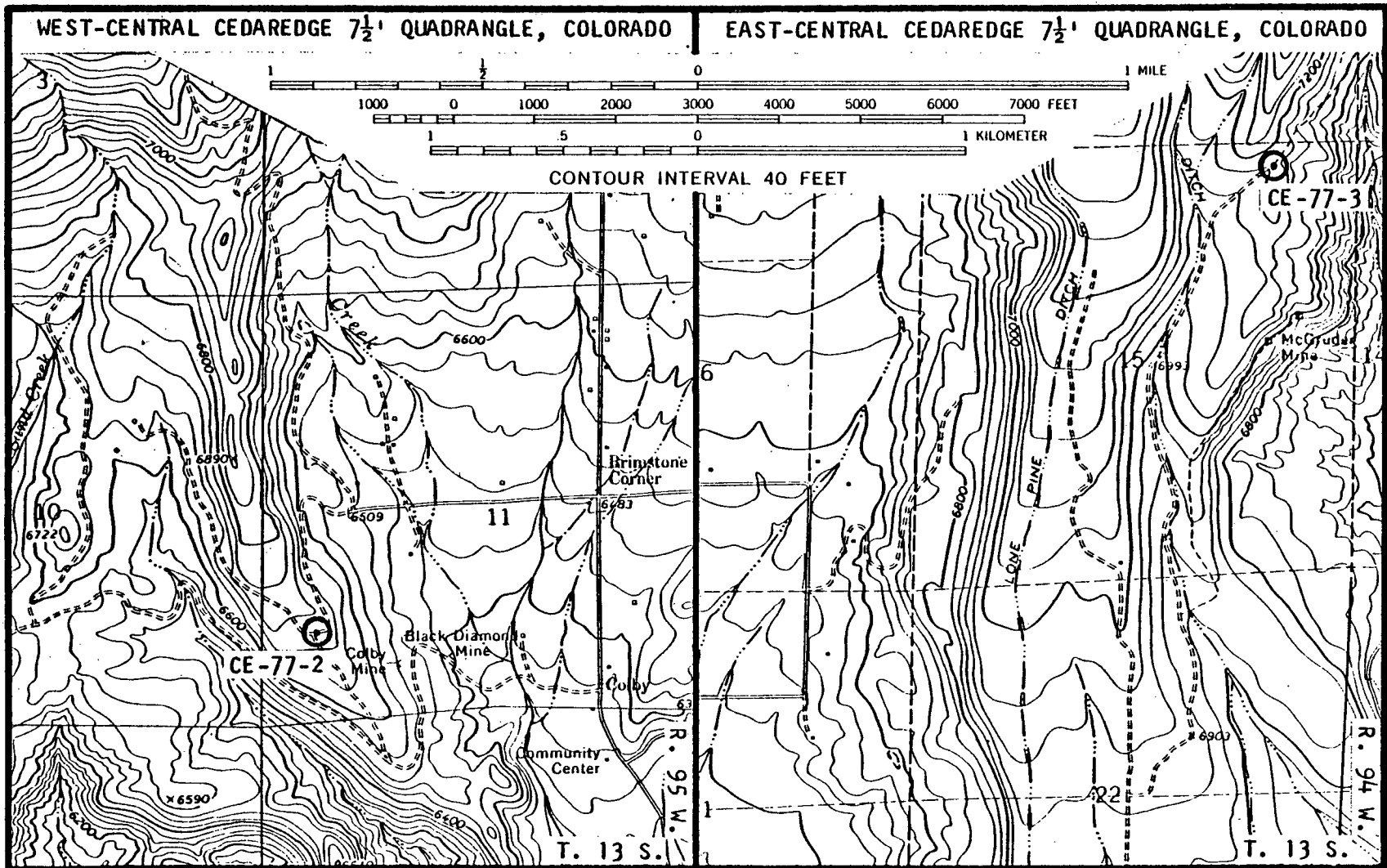


Figure 2.--Maps showing drill-hole locations in the Cedaredge 7 1/2' quadrangle, Colorado.

U.S. GEOLOGICAL SURVEY DRILL-HOLE LOG
 CEDAREGE 7 $\frac{1}{2}$ ' QUADRANGLE, GRAND MESA COAL FIELD

Drill-hole no. CE-77-2 State Colorado County Delta

T. 13 S., R. 95 W., sec. 11, CN $\frac{1}{2}$ SW $\frac{1}{4}$ SW $\frac{1}{4}$ Approx. elev. (ft) 6700

Drilled depth 460' Cored interval NONE

Logged depth 449' Logging company Strata Surveys Date logged 8-31-78

| Drilling media record | | Bore-hole record | | Casing record |
|-----------------------|---------|------------------|----------|---------------------|
| Air/Foam | 0- 460' | 6.75" | 0- 40' | 3.0" ID PVC 0- 454' |
| | | 4.75" | 40- 460' | |

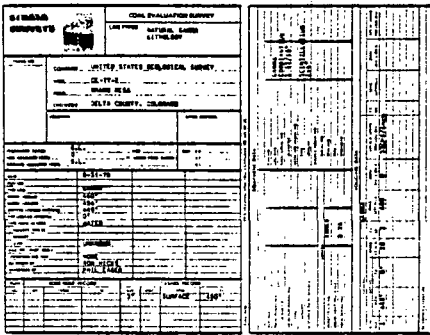
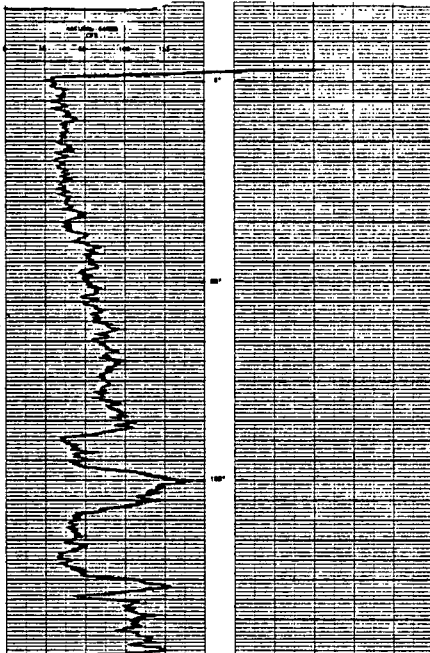


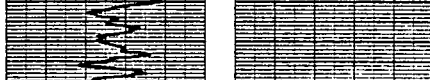
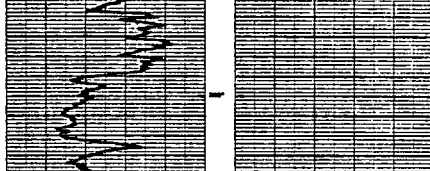
LOGGING DATA

Gamma source NONE

| Run no. | Tool diam. | Log run | T.C. (sec) | Scale | Interval | Speed (fpm) |
|---------|------------|---------|------------|-------------|----------|-------------|
| 1 | 1.69" | Gamma | 2 | 167 cps/in. | 449- 0' | 20 |

Remarks: Run no. 1 is 1' too shallow.

U.S. GEOLOGICAL SURVEY
 Drill-hole no. CE-77-2 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | DEPTH | |
|-------------------------|--|--|--|-------|----|
| | GAM | | | FT | M |
| 0-87' Surficial deposit |  | | | 0 | 0 |
| 154-155½' Impure coal |  | | | 150 | 50 |
| 195-199' Coal |  | | | 200 | |
| 200-201½' Coal |  | | | 200 | |
| 201½-203' Impure coal |  | | | 200 | |
| 220½-221½' Impure coal |  | | | 250 | |

U.S. GEOLOGICAL SURVEY
Drill-hole no. CE-77-2 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | DEPTH | |
|------------------------|------------------|------|--|-------|---|
| | GAM | | | FT | M |
| 277-277½' Impure coal | | | | | |
| 281-282' Impure coal | | | | | |
| 290½-291' Impure coal | | 300 | | | |
| 314½-315' Impure coal | | 100 | | | |
| 335½-345½' Coal | | | | | |
| 345½-346' Impure coal | | 350 | | | |
| 356½-360½' Coal | | | | | |
| 360½-361' Impure coal | | | | | |
| 367½-369½' Impure coal | | 400 | | | |
| 377½-378' Impure coal | | | | | |
| 378-379' Coal | | | | | |
| 379-379½' Impure coal | | | | | |
| 388-390½' Impure coal | | | | | |
| 391½-393½' Coal | | 449 | | | |
| 393½-394' Impure coal | | T.D. | | | |
| 419½-421½' Coal | | | | | |
| 421½-422½' Impure coal | | | | | |
| 422½-434' Coal | | | | | |
| 434-435' Impure coal | | | | | |
| 435-436½' Coal | | | | | |

U.S. GEOLOGICAL SURVEY DRILL-HOLE LOG
 CEDAREGE 7½' QUADRANGLE, GRAND MESA COAL FIELD

Drill-hole no. CE-77-3 State Colorado County Delta

T. 13 S., R. 94 W., sec. 15, NW¼NE¼NE¼ Approx. elev. (ft) 7170

Drilled depth 360' Cored interval NONE

Logged Logging
 depth 343' company Strata Surveys Date logged 8-31-78

| Drilling media record | | Bore-hole record | | Casing record |
|-----------------------|---------|------------------|---------|---------------------|
| Air | 0- 360' | 5.13" | 0- 360' | 3.0" ID PVC 0- 348' |

LOGGING DATA
 Gamma source NONE

| Run no. | Tool diam. | Log run | T.C. (sec) | Scale | Interval | Speed (fpm) |
|---------|------------|---------|------------|-------------|----------|-------------|
| 1 | 1.69" | Gamma | 2 | 167 cps/in. | 343- 0' | 20 |

Remarks:

U.S. GEOLOGICAL SURVEY
Drill-hole no. CE-77-3 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | DEPTH | |
|-------------------------|------------------|--|--|-------|----|
| | GAM | | | FT | M |
| 0-16' Surficial deposit | | | | 0 | 0 |
| 75½-76' Impure coal | | | | 50 | |
| 81-90' Coal | | | | | |
| 90-90½' Impure coal | | | | | |
| 144-152½' Coal | | | | 100 | |
| 152½-153' Impure coal | | | | | |
| 157-157½' Impure coal | | | | | |
| 160-162' Impure coal | | | | | |
| 167-172' Coal | | | | 150 | |
| 172-173' Impure coal | | | | | 50 |
| 173-174' Coal | | | | | |
| 174-175' Impure coal | | | | | |
| 231½-233½' Impure coal | | | | 200 | |
| 233½-235' Coal | | | | | |
| 235-236½' Impure coal | | | | | |
| 236½-238½' Coal | | | | | |
| 238½-239' Impure coal | | | | | |
| 246-251' Coal | | | | 250 | |
| 253-254' Coal | | | | | |

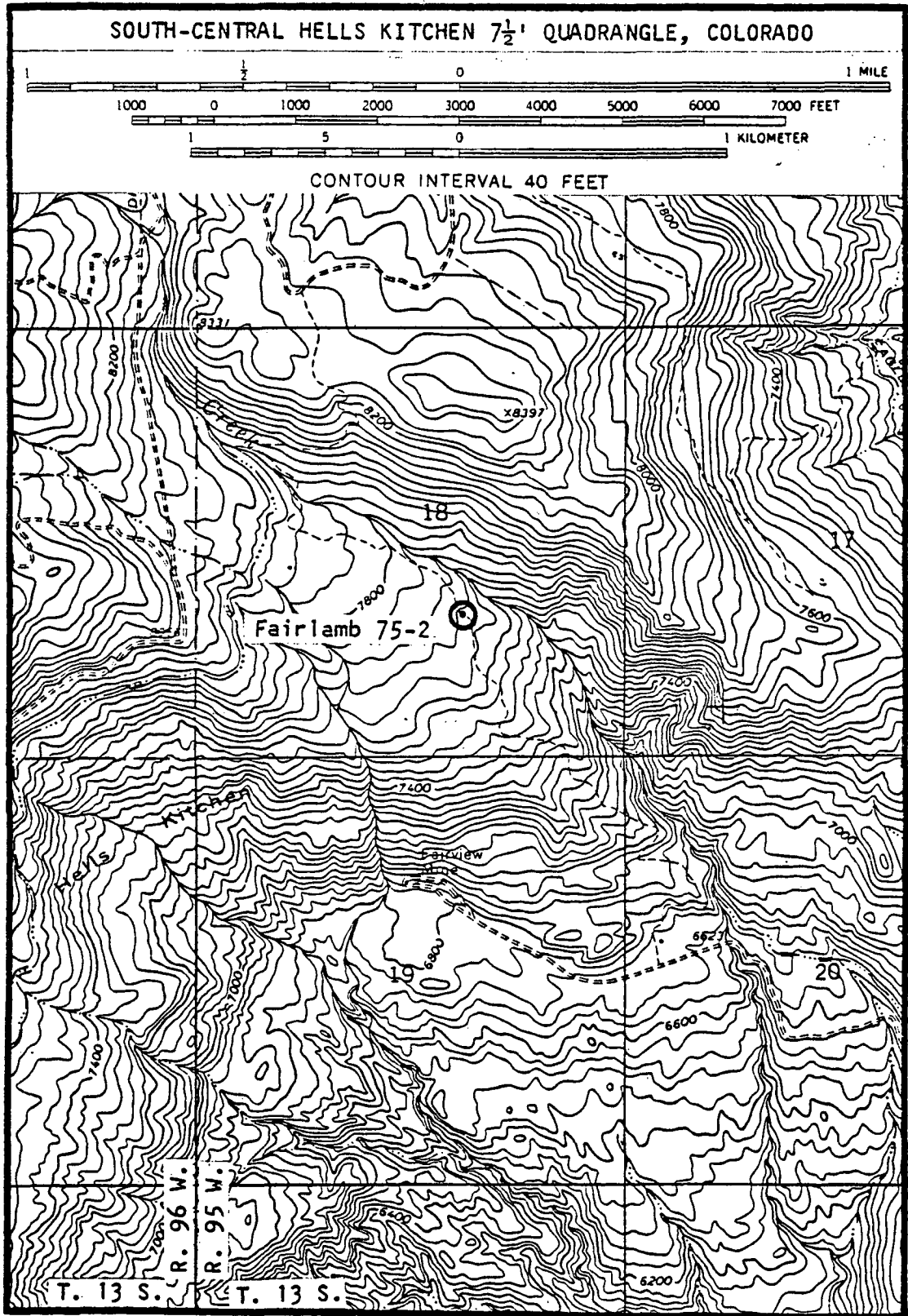


Figure 3.--Map showing drill-hole location in the Hells Kitchen 7½' quadrangle, Colorado.

U.S. GEOLOGICAL SURVEY DRILL-HOLE LOG
HELLS KITCHEN 7½' QUADRANGLE, GRAND MESA COAL FIELD

Hole no. Fairlamb 75-2 State Colorado County Delta

T. 13 S., R. 95 W., sec. 18, CS $\frac{1}{2}$ NW $\frac{1}{4}$ SE $\frac{1}{4}$ Approx. elev. (ft) 7670

Drilled depth 1103' Cored interval NONE

Logged depth 1103' Logging company Utah Int'l., Inc. Date logged 5-20-75

| Drilling media record | Bore-hole record | Casing record |
|-----------------------|--|---------------|
| Mud 0-1103' | 5.13 & 5.0" 0- 470' 4.75" 470-1103' | NONE |

LOGGING DATA

Gamma source Cs 137

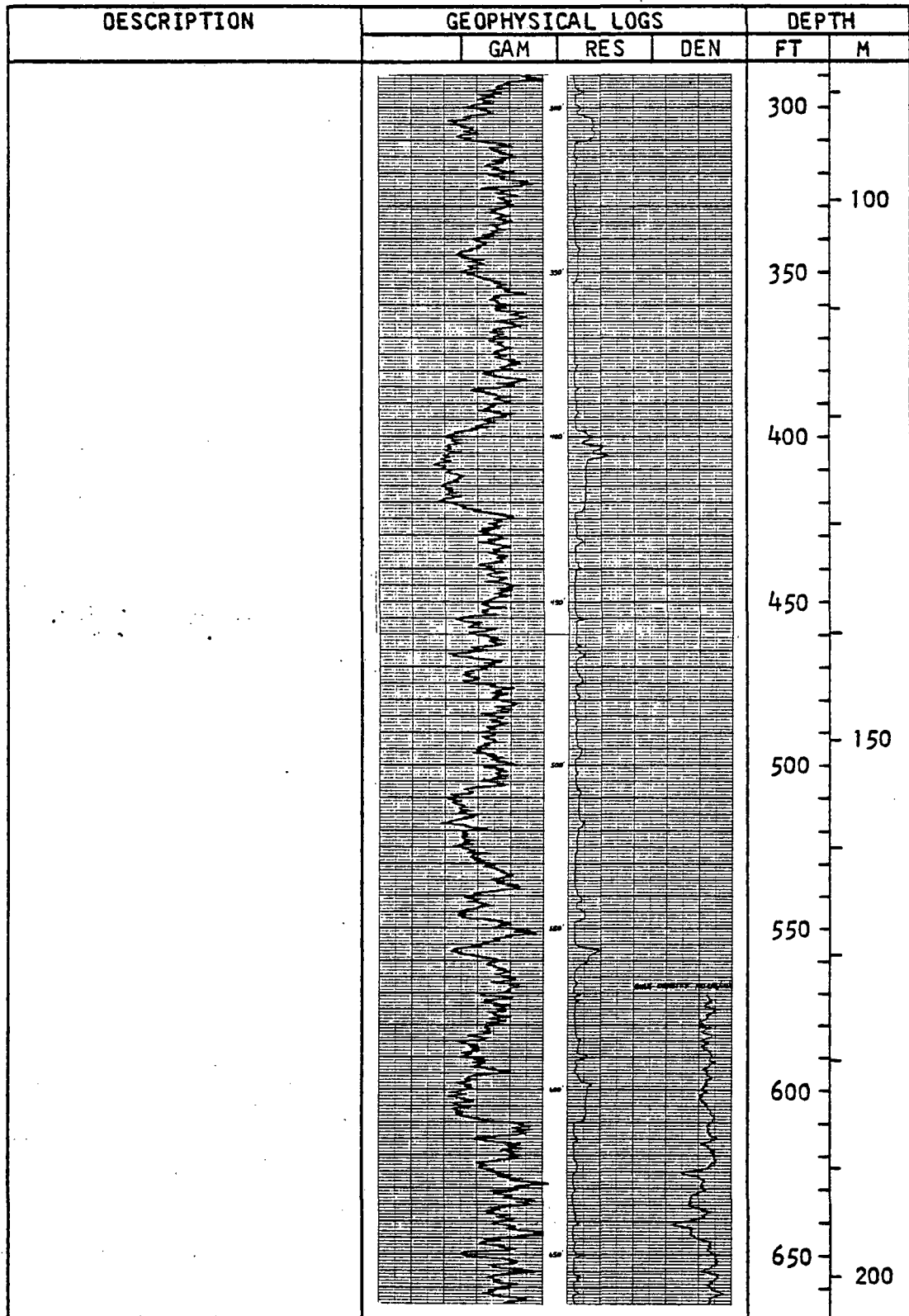
| Run no. | Tool diam. | Log run | T.C. (sec) | Scale | Interval | Speed (fpm) |
|---------|------------|---------------------------------|------------|--|------------------------------------|-------------|
| 1 | 1.69" | Gamma Resistivity Density | 2 2 | 50 cps/in. 25 Ohms/in. 500 cps/in. | 1102- 0' 1103- 7' 1102- 571' | 20 |

Remarks:

U.S. GEOLOGICAL SURVEY
 Drill-hole no. Fairlamb 75-2 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | DEPTH | |
|--------------------------|------------------|-----|--|-------|----|
| | GAM | RES | | FT | M |
| 0-165' Surficial deposit | | | | | |
| | | | | 0 | 0 |
| | | | | 50 | |
| | | | | 100 | |
| | | | | 150 | 50 |
| | | | | 200 | |
| | | | | 250 | |

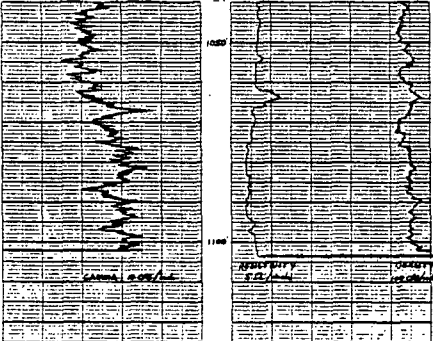
U.S. GEOLOGICAL SURVEY
 Drill-hole no. Fairlamb 75-2 continued



U.S. GEOLOGICAL SURVEY
Drill-hole no. Fairlamb 75-2 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | DEPTH | | | | |
|-----------------------------------|------------------|-----|-----|-------|---|--|-----|--|
| | GAM | RES | DEN | FT | M | | | |
| 716½-717' Impure coal | | | | 700 | | | | |
| 717-718' Coal | | | | | | | | |
| 718-718½' Impure coal | | | | | | | | |
| 782½-783½' Impure coal | | | | | | | 750 | |
| 793½-794½' Impure coal | | | | | | | | |
| 850½-851' Impure coal | | | | | | | | |
| 851-853' Coal | | | | | | | | |
| 853-853½' Impure coal | | | | | | | 800 | |
| 853½-857' Coal | | | | | | | | |
| 857-858' Impure coal | | | | | | | 250 | |
| 893-896½' Coal | | | | | | | | |
| 896½-898½' Impure coal | | | | | | | 850 | |
| 902-903' Impure coal | | | | | | | | |
| 930½-931' Impure coal | | | | | | | | |
| 940½-943' Impure coal | | | | | | | | |
| 944-946' Coal | | | | | | | 900 | |
| 950½-951½' Coal | | | | | | | | |
| 951½-952' Impure coal | | | | | | | | |
| 956½-957½' Impure coal | | | | | | | | |
| 957½-967½' Coal | | | | 950 | | | | |
| 967½-970½' Impure coal | | | | | | | | |
| 993½-994½' Impure coal | | | | | | | | |
| 994½-995' Coal | | | | | | | | |
| 995-995½' Impure coal | | | | 300 | | | | |
| 995½-1040' Sandstone (Rollins) | | | | 1000 | | | | |

U.S. GEOLOGICAL SURVEY
 Drill-hole no. Fairlamb 75-2 continued

| DESCRIPTION | GEOPHYSICAL LOGS | | | DEPTH | |
|-----------------------------------|--|-----|-----|-------|------|
| | GAM | RES | DEN | FT | M |
| 1040-1066' Sandstone (Rollins) |  | | | 1050 | 320 |
| | | | | 1102 | T.D. |