

OIL AND GAS WELLS, SOUTHWESTERN VIRGINIA BEFORE 1950 567

WEST VIRGINIA
MERCER COUNTY

MERCER

A. W. Hicks No. 6478 well. K45 55° 22' 29" 2640' 3202'

United Fuel Gas Co.

Located 1,500 ft south of 37° 20'; 7,600 ft east of 81° 15'.

Elevation, ground, 2,834.18 ft. Total depth, 4,014 ft—well drilling 4,014, Feb. 6, 1951.

Production: 47 million cubic feet; test after shot 26 million cubic feet at 3,180-3,187 ft.

Coal at 678-682, 1,100-1,102, 1,106-1,107, 1,116-1,119, 1,294-1,304 ft.

Sample-library reference: Virginia Geological Survey and Kentucky Geological Survey.

Formations	Thickness (feet)	Depth to base of formation (feet)
Hinton formation:		
Hinton formation undivided.....	550+	601
Stony Gap sandstone member.....	77	678
Blucfield formation.....	1,124	1,802
Greenbrier limestone.....	1,206	3,008
Maccrady shale.....	166	3,174
Pocono formation.....	623	3,797
Big Stone Gap shale.....	81	3,878
Chemung and Brallier formations.....	136+	4,014

1520' S. of 37° 20'
7600' E of 4° 15'

KGS Sample Set # 2290 2040-4014

UNITED FUEL GAS COMPANY, NO. 6478 I. W. HICKS

Location: 0.65 mi. S. of Sand, on Red Oak Ridge, in the Bluefield Quadrangle, Mercer County, West Virginia
MERCER |

Interval

- 51-60 Shale, grayish red (10R4/2)*, slightly calcareous, 90%; shale, medium light gray (10B), slightly calcareous, 10%.
- 60-70 Ditto.
- 70-75 Ditto, fossiliferous (foraminifera, ostracods—more ostracods in gray shale.)
- 75-85 Ditto, red shale, 85%; gray shale, 15%.
- 85-95 Ditto, red shale, 95%; gray shale, 5%.
- 95-100 Ditto, red shale, 95%; gray shale, 5%.
- 100-105 Shale, grayish red (10R4/2), slightly calcareous, silty.
- 105-110 Ditto, to very silty, slightly fossiliferous; trace red shaly limestone and medium gray to light gray siltstone.
- 110-114 Siltstone, pale red (10R5.5/2), medium gray, subrounded, poorly sorted, shaly, considerable gray minerals included, very calcareous to calcareous cement, very slightly micaceous, 60%; shale, as above, 40%; trace greenish gray very fine-grained sandstone.
- 114-115 Ditto: siltstone, 85%; shale, 15%.
- 115-118 Ditto: siltstone, very fine-grained to medium-grained, slightly calcareous cement, 90%; shale, 10%.
- 118-124 Shale, grayish red (10R4/2), very slightly calcareous, trace finely micaceous mineral, 60%; siltstone, as above, 40%.
- 124-130 Shale, as above, 50%; siltstone, 50%.
- 130-135 Siltstone, as above, less dark minerals included, more micaceous, 70%; shale, 30%.
- 135-142 Shale, as above, silty, 70%; siltstone, 30%.
- 142-148 Siltstone, as above, some with green mineral inclusions, 85%; shale, as above, non-silty, to some silty, 15%; trace greenish gray shale.

* Nos. from Nat'l Research Council "Rock-Color Chart"

Interval

- 148-154 Shale, as above, some very slightly silty; trace greenish gray silty shale.
- 154-159 Shale, as above, 60%; shale, medium light gray (N6), calcareous, 25%; limestone, pinkish gray (5YR3/1), medium clastic, 15%.
- 159-164 Ditto.
- 164-168 Siltstone, grayish red (10R4/2), fine-grained, subrounded to rounded, well sorted, calcareous cement, 70%; shale, red, as above, 10%; shale, gray, as above, 10%; limestone, as above, and some light brownish gray (5YR6/1), 10%.
- 168-171 Siltstone, as above, friable, 90%; very small fragments shales as above, 10%.
- 171-178 Shale, medium light gray (N6), trace finely micaceous mineral, 90%; shale, red, as above, very slightly silty, slightly calcareous, 10%.
- 178-183 Shale, medium light gray (N6), silty to little non-silty; slightly calcareous, 80%; shale, red, as above, 20%.
- 183-187 Shale, medium light gray (N6), finely micaceous, very slightly calcareous, 50%; shale, dusky red (10R3/2), finely micaceous, some slightly silty, 50%.
- 187-192 Shale, red, as above, 60%; shale, gray, as above, 20%; siltstone, grayish red, as 164-171, 20%.
- 192-197 Shale, gray, calcareous, as above, slightly silty to non-silty, 70%; shale, red, some very calcareous, 30%.
- 197-201 Siltstone, light gray (N7), very fine-grained, subrounded to rounded, poorly sorted, shaly, finely micaceous, 50%; shale, gray, as above, 20%; shale, red, as above, 20%; siltstone, pale red (10R4/2), fine-grained, subrounded to rounded, poorly sorted, shaly, very calcareous cement, 10%.
- 201-205 Siltstone, light gray, as above, friable w/ small clusters, 70%; siltstone, red, as above, very small clusters, 15%; shale, medium light gray (N6), very small pieces, 13%; pyrite, small fragments, 2%.
- 205-206 Ditto: shale, medium light gray (N6) to medium dark gray (N4), small pieces, some carbonaceous, 40%; shale, red, as 197-201, 10%; siltstone, light gray, as above, 30%; siltstone, red, as above, 20%; considerable pyrite.
- 206-211 Limestone, medium dark gray to medium light gray (N4-6), finely elastic, shaly, some silty, fossiliferous (ostracods), 80%; shale, as limestone, calcareous to slightly calcareous, 20%; considerable pyrite.
- 211-217 Limestone, as above, non-fossiliferous, 70%; shale, 10%; siltstone, medium light gray (N6), medium-gray red, subrounded, considerable shaly material, very micaceous, slightly calcareous, 20%.

Interval

- 217-225 Limestone, as above, very shaly, 35%; siltstone, as above, 35%; shale, dark grayish red (5R2/2), slightly silty to silty, slightly calcareous, 30%; trace crystalline calcite.
- 225-230 Limestone, as above, very shaly and silty, 30%; shale, gray, as limestone, 30%; siltstone, as above, 30%; shale, red, as above, 10%; trace pyrite.
- 230-236 Siltstone, medium light gray, as above, calcareous, 50%; shale, gray, as above, calcareous, 35%; shale, red, 15%; trace calcite and pyrite.
- 236-242 Shale, gray, as above, 50%; siltstone, medium light gray, as above, 30%; shale, red, to very silty, approaching siltstone, 20%.
- 242-245 Shale, medium dark gray (M4), slightly calcareous, 80%; siltstone, as above, 10%; shale, red, as above, 10%.
- 245-248 Shale, grayish red (5R2/2), 90%; shale, medium light gray, calcareous, 10%.
- 248-254 Shale, medium gray to medium light gray (M5-6), some very silty, calcareous to very calcareous, 70%; siltstone, light gray (M7), coarse-grained, subrounded, poorly sorted, shaly and calcareous, 20%; shale, dark grayish red (5R2/2), very calcareous, some silty, 10%.
- 254-260 Shale, red, as above, very slightly calcareous, 60%; limestone, medium gray (M5), and light brownish gray (5YR5/1), finely clastic, shaly, some silty, 40%.
- 260-266 Shale, red, as above, silty to some non-silty, 70%; limestone, as above, fossiliferous (ostracods), with some very calcareous siltstone, 20%; shale, greenish gray (5GY6/1), 10%.
- 266-273 Siltstone, medium red (10R5/2), coarse-grained, subrounded to rounded, moderately well sorted, friable w/ few clusters with calcareous cement and considerable non-quartz material, micaceous, 90%; shale, red and gray, as above, 10%; trace limestone and pyrite.
- 273-300 Siltstone, as above, very fine-grained, clustered.
- 283-287 Shale, dark reddish brown (10R3/4), some silty, 50%; siltstone, red, as above, 20%; shale, greenish gray (5GY6/1), slightly calcareous, 30%.
- 287-292 Shale, grayish red (10R4/2), as above, 60%; shale, greenish gray, as above, 20%.
- 292-297 Ditto, slightly calcareous, 90%; greenish gray, 10%.
- 297-302 Shale, red, as above, calcareous, fossiliferous (good zone ostracod zone, few foraminifera), 90%; greenish gray shale, 10%.
- 300-307 Ditto.

Interval

- 307-312 Shale, medium light gray (N6), calcareous, micaceous, some silty, 85%; shale, red, as above, micaceous, 15%.
- 312-317 Shale, medium light gray, as above, 70%; shale, red, as above, 15%; siltstone, light gray (N7), coarse-grained, subrounded to rounded, poorly sorted, shaly, micaceous, some mineral inclusions, slightly calcareous, 10%.
- 317-322 Shale, red, as above, 95%; shale, gray, 5%.
- 322-330 Siltstone, light brownish gray (5YR6/1), fine-grained, subrounded, very poorly sorted, very shaly, micaceous, slightly calcareous, 30%; siltstone, medium gray (N5), coarse-grained as preceding, 20%; shale, red, as above, 30%; shale, gray, as above, 20%.
- 330-336 Shale, red, as above, 90%; siltstone, medium gray, as above, 10%.
- 336-342 Ditto.
- 342-347 Ditto, finely micaceous, 90%; siltstone, 10%.
- 347-353 Ditto, red shale.
- 353-359 Ditto, some very silty and very calcareous, 95%; shale, medium light gray, slightly calcareous, 5%.
- 359-365 Shale, medium dark gray (N4), calcareous, 70%; shale, red, as above, 15%; shale, greenish gray (5GY6/1), silty, slightly calcareous, micaceous, 15%.
- 365-370 Shale, grayish red (5R/2), 60%; shale, medium light gray (N6), 30%; shale, medium dark gray, as above, 10%.
- 370-374 Shale, grayish red (5R/2), some silty, finely micaceous, calcareous, 70%; shale, medium light gray (N6), finely micaceous, 20%; limestone, medium dark gray (N4), medium clastic, 10%.
- 374-380 Shale, dark reddish brown (10R3/4), very slightly calcareous, some with rounded pebbles & mat. of black shaly material, 80%; gray shale, as above, 10%; limestone, medium red (10R5/2), very silty, soft, slightly micaceous, 10%.
- 380-384 Limestone, pale reddish brown (10R5/4), 4/10; medium light gray (N6), 4/10, micaceous; siltstone, light brownish gray (5YR6/1) 2/10—very finely clastic, shaly, 50%; shale, dark reddish brown, as above, 30%; shale, gray, as above, 20%.
- 384-390 Shale, grayish red (5R/2), slightly calcareous, some slightly silty, some with trace mica, 90%; shale, gray, as above, 10%.
- 390-400 Ditto.

Interval

- 400-408 Siltstone, grayish red (10N4/2), coarse-grained, subrounded, very poorly sorted, shaly, very calcareous cement, micaceous, 70%; shale, red, as above, 10%; shale, gray, as above, 10%.
- 408-414 Shale, medium gray (N5), very calcareous, slightly silty and micaceous, 80%; limestone, medium gray (N5), finely clastic, shaly, 10%; siltstone, as above, to shale, red, 10%.
- 414-420 Limestone, medium gray (N5), finely to medium clastic, shaly, 70%; shale, medium gray (N5), as above, 20%; siltstone to shale, red, 10%.
- 420-426 Limestone, medium gray (N5), medium to some coarsely clastic, slightly mottled with very light gray, 20%; limestone, medium gray (N5), shaly, as above, 30%; shale, medium light gray (N6), slightly calcareous, 20%; shale, grayish red (10N4/2), 20%.
- 426-431 Limestone, medium gray, shaly, as above, some silty, 50%; shale, medium gray, as above, calcareous, 20%; limestone, medium gray, medium to coarsely clastic, as above, 10%; shale, red, as above, calcareous, 20%.
- 431-436 Shale, grayish red (10N4/2), silty, some slightly calcareous, 70%; shale, medium gray (N5), silty, very slightly calcareous, 20%; limestone, as above, finely clastic and shaly, some medium clastic, 10%.
- 436-440 Shale, red, as above, 90%; shale, gray, as above, 10%; trace limestone, as above.
- 440-445 Shale, grayish red (5R4/2), slightly micaceous, part silty.
- 445-449 Shale, medium light gray (N6), slightly micaceous, some silty, 60%; shale, light grayish red (5R5/2), slightly micaceous, some silty, 40%.
- 449-453 Shale, medium light gray (N6), as above, calcareous, 85%; shale, red, as above, 15%.
- 453-460 Limestone, medium dark gray (N5), finely clastic, slightly shaly, 50%; shale, medium light gray (N6), as above, 50%.
- 460-468 Ditto: limestone, 40%; shale, 60%.
- 468-476 Sandstone, very light gray (N3), very fine-grained, subrounded, moderately well sorted, slightly peppered with fine black mineral, 50%; limestone, as above, 25%; shale, as above, 25%; trace pyrite.
- 476-484 Limestone, medium dark gray (N4), very finely clastic, shaly, 60%; sandstone, as above, 20%; shale, as above, 20%; trace calcite and pyrite.
- 484-491 Limestone, as above, 80%; shale, 20%.
- 491-497 Ditto.
- 497-503 Limestone, as above, finely to medium clastic.

Interval

- 503-510 Shale, medium gray (N5), calcareous, 90%; limestone, as above, 10%.
- 510-516 Shale, medium dark gray (N4), calcareous, 70%; limestone, medium dark gray (N4), finely clastic, very shaly, 20%; shale, medium gray (N5), as above, 10%; trace coal (1 piece).
- 516-522 Shale, medium dark gray, very calcareous, as above, 70%; limestone, as above, 30%.
- 522-529 Ditto: shale, 50%; limestone, 50%.
- 529-534 Limestone, as above, 70%; shale, medium gray (N5), silty, calcareous, 10%; shale, grayish red (5N₄/2), slightly micaceous, 20%.
- 534-539 Shale, medium light gray (N6), slightly calcareous, some slightly silty, 80%; shale, red, as above, 20%.
- 539-544 Ditto: shale, gray, 70%; shale, red, calcareous, 30%.
- 544-549 Ditto: shale, gray, 60%; shale, red, calcareous, 40%.
- 549-555 Shale, medium gray (N5), calcareous, 90%; shale, red, as above, 10%.
- 555-561 Shale, gray, as above, 50%; limestone, medium gray (N5), finely clastic, very shaly, 50%.
- 561-568 Limestone, as above, little less shaly, 65%; shale, as above, 35%.
- 568-574 Shale, as above (N4.5), 70%; limestone, 30%.
- 574-581 Shale, medium light gray (N6), slightly silty and micaceous; trace pyrite.
- 581-587 Ditto, part slightly calcareous.
- 587-593 Shale, medium dark gray (N4), some silty; trace of mica, 90%; limestone, medium dark gray (N4), medium clastic, some silty to sandy, 10%.
- 593-601 Shale, medium light gray (N6), 50%; shale, medium light gray (N6), very silty approaching very fine-grained siltstone, 50%.
- 601-605 Sandstone, very light gray (N8), very fine-grained, subrounded, rather poorly sorted, shaly, some dark mineral inclusions, small clusters, 60%; shale, medium gray (N5), slight to very silty, 30%; shale, medium dark gray (N4), slightly calcareous, 20%; trace pyrite.
- 605-608 Siltstone, very light gray (N8), subrounded to rounded, moderately well sorted, friable with very few clusters, few dark grains, 80%; shales, as above, 20%; trace pyrite.
- 608-611 Sample missing.
- 611-613 Sandstone, light gray (N7), very fine-grained, subrounded to sub-angular, rather poorly sorted, shaly, peppered with brown mineral, 85%; shales, as above, 15%.

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Interval

- 613-618 Sandstone, as above, 80%; shale, as above, part very calcareous, 15%; shale, grayish red (10M4/2), 5%.
- 619-623 Sandstone, white (N9), fine-grained, subrounded to subangular, well sorted, friable, 85%; shale, medium gray (N5), finely micaceous, 7%; shale, grayish black (N2), some carbonaceous, 6%; shale, red, as above, 2%.
- 623-625 Sandstone, as above, very fine-grained, 95%; shale, carbonaceous, as above, 5%.
- 626-628 Ditto.
- 628-630 Ditto: fine-grained, few shaly clusters, 90%; shale, medium gray (N5), some grayish black and carbonaceous, little red as above, 10%; trace pyrite.
- 630-632 Ditto.
- 632-638 Ditto: sandstone, 97%; shale, gray, 3%.
- 638-642 Sandstone, as above, few clusters, 95%; shale, medium gray, 3%; shale, medium dark gray (N4), calcareous, 2%; trace pyrite.
- 642-646 Sandstone, as above, trace coarse-grained sand, 95%; shales, as above, and red, 5%.
- 646-650 Sandstone, as above, 90%; shale, medium dark gray (N4), 5%; shale, very dusky red, (10R2/2), 2%.
- 650-652 Sandstone, as above, 93%; shale, medium dark gray (N4), 3%; shale, medium gray (N5), calcareous, 2%; shale, red, 2%.
- 652-654 Sandstone, as above, 98%.
- 654-656 Ditto.
- 656-658 Ditto, very fine-grained.
- 658-660 Ditto.
- 660-662 Ditto.
- 662-663 Ditto.
- 663-665 Ditto.
- 665-667 Ditto, iron staining.
- 667-669 Ditto, fine-grained to very fine-grained.
- 669-671 Ditto, very fine-grained.
- 671-673 Ditto, very fine-grained, not as well sorted.

Interval

- 673-678 Ditto, fine-grained, some very fine-grained.
- 676-678 Ditto, very fine-grained; trace white calcite.
- 678-682 Coal, good conchoidal fracture, about 10%; sandstone, as above, 50%; pyrite, 10%.
- 682-683 Sandstone, as above, 50%; shale, dark gray (N3), carbonaceous, 20%; shale, medium gray (N5), silty, 30%; numerous pyrite pieces.
- 683-688 Shale, medium gray (N5), calcareous to very slightly calcareous, very slightly silty.
- 688-693 Shale, as above, 75%; siltstone, light gray (N7), medium-grained, subrounded, shaly, slightly micaceous, 25%.
- 693-697 Siltstone, coarse-grained, as above, 90%; shale, medium dark gray and medium gray (N4-5), 10%; trace pyrite.
- 697-700 Shale, dusky red (10R3/2), 40%; limestone, medium light gray (N6), medium clastic, mottled with very light gray, 30%; shale, dusky purple (5P3/2), 15%; shale, medium gray (N5), 15%.
- 700-703 Ditto.
- 703-712 Shale, brown (5YR2/2), silty, 30%; shale, red, as above, 30%; shale, medium gray to medium light gray (N5-6), silty, some slightly micaceous, 30%; limestone, as above, 10%; trace pyrite.
- 712-721 Ditto: shale, gray, 50%; shale, brown, 30%; shale, red, 15%; limestone, 5%.
- 721-724 Sandstone, light gray (N7), very fine-grained, subrounded, poorly sorted, silty to shaly, friable, 70%; shale, medium gray (N5), very finely micaceous, very slightly silty, 20%; siltstone, very light gray, well cemented, 10%.
- 724-727 Sandstone, pale brown (5YR5/2), as above.
- 727-730 Shale, medium dark gray (N4), finely micaceous, 50%; siltstone, pale brown, as above, 40%; shale, blackish red (5R2/2), finely micaceous, 10%.
- 730-733 Shale, greenish gray (5G6/1), silty, finely micaceous, 50%; shale, medium gray, 25%; shale, medium light gray (N6), 25%; numerous pieces angular clear medium-grained quartz and little white calcite fragments; trace pyrite.
- 733-737 Ditto.
- 737-742 Shale, medium gray (N5), finely micaceous, 60%; shale, grayish red (5R4/2), 25%; limestone, light brownish gray (5YR6/1), shaly, 15%.

Interval

- 712-718 Ditto: shale, medium gray (N5), 50%; limestone, to some calcareous shale, 30%; shale, red, as above, 20%.
- 718-751 Shale, medium gray (N5), micaceous, very slightly silty; trace red shale.
- 751-754 Ditto.
- 754-758 Siltstone, light gray (N7), medium-grained, subrounded, shaly, few dark mineral grains, 40%; shale, as above, more micaceous, 60%.
- 758-761 Shale, as above, slightly micaceous, 60%; siltstone, as above, 40%.
- 761-767 Siltstone, fine-grained, rather well cemented, 70%; shale, as above, 30%.
- 767-771 Shale, medium dark gray (N4), very finely micaceous, 70%; siltstone, as above, 10%; sandstone, very light gray (N3), very fine-grained, subrounded, moderately poorly sorted, shaly, few dark and brown minerals, clustered, 20%; trace red shale.
- 771-775 Shale, medium dark gray, as above, 70%; sandstone, as above, 30%; trace red shale.
- 775-776 Sandstone, as above, friable, 80%; shale, as above, 20%.
- 776-777 Ditto: sandstone, 75%; shale, 25%.
- 777-779 Ditto.
- 779-781 Ditto.
- 781-786 Shale, grayish red (10P₂/2), finely micaceous, 50%; shale, medium gray (N5), slightly silty, finely micaceous, 25%; shale, medium gray, 25%.
- 786-791 Ditto.
- 791-796 Ditto, part of gray shale calcareous.
- 796-801 Ditto: gray shale, 75%; red shale, 25% — calcareous.
- 801-806 Shale, gray, 85%; red, 25%.
- 806-808 Shale, gray, part silty, 85%; red, 15%.
- 808-813 Ditto, part very slightly micaceous, 85%; red, 15%.
- 813-818 Limestone, medium dark gray (N4), finely clastic, very slightly mottled with light gray, 25%; shale, gray, as above, 50%; shale, red, 25%.
- 818-824 Shale, medium gray (N5), 30%; shale, medium gray (N5), silty, micaceous, 30%; shale, red, as above, 30%; limestone, as above, 10%.
- 824-829 Shale, medium dark gray (N4), 50%; shale, medium gray (N5), very silty approaching siltstone, part calcareous, 50%.

Interval

- 829-834 Shale, grayish red (524/2), very slightly micaceous, 50%; shale, dark greenish gray (524/1), 50%.
- 834-840 Ditto.
- 840-845 Ditto: red shale, 30%; greenish gray, 70%. (Sample dirty).
- 845-850 Ditto: red shale, 40%; greenish gray, very slightly micaceous, 60%.
- 850-858 Ditto: red shale, 25%; greenish gray, 75%. (Sample dirty).
- 858-863 Ditto.
- 863-868 Shale, medium gray (N5), part slightly silty.
- 868-874 Siltstone, medium gray (N5), medium-grained, subrounded, shaly, 40%; shale, as above, 50%; shale, medium dark gray (N4), slightly silty, 10%.
- 874-880 Siltstone, as above, 50%; shale, medium gray, as above, 30%; shale, medium dark gray, more carbonaceous, some slightly silty, 20%.
- 880-885 Siltstone, as above, 70%; shale, medium gray (N5), very silty, 15%; shale, medium dark gray, very little carbonaceous, 15%; trace red shale.
- 885-889 Sandstone, pinkish gray (512/1), to white (N9), very fine-grained, subrounded to subangular, moderately well sorted, friable, 75%; shale, grayish red (10W/2), 15%; shale, medium dark gray (N4), 10%.
- 889-893 Ditto: sandstone, 75%; red shale, 5%; medium dark gray shale, 20%; trace calcite.
- 893-897 Ditto, more calcite.
- 897-898 Sandstone, white (N9), very fine-grained, subrounded to subangular, moderately well sorted, friable, with trace mica, 80%; shale, medium gray to medium dark gray, 20%; trace calcite.
- 898-903 Sandstone, as above, clustered, very slightly calcareous cement, very slightly peppered with dark mineral, 55%; shale, medium dark gray, 15%.
- 903-907 Ditto: friable with few small clusters, not as well sorted, 90%; shale, 10%.
- 907-910 Ditto: sandstone, 95%; shale, 5%.
- 910-914 Ditto: sandstone, 98%; shale, 2%.
- 914-918 Ditto.
- 918-920 Ditto, subangular to subrounded.
- 920-922 Ditto.

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Interval

- 922-928 Sandstone, very light gray (N3), very fine-grained, subangular to subrounded, moderately well sorted, part clustered with few dark mineral inclusions and slightly calcareous cement, some lenses of interbedded dark shaly coal, 90%; shale, dark gray (N3), 10%; trace pyrite and red shale.
- 928-930 Ditto: sandstone, friable, 95%; shale, 5%.
- 930-934 Ditto.
- 934-937 Ditto, very light gray to white sandstone.
- 937-939 Ditto, white sandstone.
- 939-941 Ditto: sandstone, 90%; shale, medium dark gray (N4), finely micaceous, 10%.
- 941-942 Ditto: sandstone, 70%; shale, 30%.
- 942-945 Shale, medium dark gray (N4), little silty, somewhat micaceous.
- 945-958 Shale, medium gray (N5), very slightly silty, very finely micaceous, 75%; shale, as above, 25%.
- 958-959 Shale, medium dark gray (N4), very finely micaceous, 90%; shale, medium gray, as above, 10%.
- 959-961 Shale, medium dark gray (N4), as above, very slightly calcareous, 90%; shale, medium gray, as above, 50%.
- 961-966 Shale, medium dark gray (N4), as above, 50%; shale, medium gray, very silty, 50%.
- 966-971 Ditto: medium gray shale very slightly calcareous.
- 971-976 Shale, light grayish purple (5M5/2), trace very finely micaceous mineral, 50%; shale, medium gray (N5), 50%.
- 976-981 Ditto, slightly silty.
- 981-985 Shale, purple, as above, part silty, trace very finely micaceous material, 35%; shale, medium gray (N5), very finely micaceous, 35%; shale, medium gray (N5), silty, 30%; trace white anhydrite.
- 985-995 Shale, purple, as above, 70%; shale, medium light gray (N6).
- 995-1002 Ditto: purple shale, micaceous, 50%; gray shale, 50%.
- 1002-1009 Ditto: purple shale, very finely micaceous, 60%; shale, medium light gray and medium gray, 40%.
- 1009-1018 Samples missing.

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Interval

- 1018-1023 Shale, medium gray (N5).
- 1026-1040 Shale, ditto, slightly calcareous.
- 1040-1049 Ditto, some very slightly micaceous.
- 1049-1060 Ditto, some slightly calcareous.
- 1060-1065 Shale, medium dark gray, some very slightly micaceous, little very slightly calcareous, one piece with some interbedded anhydrite.
- 1065-1070 Shale, medium gray (N5), finely micaceous, some silty.
- 1070-1075 Shale, medium gray (N5), finely micaceous; trace red shale.
- 1075-1080 Ditto.
- 1080-1085 Shale, medium light gray (N6), very finely micaceous.
- 1085-1090 Shale, medium dark gray (N4), very slightly silty, moderately finely micaceous, 80%; shale, very light gray (N6), very silty, 20%; considerable pyrite.
- 1090-1095 Shale, medium dark gray (N4), slightly silty, moderately very finely micaceous.
- 1095-1100 Ditto, 85%; shale, medium light gray (N6), very silty, 15%.
- 1100-1102 Shale, dark gray (N3), part finely micaceous, 60%; shale, grayish black (N2), carbonaceous, 20%; coal, some shaly 10%; shale, red, 5%; sandstone, very light gray (N3), very fine-grained, subrounded to subangular, moderately well sorted, slightly shaly, 10%; numerous pieces pyrite.
- 1102-1106 Shale, dark gray, as above, 85%; shale, grayish black, as above, ~~xxxxxx~~, 10%; sandstone, as above, 5%.
- 1106-1107 Sandstone, as above, friable, 85%; shale, grayish black, as above, and some shaly coal, 15%.
- 1107-1109 Ditto: sandstone, 80%; shale, 20%.
- 1109-1111 Ditto: sandstone, 90%; shale, 10%; trace pyrite.
- 1111-1116 Ditto: sandstone, 95%; shale, 5%.
- 1116-1119 Coal, 25%; shale, grayish black (N2), carbonaceous, part non-carbonaceous, 40%; sandstone, as above, 35%.
- 1119-1123 Siltstone, medium light gray (N6), medium-grained, subrounded, moderately well sorted, few dark grains, 60%; shale, medium gray (N5), finely micaceous, 20%; sandstone, light gray (N7), very fine-grained, subrounded, moderately well sorted, friable, 20%; trace pyrite.
- 1123-1130 Shale, medium light gray (N4).

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Interval

- 1130-1136 Ditto.
- 1136-1146 Ditto.
- 1146-1154 Ditto.
- 1154-1156 Shale, medium dark gray (N4), finely micaceous, 60%; limestone, medium dark gray (N4), finely clastic, some medium crystalline, slightly mottled, 40%.
- 1156-1161 Shale, medium dark gray, very calcareous, some approaching shaly limestone.
- 1161-1166 Siltstone, light gray (N7), medium-grained, subangular, shaly, slightly calcareous, 35%; shale, medium gray (N5), very finely micaceous, 35%; shale, medium dark gray, as above, 15%; limestone, medium dark gray (N4) shaly, fossiliferous, 15%.
- 1166-1170 Siltstone, as above, slightly micaceous, 50%; shale, medium light gray (N6), somewhat finely micaceous, 20%; shale, medium gray (N5), as above, 15%; shale, medium dark gray, as above, extremely calcareous, 15%.
- 1170-1179 Siltstone, very calcareous, as above, 50%; shale, medium dark gray (N4), as above, 20%; limestone, medium dark gray (N4), finely clastic to finely crystalline, fossiliferous, 20%; shale, medium gray (N5), finely micaceous, 10%.
- 1179-1184 Shale, light gray (N7), silty, calcareous, 50%; shale, medium dark gray, as above, some non-calcareous, to very calcareous approaching limestone, 40%; shale, medium gray, finely micaceous, 10%.
- 1184-1189 Shale, light gray to medium gray (N7-5), silty, non-calcareous, 70%; shale, medium dark gray, calcareous, 15%; shale, medium gray, finely micaceous, 15%.
- 1189-1200 Shale, medium light gray (N6), calcareous to very calcareous.
- 1200-1206 Ditto.
- 1206-1212 Ditto.
- 1212-1217 Ditto.
- 1217-1222 Ditto.
- 1222-1230 Shale, as above, 90%; limestone, medium light gray (N6), finely clastic.
- 1230-1236 Shale, as above, 95%; shale, medium light gray (N6), calcareous, slightly silty, 5%.
- 1236-1241 Shale, as above, 90%; limestone, medium gray (N5), finely clastic, part dolomitic, shaly, 10%.

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Interval

- 1241-1246 Shale, as above, 85%; limestone, as above, 12%; white anhydrite, 3%.
- 1246-1257 Shale, as above.
- 1257-1263 Ditto, slightly silty.
- 1263-1268 Limestone, medium dark gray (N4), finely elastic with some coarsely crystalline, part mottled with very light gray, part medium elastic and oolitic, 50%; shale, as above, medium dark gray (N4), 50%.
- 1268-1270 Limestone, as above, finely elastic, slightly mottled with light gray, ~~part mottled with~~ 70%; shale, 30%, very small pieces.
- 1270-1275 Ditto: limestone, 40%; shale, 60%.
- 1275-1280 Ditto: limestone, 70%; shale, 30%; oil residue in acid.
- 1280-1285 Ditto: limestone, 80%; shale, 20%.
- 1285-1290 Ditto: limestone, 90%; shale, 10%.
- 1290-1294 Ditto: limestone, 90%; shale, 10%; trace white calcite.
- 1294-1455 Samples missing. *See next page.*
- 1455-1463 Shale, medium gray (N5), some slightly calcareous, part slightly silty, part slightly micaceous, fossiliferous (crinoid); trace limestone.
- 1463-1471 Ditto, (ostracod); trace pyrite.
- 1471-1479 Ditto (no fossil noted), more calcareous.
- 1479-1487 Ditto, calcareous (pelecypod?).
- 1487-1493 Limestone, medium light gray (N6), mottled with very light gray, 60%; shale, as above, 40%.
- 1493-1500 Limestone, medium gray (N5), very shaly, very finely elastic, 85%; shale, as above, 15%.
- 1500-1510 Ditto, some very slightly mottled with very light gray; trace crinoid.
- 1510-1520 Ditto.
- 1520-1530 Ditto.
- 1530-1542 Shale, medium light gray (N6), some slightly calcareous to calcareous.
- 1542-1555 Shale, medium gray (N5), finely micaceous, 55%; shale, as above, slightly silty, 30%; limestone, medium gray (N5), mottled with light gray, 10%; calcite, white, 5%.
- 1555-1567 Limestone, medium gray (N5), finely elastic, slightly mottled with light gray, crinoidal, 50%; shale, medium gray (N5), finely micaceous, 40%; shale, medium gray, slightly silty, 10%.

Interval

- 1294-1299 Shale, dark gray (N3), part finely micaceous, part carbonaceous, 85%; coal, some shaly, 10%; limestone, as above, 5%; trace white calcite and pyrite.
- 1299-1304 Shale, as above, 70%; coal, 10%; sandstone, very light gray (N3), very fine-grained, subrounded to subangular, well sorted, friable, 20%.
- 1304-1309 Sandstone, as above, considerable iron staining, 85%; shale, as above, 15%.
- 1309-1315 Shale, medium dark gray (N4), trace finely micaceous material, 60%; sandstone, medium light gray (N6), very fine-grained, subangular to subrounded, very poorly sorted, well cemented, 35%; sandstone, very light gray, as above, 5%; trace calcite and pyrite.
- 1315-1321 Shale, as above, 60%; sandstone, medium light gray, as above, 20%; sandstone, very light gray, as above, slight calcareous cement, 20%.
- 1321-1329 Siltstone, medium light gray to medium gray, as sandstone above, 50%; siltstone, very light gray to light gray (N3-7), coarse-grained, subrounded, very poorly sorted, very well cemented, 25%; shale, as above, 25%.
- 1329-1335 Sample missing.
- 1335-1345 Shale, medium gray (N5), 50%; siltstone, very light gray to light gray, 50%.
- 1345-1355 Shale, as above, 85%; siltstone, 15%.
- 1355-1365 Ditto: shale, 85%; siltstone, part with slightly calcareous cement, 15%; trace pyrite.
- 1365-1369 Ditto.
- 1369-1377 Shale, medium dark gray (N4), as above, 90%; siltstone, as above, calcareous, 10%; trace pyrite.
- 1377-1385 Shale, medium gray (N5), about fifth calcareous.
- 1386-1394 Shale, medium gray (N5); trace brown shale.
- 1394-1402 Shale, as above, 95%; limestone, medium gray (N5), and very light shale, 5%.
- 1402-1412 Shale, medium dark gray (N4).
- 1412-1422 Ditto.
- 1422-1432 Ditto, very slightly calcareous.
- 1432-1442 Ditto.
- 1442-1455 Ditto.

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Interval

- 1567-1570 Limestone, as above, shaly, 75%; shales, as above, 25%. (Sample dirty)
- 1570-1574 Ditto.
- 1574-1578 Ditto.
- 1578-1582 Limestone, dark gray (N3), finely clastic, some medium crystalline, little dolomitic, 60%; shales, as above, 30%; shale, dark gray (N3), 10%.
- 1582-1585 Ditto.
- 1585-1588 Limestone, dark gray, as above, 50%; shales, as above, 20%; shale, dark gray (N3), 30%; trace pyrite.
- 1588-1592 Limestone, as above, 70%; shales, 10%; shale, dark gray, 20%.
- 1592-1595 Limestone, as above, some light gray, 70%; shale, dark gray, 30%; trace pyrite.
- 1595-1599 Ditto.
- 1599-1608 Shale, grayish red (5N4/2), very slightly calcareous, slightly silty, 40%; shale, medium light gray (N6), very slightly calcareous, some very slightly silty, 40%; shale, medium dark gray (N4), 20%.
- 1608-1618 Shale, grayish red, as above, 50%; shale, medium light gray, 40%; shale, medium dark gray, 10%.
- 1618-1628 Siltstone, medium light gray (N6), coarse-grained, poorly sorted, very calcareous cement, 40%; shale, medium light gray (N6), calcareous, slightly silty, 40%; shale, medium dark gray, 20%.
- 1628-1638 Shale, medium light gray, as above, 50%; shale, medium gray (N5), finely micaceous, calcareous, 30%; siltstone, as above, 20%; trace red shale and very light gray limestone.
- 1638-1648 Shale, medium light gray (N4), calcareous, slightly silty, 75%; limestone, medium dark gray (N4), medium clastic, crinoidal, 25%.
- 1648-1651 Limestone, as above, part very light gray and medium crystalline, 40%; shale, as above, 60%.
- 1651-1662 Siltstone, medium light gray (N6), coarse-grained, poorly sorted, shaly, calcareous, 50%; shale, medium dark gray (N4), trace finely micaceous material, 50%; trace fossiliferous limestone, as above.
- 1662-1673 Limestone, medium gray (N5), medium clastic to little crystalline, part very shaly, 75%; shale, medium gray (N5), 25%.
- 1673-1684 Ditto: limestone, crinoidal, 60%; shale, 40%.
- 1684-1696 Ditto: limestone, to coarsely clastic, trace coarsely crystalline, very crinoidal, 80%; shale, 20%.

Interval

- 1696-1708 Limestone, medium dark gray (N4), as above, some oolitic (ooliths 1/3 mm.), slightly fossiliferous, 90%; shale, medium dark gray (N4), 10%.
- 1708-1720 Ditto, few ooliths to 2/3 mm.
- 1720-1725 Limestone, medium gray (N5), medium to coarsely clastic, few coarsely crystalline with trace calcite, crinoidal, part finely clastic, 85%; shale, as above, 15%.
- 1725-1730 Shale, medium gray (N5), finely micaceous, 40%; shale, medium dark gray (N4), 10%; siltstone, medium light gray (N6), very fine-grained, very calcareous, well cemented, 40%; limestone, as above, some red, 10%.
- 1730-1752 Shale, pale brown (5YR5/2), silty, very slightly calcareous, 40%; shale, medium gray (N5), some very slightly silty, finely micaceous, 40%; siltstone, as above, and pale red (5R4/2), 20%; trace limestone and crinoid stem.
- 1752-1762 Limestone, medium dark gray (N4), medium clastic, some coarsely crystalline and trace finely crystalline, very oolitic (ooliths 1/2-1 mm.), often dark gray ooliths in very light gray matrix, little brownish gray, fossiliferous (Bryozoa, crinoid), 60%; shale, medium light gray (N6), slightly calcareous, very finely micaceous, 40%.
- 1762-1791 Ditto: limestone, (some 1/2 mm.), 70%; shale, 30%.
- 1791-1802 Ditto: limestone, 80% (fish scale?, crinoid); shale, 20%.
- 1802-1815 Limestone, as above, less oolitic, more light gray limestone and coarsely crystalline light gray limestone, crinoidal, 80%; shale, 20%.
- 1815-1825 Limestone, medium dark gray (N4), very finely clastic to some very finely crystalline, shaly, fossiliferous (crinoid and fragments).
- 1825-1835 Limestone, medium gray (N5), as above, slightly fossiliferous.
- 1835-1845 Limestone, as above, trace coarsely crystalline light gray limestone.
- 1845-1861 Ditto.
- 1861-1882 Ditto, 1825-1835.
- 1882-1892 Limestone, dark gray (N3), very finely clastic to very finely crystalline, trace coarsely crystalline, shaly; trace pyrite.
- 1892-1907 Limestone, medium gray (N5), very finely clastic with little crystalline, 80%; limestone, medium gray to light gray (N5-7), medium and coarsely clastic, some coarsely crystalline, fossiliferous (crinoid and fragments), 20%.

Interval

- 1907-1917 Limestone, medium dark gray (N4), very finely clastic to very finely crystalline, shaly; trace medium dark gray calcareous shale.
- 1917-1932 Ditto.
- 1932-1937 Ditto; trace fossil impression.
- 1937-1946 Ditto: limestone, medium gray (N5)1
- 1946-1956 Ditto, very shaly.
- 1956-1970 Limestone, medium gray, very finely clastic, shaly.
- 1970-1980 Ditto.
- 1980-1991 Ditto; trace/^{very}light gray limestone.
- 1991-2002 Shale, red (5R5/2), very slightly calcareous, trace finely micaceous material, 35%; limestone, red, as above, shaly, slightly fossiliferous, 20%; limestone, medium light gray to medium dark gray (N6-4), as above, 45%.
- 2002-2020 Limestone, medium gray (N5), finely clastic, and shaly, 45%; limestone, medium gray (N5), medium clastic, some mottled with light gray, 35%; limestone, red, as above, 20%.
- 2020-2040 Limestone, medium dark gray (N4), finely clastic to some medium clastic, and little coarsely crystalline; trace oolitic, 60%; limestone, light gray, finely clastic, some coarsely crystalline, 30%; limestone, red, as above, 20%.

Samples run by Eloise T. Jacobsen,
Geologist, U. S. Geological Survey
Lexington, Kentucky, May-June, 1949

UNITED FUEL GAS COMPANY

Number 6470

Geographic location: 0.85 miles South of Sand on Red Oak Ridge.

Minerals quadrangle, Mercer County, West Virginia.

Total Depth: 4014'.

Interval

- 2040-2046 Limestone, medium dark gray (M), somewhat mottled with very light gray (L), $\frac{1}{2}$ medium dark gray (M), slightly nodular with very finely clastic matrix, very light gray, very coarsely crystalline, and slightly crinoidal.
- 2046-2055 Limestone, slightly shaly, medium dark gray (M), as above, nodules slightly smaller and more numerous, smaller part very light gray and very finely clastic to coarsely crystalline, fossiliferous (crinoid and macrofossil fragments.)
- 2055-2065 Limestone, as above, less nodular, no fossils noted.
- 2065-2070 Limestone, very shaly, dark gray (D), very finely clastic.
- 2070-2075 Limestone, medium dark gray (M), very finely clastic, matrix, very slightly nodular and crinoidal, somewhat mottled with very light gray limestone.
- 2075-2091 Limestone, medium clastic with about 1/2 very finely clastic matrix, more crinoidal.
- 2091-2093 Limestone, as above, medium clastic with very finely clastic matrix, crinoidal, fragment of pelocypod (?), and other macrofossil fragments, about 1/3 very light gray limestone, very coarsely crystalline to some very finely clastic, slightly nodular.
- 2093-2103 Siltstone, medium clastic, about 1/2 very light gray limestone.
- 2103-2117 Limestone, very shaly, medium dark gray (M), very finely clastic.

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Interval

- 2117-2132 Limestone, medium dark gray (M4), medium clastic, with very finely clastic matrix, slightly nodular, crinoidal, somewhat mottled with very light gray very coarsely crystalline and very finely clastic limestone.
- 2132-2134 Limestone, medium-grained, medium dark gray to very light gray (N5-A-3), as above, crinoidal, about 1/2 very light gray limestone.
- 2134-2144 Limestone, medium dark gray, nodular (1/2-1 in.) with very finely clastic matrix predominating, slightly mottled with slightly crinoidal very coarsely crystalline to some very finely clastic, very light gray limestone, very slight trace shale.
- 2144-2157 Limestone, shaly, finely clastic, medium dark gray (M4), slight trace very small nodules as above.
- 2157-2167 Limestone, slightly shaly, as 2134-2144, fossiliferous? ostracod, microfossil fragments, crinoids, coral (?); trace pyrite and calcite.
- 2167-2176 Limestone, slightly shaly to shaly, medium dark gray (M4), finely clastic.
- 2176-2186 Limestone, as above, shaly.
- 2186-2196 Limestone, medium dark gray (M4), finely clastic, some mottling with very light gray (N5), very coarsely crystalline to very finely clastic limestone, very slightly crinoidal, very slightly shaly.
- 2196-2206 Ditto.
- 2206-2215 Ditto, about 20% very light gray limestone, very finely clastic to very coarsely crystalline.
- 2215-2223 Ditto.
- 2223-2231 Limestone, slightly shaly to very slightly shaly, medium dark gray (M4), finely clastic; trace sandy limestone.
- 2231-2238 Limestone, as above; some light gray (N7), finely crystalline to finely clastic, very slightly shaly limestone.
- 2238-2248 Ditto.
- 2248-2257 Ditto, shaly; about 20% light gray limestone, finely clastic, some very coarsely crystalline.
- 2257-2262 Limestone, slightly shaly, medium light gray (N6) and very light gray (N5), medium clastic, some of very light gray coarsely crystalline to finely clastic, slightly crinoidal; trace light brownish gray chert.

Interval

- 2262-2274 Limestone, very slightly shaly, brownish gray (5YR 4/1), as above, about 10% very light gray, slightly nodular, more chert.
- 2274-2283 Limestone, slightly shaly, medium light gray (N6), part very light gray, finely clastic, very slightly crinoidal (very light gray (N8)).
- 2283-2293 Limestone, as above, more crinoidal.
- 2293-2303 Limestone, medium dark gray (N4), very finely clastic, very slightly shaly.
- 2303-2314 Limestone, as above, slightly shaly, trace crinoids, part nodular and medium clastic.
- 2314-2325 Limestone, as above, shaly, finely clastic to medium clastic, considerable nodular.
- 2325-2336 Ditto, non-shaly and small part oolitic, less nodular than above.
- 2336-2346 No sample.
- 2346-2354 Limestone, medium brownish gray (5YR 5/1), mottled with very light gray (N6), finely clastic to little medium clastic, slightly nodular, very slightly shaly.
- 2354-2365 Limestone, as above, very finely clastic, very slightly nodular, very slight trace of shaly material.
- 2365-2379 Ditto, slightly nodular.
- 2379-2389 Limestone, shaly, dark gray (N3), very finely clastic.
- 2389-2396 No sample.
- 2396-2406 Limestone, medium dark gray to medium gray mottled with very light gray, finely clastic, slightly crinoidal and trace of other fragments; considerable limestone, very light gray (N8), finely clastic, moderately soft, trace fossils.
- 2406-2414 Limestone, shaly, medium gray (N5), finely clastic, moderately soft, very slightly crinoidal.
- 2414-2421 Limestone, slightly shaly, dark gray (N3), very finely clastic, slight trace very small calcite veins, few macrofossil fragments.
- 2421-2435 Ditto.
- 2435-2447 Ditto, very slightly shaly to non-shaly, slightly mottled, with light gray (N7) limestone, some brachiopods, very slightly crinoidal and nodular.

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Interval

- 2447-2457 Limestone, slightly shaly to shaly, medium dark gray (N4), very finely clastic, very slight trace of crinoid and trace other fossil fragments.
- 2457-2465 Limestone, as above, with considerable medium light gray (N6), limestone, finely clastic, moderately soft, very slightly shaly, part slightly nodular (1/5 mm.), and medium clastic, trace macrofossil fragment.
- 2465-2475 Limestone, as above, slightly to very slightly shaly; trace calcite and trace larger medium dark gray nodules.
- 2475-2482 Ditto, shaly; no calcite nor larger medium dark gray nodules noted.
- 2482-2492 Limestone, dark gray (N3), very slightly shaly, very finely clastic, some part slightly mottled with lighter colored limestone, and very small part nodular (1/4 mm. in diameter).
- 2492-2498 Shale, calcareous, medium gray (N5), moderately soft.
- 2498-2503 Shale, as above, some limestone, shaly, medium gray (N5), with medium dark gray (N5) nodules.
- 2503-2510 Limestone, medium clastic, very slightly shaly, as above, nodular, very finely clastic matrix, fossiliferous (crinoids and other macrofossil fragments).
- 2510-2518 Ditto, some very light gray very finely clastic and soft; very slight trace oolitic.
- 2518-2525 Ditto; about 20% limestone, brownish gray (5YR 4/1), very finely clastic.
- 2525-2532 Limestone, very light gray (N8), finely clastic, soft to moderately soft, very slightly shaly.
- 2530-2542 Limestone, medium dark gray (N4), very finely clastic, very slightly shaly; and limestone, medium dark gray (N4), medium clastic to coarsely clastic, with very finely clastic, very light gray (N8) matrix, nodular and angular medium dark gray limestone, very slightly shaly.
- 2542-2547 Limestone, shaly to slightly shaly, medium gray (N5), very finely clastic, about 40% nodular, as above, with light gray very finely clastic matrix, trace oolite (?); trace coarsely crystalline white limestone.
- 2547-2557 Shale, calcareous to very calcareous, medium gray (N5), 50%; limestone, brownish gray (5YR 4/1), very finely clastic, 50%.
- 2557-2565 Shale, medium light gray (N6), as above.

Interval

- 2565-2575 Limestone, slightly shaly, medium light gray (N6), medium elastic, matrix finely elastic, very light gray (N6) and darker gray, nodular, slightly crinoidal.
- 2575-2585 Limestone, as above, finely elastic; shale, calcareous to very calcareous, medium gray (N5).
- 2585-2595 Limestone, medium dark gray (N4), with considerable light gray mottling, coarsely elastic with very finely elastic matrix, nodular with trace oolitic, trace very coarsely crystalline light gray limestone, slightly shaly, slightly fossiliferous, (crinoids and other macrofossil fragments).
- 2595-2603 Limestone, as above; about 30% limestone, dark gray (N3), very finely elastic, very slightly shaly.
- 2603-2613 Ditto; trace light brownish gray (5YR 6/1) chert.
- 2613-2623 Shale, calcareous, medium light gray (N6).
- 2623-2634 Ditto.
- 2634-2644 Limestone, slightly to very slightly shaly, medium gray (N5), medium elastic, light gray, angular limestone inclusions, some dark gray nodules.
- 2644-2647 Limestone, as above, medium elastic to coarsely elastic; some very coarsely crystalline light gray limestone, trace crinoids.
- 2647-2657 Ditto, coarsely crystalline, crinoidal, about 1/2 light gray limestone, trace shaly material.
- 2657-2665 Ditto.
- 2665-2675 Ditto, shaly, oolitic (1/3 to few 2/3 mm. in diameter).
- 2675-2683 Limestone, shaly, medium gray (N5), finely elastic.
- 2683-2692 Limestone, as 2665-2675, very light gray to dark gray, ooliths (1/3 to 1 mm. in diameter, matrix, light and dark gray) very*
- 2692-2702 Limestone, shaly, medium gray (N5), very finely elastic; some limestone, light gray (N7), slightly shaly, finely elastic, soft, little oolitic; trace crinoids.
- 2702-2709 Limestone, light brownish gray (5YR 6/1), very finely elastic, some light gray (N7), limestone, finely elastic and soft, trace oolites (1/3 mm).
- 2709-2717 Limestone, as above, medium dark gray (N4); about 1/2 light gray limestone, finely elastic to medium elastic.

*Fossiliferous (crinoid? brachiopod? and other macrofossil fragments).

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Interval

- 2717-2726 Limestone, shaly, medium dark gray (N1), finely clastic.
- 2726-2736 Limestone, as above.
- 2736-2745 Ditto, small part mottled with light gray.
- 2745-2750 Limestone, shaly, slightly sandy, medium clastic, medium dark gray, (N4), little oolitic and nodular, slightly mottled with light gray and part with light gray matrix, some light *
- 2750-2762 Shale, slightly calcareous to calcareous, medium light gray (N6), 60%; limestone, as above, very fossiliferous (crinoids, and fragments), no quartz grains noted, 40%.
- 2762-2774 Limestone, slightly shaly, as above, nodular, much with light gray matrix.
- 2774-2786 Limestone, slightly shaly, dark gray (N3), finely clastic; some light brownish gray (5M 6/1), chert.
- 2786-2796 Limestone, slightly sandy, dark gray (N3), mottled with light gray, coarsely clastic, oolitic (1/6-1 1/2 mm.), and nodular, considerable light gray, finely clastic, matrix, some very coarsely crystalline light gray limestone, crinoidal, some medium-grained quartz fragments.
- 2796-2807 Limestone, very shaly, medium light grayish red, purple (5 NP 5/2), finely clastic, granular.
- 2807-2818 Ditto.
- 2818-2828 Limestone, shaly to very slightly shaly, part dolomitic, medium light gray to medium dark gray (N6-4), finely clastic; about 15% chert, medium dark gray (N4) and light brownish gray (5M 6/1).
- 2828-2838 Limestone, slightly shaly, dark gray (N3), very finely clastic; little light gray (N7), limestone, very finely clastic, soft, very slightly shaly; chert, as above, 15%.
- 2838-2848 Limestone, as above, more light gray limestone; chert about 20%.
- 2848-2858 Limestone, as above; little less light gray limestone; chert about 15%; trace crinoids.
- 2858-2866 Limestone, very slightly shaly, medium dark gray (N4), finely clastic, chert as above, 10%; trace calcite.
- 2866-2874 Limestone, as above, dark gray (N3), part slightly mottled, with light gray; chert, 10%.
* gray (N7), medium clastic, slightly nodular and soft; rounded, and frosted coarse-grained, quartz.

Interval

- 2874-2885 Limestone, as above; about 20% light gray, finely clastic, soft limestone.
- 2885-2895 Ditto; little more chert.
- 2895-2900 Ditto, slightly shaly; about 20% chert.
- 2900-2913 Ditto, slightly shaly; about 40% light gray limestone; trace chert.
- 2913-2925 Ditto; about 30% light brownish gray chert.
- 2925-2936 Limestone, shaly, medium dark gray (N4), very finely clastic, 70%; limestone, light gray (N7), finely clastic, trace fossiliferous.
- 2936-2942 Limestone, very slightly shaly, medium dark gray, as above, 70%; limestone, very slightly shaly, medium light gray (N6), finely clastic, 30%.
- 2942-2953 Shale, medium light gray (N6), non-calcareous to little shaly limestone, as above.
- 2953-2963 Shale, as above, very slightly calcareous to part shaly limestone.
- 2963-2970 Limestone, slightly shaly, medium dark gray (N4), very finely clastic.
- 2970-2977 Shale, slightly calcareous to very slightly calcareous, medium light gray (N6), some sandy and very calcareous.
- 2977-2987 Shale, very slightly calcareous to calcareous, medium gray (N5).
- 2987-2994 Limestone, very slightly shaly, dark gray (N3), little very slightly mottled with light gray; trace fossiliferous.
- 2994-2998 Limestone, as above, slightly more mottled and fossiliferous.
- 2998-3008 Limestone, dolomitic, very slightly shaly to shaly, medium gray (N5), very finely clastic.
- 3008-3018 Dolomite, slightly shaly, medium gray (N5), some very coarse-grained to coarse-grained, very light gray (N6), chert fragments; considerable matrix dark gray (N4), slightly dolomitic, shale.
- 3018-3023 Limestone, very slightly shaly, medium dark gray (N4), very finely clastic; and limestone, very slightly shaly, medium light gray (N6), finely clastic.
- 3023-3030 Ditto.

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- 3030-3040 Dolomite, slightly shaly, slightly limy, medium light gray (M6), finely clastic, granular.
- 3040-3047 Anhydrite, very light gray (M8), medium crystalline; dolomite, slightly shaly, medium dark gray (M4), very finely clastic.
- 3047-3060 Dolomite, slightly limy to slightly shaly, medium light gray (M6.3), finely clastic, moderately soft.
- 3060-3070 Lito.
- 3070-3080 Dolomite, shaly, very slightly calcareous, medium dark gray (M4).
- 3080-3092 Dolomite, shaly, very slightly calcareous, medium light gray (M6), finely clastic, granular.
- 3092-3102 Shale, very slightly dolomitic, grayish red (5R 4/2); and shale, very slightly calcareous, medium light gray (M6), and light olive gray (5Y 6/1).
- 3102-3111 Shale, grayish red, as above; shale, greenish gray (5GY 6/1), slightly dolomitic.
- 3111-3124 Lito.
- 3124-3135 Dolomite, shaly, light gray (M7), finely clastic, granular; shale, as above.
- 3135-3140 Dolomite, light brownish gray (5YR 6/1), very finely clastic to very finely crystalline, granular.
- 3140-3152 Shale, very slightly dolomitic, greenish gray (5GY 6/1) and medium light gray (M6); shale, grayish red, as above, 50%.
- 3152-3164 Dolomite, slightly shaly, very slightly calcareous, medium dark gray (M4), finely clastic, hard; little medium dark gray, slightly dolomitic shale.
- 3164-3174 Lito, some with very small nodules.
- 3174-3181 Siltstone, slightly shaly, light gray (M7), coarse-grained, subrounded to subangular, poorly sorted, very slightly calcareous, moderately friable to moderately well cemented.
- 3181-3182 Lito, medium light gray (M6).
- 3182-3184 Graysack, medium light gray (M6) to very light gray (M8), very fine-grained, subangular to angular, very poorly sorted, (some medium-grained and few coarse-grained quartz grains noted), silt cement, about 65% quartzose, dark and green inclusions, from silt to fine-grained size and trace very fine-grained red inclusions, moderately friable.

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Interval

- 3184-3187 Graywacke, as above, about 90% quartzose, mostly loose grains, trace mica.
- 3187-3192 Ditto, very fine-grained to fine-grained.
- 3192-3195 Ditto, medium light gray (N6), fine-grained, about 70% quartzose, some clusters.
- 3195-3202 Ditto, calcareous cement.
- 3202-3209 Siltstone, light gray (N7), medium-grained, subrounded moderately well sorted, small black inclusions, very slightly micaceous, moderately friable.
- 3209-3212 Graywacke, light gray (N7), very fine-grained, as siltstone above, poorly sorted, slightly micaceous, about 60% quartzose, considerable silt cement.
- 3212-3217 Graywacke, ^{as above} mostly loose grains, some medium-grained angular quartz fragments.
- 3217-3224 Ditto, calcareous, small clusters, some medium- to coarse-grained angular quartz fragments, considerable black inclusions, about 50% quartzose.
- 3224-3237 Shale, medium dark gray (N4), slightly fissile, slightly micaceous.
- 3237-3246 Siltstone, shaly, calcareous, light gray (N7), fine-grained, subrounded, moderately well sorted, slightly micaceous, moderately well cemented to moderately friable.
- 3246-3254 Ditto, medium-grained.
- 3254-3261 Ditto, medium-grained to coarse-grained.
- 3261-3267 Shale, silty, medium dark gray (N4), micaceous; trace pyrite.
- 3267-3273 Shale, as above, slightly silty, very finely micaceous.
- 3273-3290 Siltstone, slightly calcareous to calcareous, shaly, light gray (N7), medium-grained, subrounded, slightly micaceous.
- 3290-3302 Shale, medium gray (N5), part silty and micaceous, part non-silty.
- 3302-3313 Shale, as above, slightly silty to silty, some with green mineral inclusions.
- 3313-3324 Siltstone, light gray (N7), medium-grained, subrounded, moderately well sorted, dark inclusions.

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Interval

- 3324-3328 Shale, silty, medium light gray (N6), finely micaceous, very slightly calcareous.
- 3328-3338 Shale, medium dark gray (N4), part silty, micaceous.
- 3338-3348 Shale, as above, silty to some non-silty.
- 3348-3356 Shale, very silty, medium light gray (N6), micaceous.
- 3364-3368 Bitto; and shale, medium gray (N5), very finely micaceous.
- 3368-3378 Siltstone, medium light gray (N6), medium-grained, subrounded, moderately well sorted, micaceous, dark and some green inclusions.
- 3378-3385 Siltstone, as above, shaly, coarse-grained.
- 3385-3398 Shale, medium-gray (4.5), silty to non-silty, micaceous.
- 3398-3408 Shale, as above; and shale, silty, medium light gray (N6), as siltstone above.
- 3408-3413 Siltstone, shaly, medium red (5R 5/2), medium-grained, subrounded, moderately poorly sorted; and shale, silty, medium red; siltstone, shaly, greenish gray (5GY 6/1), medium-grained, subrounded, poorly sorted, micaceous; pyrite in both red and green siltstone.
- 3414-3417 Siltstone, light olive gray (5Y 6/1), as above.
- 3417-3421 Siltstone, very slightly calcareous, coarse-grained.
- 3421-3427 Shale, very silty, (approaching shaly siltstone), medium light gray (N6), micaceous.
- 3427-3433 Siltstone, shaly, as silty shale above, medium-grained, moderately friable.
- 3433-3439 Siltstone, as above, light gray (N7).
- 3439-3441 Bitto, fine-grained.
- 3441-3447 Bitto, coarse-grained.
- 3447-3455 Shale, medium dark gray (N4), little slightly silty, very slightly micaceous.
- 3455-3468 Siltstone, medium light gray (N6), coarse-grained, subrounded, moderately well sorted, slightly micaceous, some dark inclusions, moderately friable.
- 3468-3475 Shale, medium dark gray (N4), micaceous.

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Interval

- 3475-3480 Siltstone, shaly, light gray (87), fine-grained, subrounded, rather poorly sorted, moderately friable to well cemented, slightly micaceous.
- 3480-3487 Siltstone, as above, slightly sandy, very poorly sorted to graywacke; fine-grained, as siltstone above, very poorly sorted, (medium-grained quartz grains noted), about 60% quartzose, fine-grained also black inclusions, micaceous, well cemented, pyrite crystals.
- 3487-3494 Ditto; very fine-grained, mostly loose grains.
- 3494-3496 Ditto, conglomeratic (quartz fragments to granule size), fine-grained; medium-grained size pyrite crystals.
- 3496-3504 Ditto, some smoky quartz, very fine-grained, clustered, moderately friable; pyrite crystals.
- 3504-3511 Ditto, (quartz fragments to very coarse-grained, trace pink quartz), fine-grained; pyrite crystals.
- 3511-3518 Ditto, mostly loose grains.
- 3518-3530 Shale, medium gray (84), very slightly fissile, moderately hard.
- 3530-3532 Ditto.
- 3532-3541 Ditto.
- 3541-3551 Shale, as above, sandy, micaceous, to graywacke, light gray (87), very fine-grained, angular to subangular, very poorly sorted, micaceous, black and green inclusions, silt cement, very well cemented; trace pyrite.
- 3551-3461 Shale, dark medium gray (84.6), very slightly fissile, slightly micaceous, trace pyrite.
- 3461-3471 Ditto.
- 3471-3480 Ditto, trace mica.
- 3480-3488 Ditto.
- 3488-3495 Shale, silty to very silty, medium gray (85), micaceous; trace pyrite.
- 3495-3602 Shale, dark medium gray (84.6), part very slightly silty, slightly micaceous.
- 3602-3619 Shale, medium-grained, part slightly silty, slightly micaceous; siltstone, shaly, medium light gray (86), fine-grained, subrounded, poorly sorted, slightly micaceous, well cemented; probably interbedded shale and siltstone, trace pyritized fossils.

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Interval

- 3619-3628 Shale, as above; siltstone, coarse-grained, with black inclusions, about 75% quartzose.
- 3629-3636 Ditto, shale, medium dark gray (N4); siltstone, very poorly sorted, very shaly and sandy grains.
- 3636-3647 Ditto; shale, very slightly fissile; siltstone, medium-grained (N5), micaceous.
- 3647-3658 Shale, as above, siltstone, medium light gray (N6), to little silty sandstone.
- 3658-3670 Ditto; shale, silty; part of siltstone, very micaceous.
- 3670-3682 Siltstone, medium light gray (N6), subrounded well sorted, dark inclusions, slightly micaceous, well cemented.
- 3682-3695 Siltstone, medium light gray, as above; shale, medium gray (N5), non-silty to very silty, part micaceous; probably interbedded.
- 3695-3705 Shale, and siltstone, as above, part shale slightly fissile.
- 3705-3715 Ditto, shale, medium dark gray (N4); siltstone, medium gray (N5), coarse-grained; trace pyrite.
- 3715-3722 Ditto; siltstone and shale.
- 3722-3732 Ditto, shale and siltstone.
- 3732-3742 Ditto.
- 3742-3752 Ditto, shale, slightly fissile; siltstone, fine-grained to coarse-grained.
- 3752-3762 Ditto, siltstone, light gray (N7); shale, medium gray (N5).
- 3762-3774 Shale, non-silty to silty, medium dark gray (N4), slightly fissile; trace mica.
- 3774-3786 Siltstone, very shaly, light gray (N7), micaceous, moderately friable.
- 3786-3797 Shale, medium gray (N5), non-silty to little silty, part very slightly fissile, trace very finely micaceous, mottled to little slightly micaceous.
- 3797-3807 Shale, very silty, medium gray (N5), micaceous, to very shaly, medium light gray (N6.5), siltstone,
- 3807-3817 Shale, medium dark gray (N4), slightly fissile, trace very finely micaceous material.

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Interval

- 3815-3828 Shale, slightly silty, medium dark gray (M4), very slightly fissile, micaceous.
- 3828-3838 Shale, medium dark gray (M4), very slightly fissile, trace finely micaceous material.
- 3838-3843 Shale, as above; trace shale, very silty, medium light gray (M6), micaceous, moderately soft.
- 3843-3857 Ditto, medium dark gray (M3.5), shale, slightly fissile; trace medium light gray silty shale grading to shaly siltstone.
- 3857-3870 Shale, silty to some non-silty, dark gray (M3), slightly fissile, slightly micaceous, trace pyrite.
- 3870-3878 Shale, dark gray (M3), slightly fissile to little fissile, trace very finely micaceous material; trace pyrite.
- 3878-3888 Shale, very silty to shaly siltstone, light gray (M6.5), micaceous, dark pepperling, moderately soft to moderately hard; trace pyrite.
- 3888-3890 Shale, as above; siltstone with some silty shale, as above.
- 3890-3898 Ditto, siltstone, medium-grained, subrounded moderately poorly sorted.
- 3898-3908 Shale, silty to very silty, medium gray (M5), finely micaceous, moderately hard to hard; trace pyritized fossil.
- 3908-3907 Siltstone, light gray (M7), medium-grained, subrounded, poorly sorted, dark inclusions, finely micaceous, moderately friable to well cemented.
- 3907-3917 Shale, very silty, medium light gray (M6), finely micaceous, moderately hard.
- 3917-3925 No sample.
- 3925-3936 Siltstone, slightly shaly, light gray (M7), subrounded, poorly sorted, trace calcareous cement, well cemented to moderately friable; and shale, medium gray (M5), trace very finely micaceous material.
- 3936-3946 Siltstone, as above; part shale slightly fissile.
- 3946-3953 Ditto; shale, as above, to very silty, and micaceous; part siltstone, calcareous; trace pyrite.
- 3953-3958 Siltstone, calcareous, medium light gray (M6), very fine-grained, subrounded, well cemented; and siltstone, light gray (M7),

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Interval

slightly shaly and very slightly calcareous, medium-grained, subrounded, moderately well sorted, moderately friable.

- 3958-3968 Shale, medium gray (N5), trace very finely micaceous material.
- 3968-3973 Shale, silty, medium gray (N5), micaceous.
- 3973-3990 Shale, as above, to some very silty; trace pyrite.
- 3990-4001 Shale, medium gray (N5), trace very finely micaceous material.
- 4001-4008 Shale, as above, very slightly silty, slightly micaceous.
- 4007-4014 Bitto, to little silty.

Total Depth: 4014'

Samples run by Eloise T. Jacobsen
Geologist, U. S. Geological Survey
Lexington, Kentucky
January, 1950