Operator: United Producing Co.
Farm: W. M. Ritter Lumber Co.
No.: 1-V-1461
Location: Buchanan County
2300' S. of 37°15'
11,600' E. of 82°00'
Elevation: 1619.16' Ground
Total Depth: 2301'
Drilling Commenced: August 20, 1947
Well Completed: February 1, 1948
Result: Gas Well

Geologic sample log prepared by M. B. McFarlan (22-649) and E. T. Jacobsen (649-2290), U. S. Geological Survey, Lexington, Kentucky
1949 - 1950

GEOLOGIC LOG

DEPTH (feet)	THICKNESS (feet)	LITHOLOGY
		Carboniferous System, Pennsylvanian Series, Pottsville Group, Norton formation
22- 34	12	Sandstone 97%, shale 3%: Sandstone, micaceous, white (N9) to light-gray (N7), very fine grained to fine-grained, few pieces medium-grained, angular to subangular, few green minerals, some iron stain; shale, carbonaceous, medium-dark-gray (N4) to black (N1).
34- 40	6	Like 22-34.
40- 49	9	Like 22-34 except more fine-grained to medium-grained few pieces calcite.
49- 55	6	Like 22-34 except little less shale, few pieces calcareous.
55- 60	5	No samples.
60- 63	3	Sandstone 99%, coal 1%: Sandstone, white (N9) to light gray (N7) to few yellowish-gray (5Y8/1), very fine-grained to fine-grained to very few medium-grained, slightly micaceous, very few pieces very slightly calcareous; some iron stain; few pieces medium dark-gray (N4) shale.
63- 67	4	Sandstone 99%, shale 1%: Sandstone, micaceous, white (N9) to very light-gray (N8) to some yellowish-gray (5Y 8/1), very fine-grained to fine-grained, few green minerals, some iron stain; shale, carbonaceous, dark-gray (N3) to coal; trace medium dark-gray (N4) shale.
67- 70	3	Sandstone: white to yellowish-gray (5Y 8/1) to some light-gray (N7), very fine-grained, slightly micaceous, some iron stain; trace shale, carbonaceous, dark-gray (N3).
70- 85	15	No samples.

85- 89	4	Sandstone 90%, shale 10%: sandstone, conglomeratic, white (N9) to light-gray (N7), medium-grained to coarse-grained to fine-grained, angular to subangular, some argillaceous, few green minerals; shale, medium-gray (N5) to grayish-black (N2), nonmicaceous to some finely micaceous, nonsilty to some silty.
89- 95	6	Shale 99%, sandstone 1%: shale, carbonaceous, medium-gray (N5), nonsilty to silty, trace coal; sandstone, white (N9) to light (N7), fine-grained to medium-grained, angular to subangular.
95- 100	5	Shale 98%, siltstone 1%, sandstone 1%: shale, carbonaceous, medium dark-gray (N4) to brownish-black (5YR 2/1), some silty resinous luster, trace coal; siltstone, very light gray (N8); sandstone, very light gray (N8) to light-gray (N7), very fine-grained to medium-grained.
100- 105	5	No samples.
105- 109	4	Sandstone 99%, shale 1%: sandstone, very light gray (N8) to medium light-gray (N6), very fine-grained, noncalcareous to calcareous, some argillaceous, very slightly micaceous, few green and black minerals, trace iron stain; shale, silty, medium dark-gray, finely micaceous; trace coal.
109- 114	5	Sandstone: white (N9) to very light gray (N8) to some light-gray (N7), very fine-grained, noncalcareous to some calcareous, very slightly micaceous, trace iron stain; trace coal; trace shale, medium dark-gray (N4), finely micaceous, slightly silty.
114- 120	6	Sandstone to siltstone 90%, shale 10%: sandstone, very fine grained to siltstone, micaceous, light-gray (N7) to medium light-gray (N6), argillaceous to nonargillaceous; shale, micaceous, medium-gray (N5), nonsilty to silty.
120- 124	4	Like 114-120 except no siltstone, less shale, few black minerals.
125- 128	3	Sandstone 85%, shale 10%, coal 5%: sandstone, argillaceous, micaceous, very light gray (N7) to medium gray (N5), very fine-grained; shale, medium dark-gray (N4) to dark-gray (N3), noncarbonaceous to carbonaceous, finely micaceous, nonsilty to slightly silty; coal.
128- 134	6	Sandstone 98%, shale 1%, coal 1%: sandstone, micaceous, light-gray (N7) to some medium light-gray (N6), very fine-grained, calcareous to slightly calcareous, nonargillaceous to argillaceous, few black minerals; shale, medium dark-gray (N4), to some dark-gray (N4), nonsilty to silty, nonmicaceous to micaceous; coal.

134- 139	5	Like 128-134 except less coal.
139- 146	7	Sandstone 79%, shale 20%, coal 1%: sandstone, micaceous, light-gray (N7) to medium-gray (N5), very fine-grained, nonargillaceous to argillaceous, very few pieces slightly calcareous; shale, medium dark-gray (N4) to some medium-gray (N5), noncarbonaceous to carbonaceous, nonsilty to silty, some micaceous.
146- 152	6	Like 139-146 except less medium-grained sandstone; less shale 10%.
152- 158	6	Shale 90%, sandstone 10%: shale, medium-gray (N5) to few medium dark-gray (N4), few very slightly micaceous, nonsilty to some silty; sandstone, light-gray (N7) to few medium light-gray (N6), very fine-grained, nonargillaceous to some argillaceous, very few slightly calcareous.
158- 163	5	Shale: medium-gray (N5), moderately calcareous; shale, carbonaceous, medium dark-gray (N4), nonmicaceous to finely micaceous, nonsilty; trace coal; trace siltstone, light-gray (N7).
163- 170	7	Shale 98%, siltstone 2%: shale, medium dark-gray (N4) to some medium-gray (N5), noncarbonaceous to some carbonaceous; siltstone, light-gray (N7); sample covered with light-gray (N7) silty material.
170- 175	5	Shale: medium-gray (N5) to medium dark-gray (N4), trace light-gray (N7) silty material.
175- 180	5	Like 170-175 except shale, silty to nonsilty, finely micaceous to nonmicaceous.
180- 185	5	Shale: medium-gray (N5) to medium dark-gray (N4), nonsilty to silty, nonmicaceous to slightly finely micaceous.
185- 201	6	Shale: medium-gray (N5), nonsilty to very silty, nonmicaceous to micaceous, noncalcareous to slightly calcareous; trace siltstone, medium light-gray (N6).
201- 206	5	Shale: medium-gray (N5) to medium dark-gray (N4), silty to nonsilty, some finely micaceous, few slightly calcareous.
206- 214	8	Shale: medium-gray (N5) to medium dark-gray (N4), noncalcareous to some very calcareous, few slightly finely micaceous; few pieces siltstone, light-gray (N7), slightly calcareous, soft.
214- 220	6	Shale: medium-gray (N5), nonsilty to some slightly silty, few slightly micaceous.
220- 225	5	Like 214-220 except less silty.

225- 230	5	Sandstone 80%, siltstone 20%: siltstone, micaceous, argillaceous, medium light-gray (N6), to medium-gray (N5), grades into sandstone, very fine grained, few pieces calcareous; trace medium dark-gray (N4) shale, carbonaceous.
230- 240	10	Like 225-230.
240- 245	5	Like 225-230; only trace sandstone.
245- 250	6	Like 225-230; only trace sandstone, no shale.
250- 255	5	Like 225-230; only trace sandstone, no shale, few pieces slightly calcareous.
255- 264	9	Like 225-230; only trace sandstone, no shale, few pieces slightly calcareous.
264- 270	6	Siltstone 99%, coal 1%: siltstone, argillaceous, micaceous, medium light-gray (N6) to medium-gray (N5); coal.
270- 277	7	Like 264-270.
277- 283	6	Siltstone 65%, coal 20%, shale 15%: siltstone, argillaceous, micaceous, medium-light-gray (N6) to medium-gray (N5); coal; shale, carbonaceous, medium dark-gray (N4); trace pyrite.
283- 290	7	Like 277-283 except no coal and shale 10%.
290- 300	10	Sandstone 55%, shale 25%, siltstone 20%: sandstone, light gray (N7) to medium-gray (N5), very fine-grained grading into siltstone, few slightly calcareous, slightly micaceous; shale 25%, medium dark-gray (N4) to medium-gray (N5), few pieces micaceous, nonsilty to some silty; trace coal.
300- 311	11	Shale: medium-gray (N5), few slightly micaceous, trace light-gray (N7) silty material.
311- 324	13	Shale: medium-gray (N5) to medium dark-gray (N4); trace coal; little light-gray (N7) silty material on sample.
326- 328	2	Sandstone 85%, shale 15%; sandstone, white (N9) to medium light-gray (N6), fine-grained, few pieces slightly argillaceous, few green minerals, little iron stain; shale, medium dark-gray (N4); trace coal.
328- 332	4	Sandstone, white (N9) to light gray (N7), fine-grained, very slightly micaceous, few green minerals, slightly iron stained; trace pyrite.
332- 340	8	Sandstone: white (N9) to light-gray (N7), fine-grained to little very fine grained, noncalcareous to some calcareous, some slightly argillaceous, few green and black minerals, little iron stain; few mica flakes (muscovite?), trace coal.

340- 345	5	Sandstone: white (N9) to light-gray (N7), fine-grained, noncalcareous to calcareous moderately permeable, few green and black minerals, few mica flakes, little iron stain.
345- 349	5	Like 340-345; more calcareous, coal 1%.
344- 353	4	Sandstone: white (N9) to very light-gray (N8), fine-grained to very fine grained, calcareous to noncalcareous, few green and black minerals, trace iron stain; little very light-gray (N8) silty material on sample.
353- 358	5	Sandstone 97%, shale 3%: sandstone, white (N9), little very light gray (N8), fine-grained to very fine-grained, slightly micaceous, few green minerals, little iron stain; shale, black grading into coal.
358- 363	5	Like 353-358.
363- 368	5	Sandstone 98%, coal 2%: sandstone, white (N9) to light-gray (N7), fine-grained to very fine grained, slightly micaceous (muscovite), some slightly argillaceous, few green and black minerals, little iron stain, trace chlorite?; coal.
368- 372	4	Sandstone: white (N9) to pale yellowish-orange (10 YR 8/6) to dark yellowish-orange (10YR 6/6), very fine grained to fine-grained noncalcareous to calcareous, few black and green minerals, moderate limonite staining.
372- 377	5	Sandstone: white (N9) to very light gray (N8) to few pale yellowish-orange (10YR 8/6), very fine grained to fine-grained, calcareous cement, black and few green minerals, trace chlorite?, limonite stain.
377- 383	6	Sandstone 98%, shale 2%: sandstone, white (N9) to medium light-gray (N6), very fine grained, slightly micaceous, nonargillaceous to some slightly argillaceous, some iron stain; shale, medium dark-gray (N4) to black (N1), nonsandy to sandy, black shale is carbonaceous.
383- 390	7	Sandstone 60%, shale 40%: sandstone, white (N9) to light-gray (N7), very fine grained, noncalcareous, few green minerals, little iron stain; shale, silty, medium dark-gray (N4) to some medium-gray (N5), finely micaceous.
390- 400	10	Shale 70%, sandstone 30%: shale, micaceous, medium dark-gray (N4) to medium-gray (N5), some slightly calcareous; sandstone, calcareous, argillaceous, light-gray (N7) to medium-gray (N5), nonmicaceous to micaceous, few black minerals.

400- 410	10	Like 390-400 except shale more calcareous and sandstone slightly calcareous to calcareous.
410- 416	6	Shale 75%, sandstone 25%: shale, medium dark-gray (N4), slightly calcareous, slightly micaceous to finely micaceous, some slightly sandy; sandstone, calcareous, argillaceous, light-gray (N7) to medium-gray (N5), slightly micaceous to micaceous, few black minerals.
416- 421	5	Like 410-416; less sandstone 15%.
421- 426	5	Like 410-416; less sandstone 15%.
		Lee formation
426- 436	10	Sandstone 74%, shale 25%, coal 1%: sandstone, white (N9) to some light-gray (N7), fine-grained, angular to subangular, few pieces calcareous, few green and black minerals, slight iron stain; shale, medium dark-gray (N4); coal.
436- 446	10	Sandstone: white (N9) to few light-gray (N7) to few yellowish-gray (5Y 8/1), fine-grained to few very fine-grained to few medium-grained, angular to subangular, few calcareous, some green and few black minerals, little iron stain.
446-451	5	Like 436-446; more calcareous.
451- 455	4	Like 435-446; more calcareous.
455- 466	11	Like 435-446; more calcareous, very few green minerals, less very fine-grained.
466- 469	3	Like 436-446; more calcareous, very few green minerals.
469- 475	6	Like 436-446; fewer green minerals.
475- 480	5	Sandstone: white (N9) to light-gray (N7), fine-grained to medium-grained, angular to subangular, few argillaceous, noncalcareous to some calcareous, some green minerals and few black minerals, several pieces coal.
480- 485	5	Sandstone 90%, shale 10%: sandstone, white (N9) to medium light-gray (N6), some argillaceous, slightly silty, some calcareous, few green and black minerals, little iron stain; shale 10%, medium-gray (N5) to medium dark-gray (N4), nonsilty to silty, slightly micaceous.
485- 488	3	Sandstone: white (N9) to light-gray (N7), very fine-grained to fine-grained, few green minerals, slight iron stain; several pieces bright coal.

488- 500	12	Sandstone, white (N9) to few light-gray (N7), fine-grained to some very fine-grained, angular to sub-angular, some green minerals, slight iron stain.
500- 505	5	Sandstone: white (N9) to medium-gray (N5), fine-grained to some medium-grained, angular to subangular, nonargillaceous to very argillaceous, very slightly micaceous, few green and black minerals, trace iron stain; trace very carbonaceous shale.
505- 510	10	Sandstone: white (N9) to light-gray (N7), fine-grained to some medium-grained, subangular to angular, few pieces calcareous, few pieces argillaceous, slight iron stain; little very light-gray (N8) silty material.
510- 515	5	Sandstone 95%, shale 5%: sandstone, light-gray (N7), to medium light-gray (N6), very fine-grained, nonargillaceous to some argillaceous, slightly micaceous, some dark and black minerals, trace iron stain.
515- 519	4	Like 510-515; less shale (cavings?).
519- 524	5	Sandstone: calcareous, very light-gray (N8) to light-gray (N7), very fine-grained, very few slightly argillaceous, trace mica.
524- 529	5	Shale 60%, sandstone 40%: shale, medium dark-gray (N4), finely micaceous to some nonmicaceous, nonsandy to sandy; sandstone, very light-gray (N8) to medium-gray (N5), very fine-grained, argillaceous to slightly argillaceous, few green minerals.
529- 534	5	Like 529-534; more sandstone.
534- 544	10	Shale: medium-gray (N5), few finely micaceous.
541- 548	7	Shale: medium-gray (N5); little silty material and few pieces siltstone, pale yellowish-brown (10YR 6/2).
548- 555	7	Shale: medium-gray (N5), with light-gray (N7) silty material covering sample.
555- 560	5	Shale: medium dark-gray (N4).
560- 567	7	Shale: medium dark-gray (N4).
567- 578	11	Shale: medium dark-gray (N4) to some medium-gray (N5), few pieces slightly silty to sandy; light-gray (N7) silty material covering sample and few pieces siltstone.
578- 589	11	Like 567-578.
589- 596	7	Like 567-578.
596- 602	6	Shale: medium dark-gray (N4).

602- 607	5	Shale 85%, siltstone 15%: shale, medium dark-gray (N4), nonmicaceous to slightly micaceous, nonsilty to some silty; siltstone, argillaceous, medium-gray (N5) to some light-gray (N7), nonmicaceous to slightly micaceous.
607- 614	7	Shale: medium-gray (N5).
614- 618	4	Shale 95%, coal 5%: shale, medium dark-gray (N4); coal, bright.
618- 625	7	Shale 80%, siltstone 10%, coal 10%: shale, medium-gray (N5) to few medium dark-gray (N4), silty to few nonsilty, slightly micaceous; siltstone, argillaceous, medium light-gray (N6), some slightly micaceous; coal, bright.
625- 635	10	Sandstone 85%, shale 15%: sandstone, light-gray (N7) to medium-gray (N5), very fine-grained, argillaceous to nonargillaceous, noncalcareous to calcareous, few pieces micaceous; shale, medium dark-gray (N4), finely micaceous to nonmicaceous, nonsilty to silty.
635- 649	14	Like 625-635; little less shale; 2% coal, bright.
649- 655		Shale, medium dark-gray (N4)*, slightly silty.
655- 664		Shale, as 649-655, 70%; and medium gray (N3), silty, micaceous shale, 30%.
664- 666		Sandstone, medium light gray (N7), very fine-grained, strongly peppered with black mineral, micaceous, clusters, 80%; shale, silty and slightly micaceous, 20%.
666- 670		Sandstone, as 664-666; 3% shale, as 664-666. Piece of coal.
670- 674		Sandstone, as 664-666, small clusters to friable, also peppered with green mineral; 5% grayish black to black shale, some very carbonaceous black shale.
674- 679		Sandstone, as 670-674, grading to large clusters, to dark medium gray (N4), fine-grained, very micaceous sandstone peppered with black mineral. Silty shale, 5%.
679- 684		Sandstone, as 674-679.
684- 688		Sandstone, as 674-679, 85%; shale, dark gray (N3), slightly silty and micaceous.
688- 693		Sandstone, as 674-679, very little shale, Coal pieces.
693- 698		Shale, dark gray (N3), silty and micaceous, to grayish black, very slightly micaceous; 5% sandstone, as 688-693. Numerous coal pieces. (Company log: coal fragments 696-698.)

* Letters and numbers in parentheses refer to color designations from the National Research Council's Rock-Color Chart.

698- 701	Siltstone, medium gray (N5), slightly peppered with minute to black mineral and slightly micaceous, 30%; sandstone, as above, 50%; shale, 20%. Trace grayish black carbonaceous shale.
701- 704	Sandstone, as above, 95%; grayish black carbonaceous shale, pieces of coal.
704- 714	Sandstone, as above, 95%; grayish black carbonaceous shale, pieces of coal. (Company log: coal fragments 708-711).
714- 722	Sandstone, as 701-704, 98%.
722 714- 736	Shale, medium dark gray (N4), slightly micaceous, to gray black (N2), carbonaceous, 50%; sandstone, as 701-704, 50%. Pieces of coal. (Company log: coal fragments, 726-730).
736- 741	Shale and sandstone, as 722-736.
741- 745	Sandstone, as 722-736, 60%; shale, of coal.
745- 750	Sandstone, as 722-736, small clusters to friable. Little carbonaceous shale. Several pieces of coal. (Company log, coal fragments from 747-750).
750- 756	Sandstone, as 722-736; 8% shale, medium dark gray (N4), slightly micaceous. Trace of coal.
756- 768	Sandstone, as 722-736. No coal noted.
768- 773	Sandstone, as 722-736, friable, 95%; shale, 5%. Few rather small pieces of coal.
773- 778	Sandstone, very light gray (N8), very fine-grained, subrounded, slightly peppered with small black and some green minerals, friable with small clusters, 93%; shale, brownish gray to gray black, carbonaceous, 7%. Iron staining.
778- 788	Sandstone and shale, iron staining, as 773-778.
788- 793	Shale, dark gray (N3), slightly micaceous, some slightly silty, 90%; sandstone, 10%.
793- 800	Shale, 95%; sandstone, 5%.
800- 814	Sandstone, as above, 50%; sandstone, brownish gray (5YR41) very fine-grained, very poorly sorted, calcareous cement, 40%; shale, gray-black, carbonaceous, 10%. Little shaly coal and coal.
814- 820	Sandstones and shale, as 800-814.

820- 823	Sandstone, very light gray (N8), fine-grained, subangular, rather poorly sorted, micaceous, slightly peppered with black and some green (glauconite?) minerals, friable but few small clusters. Coal fragments (cavings?).
823- 830	Sandstone, as 820-823, very fine- to fine-grained, friable; few coal fragments.
830- 836	Sandstone, very light gray (N8), as 820-823 and some as 773-778, brownish gray as 800-814. Some coal fragments (cavings?). Noted several pieces of quartz, medium- to coarse-grained size appearing to be broken. Conglomeratic?
836- 842	Sandstones, as 830-836. Quartz pieces. Trace black, very micaceous shale.
842- 847	Sandstones, as 830-836. Larger quartz fragments.
847- 856	Sandstone, very light gray (N8), medium-grained, subangular, poorly sorted, friable, slightly micaceous, few clusters peppered with black mineral. Numerous coal fragments. Noted several coarse-grained size quartz fragments.
856- 864	Sandstone, fine- to medium-grained, as 847-856. Few quartz fragments.
864- 870	Siltstone, yellowish gray (5Y8/1), subrounded, rather poorly sorted. Small cut.
870- 876	Shale, medium dark gray (N4), slightly micaceous and very slightly silty, 60 percent; medium gray (N5) shaly siltstone, 30 percent; sandstone, as 847-856, 10%. All small pieces.
876- 883	Shale, dark gray (N3), slightly micaceous, 95%; sandstone, 5%.
883- 893	Siltstone, very light gray (N8), subangular to subrounded rather well sorted, friable, micaceous.
893- 904	Sandstone, light gray (N7), fine-grained, subangular to subrounded, rather well sorted, friable to small clusters peppered with black and few green minerals. Trace black carbonaceous shale and black micaceous slightly silty shale.
904- 915	Sandstone, " " " " "
915- 920	Sandstone, as 893-904.
920- 930	Sandstone, as 893-904, friable. Piece coal and approximately 1% dark shale.
930- 940	Sandstone, small clusters, " " " "

940- 950	Sandstone, friable to small clusters, piece coal and approximately 1% dark shale.
950- 955	Sandstone, as 893-904, friable to small clusters.
955- 960	Sandstone, as 950-955. Some brownish gray (5Y4/1) siltstone.
960- 963	Sandstone, as 950-955. Some dark gray shale and brownish siltstone.
963- 967	Sandstone, very light gray (N8), very fine-grained, subrounded, poorly sorted, friable, 60%; sandstone, as 950-955, 40%.
967- 971	Sandstone, as 963-967, 50%; as 960-963, 40%; shale, medium and dark gray, 10%.
971- 974	Coal and shale, grayish black, carbonaceous; 50%, Shale, blackish gray, slightly calcareous, some pyritic, 25%; sandstone, as 967-971, 25%.
974- 979	Sandstone, very light gray (N8) with much iron staining, fine- to medium-grained, subangular to subrounded, poorly sorted; about 1% shale as above (caving?).
979- 984	Sandstone, medium grained, as 974-979; coarse-grained (or larger) white quartz and gray chert angular fragments (broken pebbles?).
984- 988	(On envelope: "Coal fragments are cavings according to driller. Driller stated that drilling was too hard for coal to have been present. Formation supposedly white sandstone.) Coal. Little sandstone as above. Gray chert "larger than coarse"-grained size.
988- 991	Shale, dark gray, slightly micaceous (N3), 60%; Sandstone, as 979-984, 40%, with yellowish gray and light brownish gray coarse to larger than coarse size chert broken fragments and few quartz fragments, probably pebbles.
991- 994	Sandstone, light gray (N7), very fine-grained, subrounded rather well sorted, friable, 80%; sandstone, as 979-984, with few medium-grained size chert, 10%; shale.
994-1001	Sandstone, light gray (N7), fine-grained, clusters peppered with black mineral, 60%; shale, medium gray (N5), slightly micaceous, and very slightly silty, 40%. Very small cut.
1001-1009	Detrital appearing sample. Sandstone and shale as above, trace mica. Pieces of coal. Some larger quartz pieces, possibly pebble, and chert fragments.

1009-1014	Sample, as 1001-1009, no chert noted. Little coal, but 5% black carbonaceous shale.
1014-1021	Sample, as 1009-1014, 10% shale; trace pyrite.
1021-1026	Sample as 1014-1021; some iron staining.
1026-1030	Sample as 1014-1021, 20% shale; some iron stains. (Did not note any quartz fragments.)
1030-1034	Sandstone, medium light gray (N6), very fine-grained, subrounded, moderately well sorted, micaceous, friable to very small clusters peppered with black mineral. Several pieces coal. 5% grayish black (N2) slightly micaceous to carbonaceous shale.
1034-1038	Sandstone, very light gray (N8), as 1030-1034, friable; some iron staining.
1038-1047	Sandstone, light gray (N7), very fine- to fine-grained, subrounded to subangular, poorly sorted, some black mineral inclusions, small clusters.
1047-1052	Sandstone, " " " " "
1052-1055	Sandstone, " " ". Trace yellowish brown (10YR6/4) silty shale.
1055-1060	Sandstone, " " " " " and some dark gray shale.
1060-1065	Sandstone, " " " " " 3% dark gray shale. Few medium-grained quartz grains. No coal noted, as on co. log from 1063-65.
1065-1069	Sandstone, light yellowish gray (5Y9/1), very fine-grained, subrounded, rather well sorted, friable; 5% very small dark gray shale fragments; trace yellowish brown silty shale and mica. Few medium-grained quartz.
1069-1075	Sandstone, " " " " "
1075-1079	Sandstone, " "; 2% shale. No quartz.
1079-1082	Shale, dark gray (N3), slightly micaceous. Trace grayish black (N2) shale.
1082-1085	Shale, " " "; 10% very light gray (N7.5) fine-grained sandstone slightly peppered with black mineral, friable to clusters.
1085-1086	(on envelope: "Show gas 1086") Sandstone, as 1082-1085, 85%; shale, as 1082-1085, 15%.
1086-1090	Sandstone, " " " " " "
1090-1094	No sample.

1094-1097	Sandstone, as 1085-1086, few clusters; shale, 5%.
1097-1100	Sandstone, " " 85; shale, 15%.
1100-1104	Sandstone, as 1085-1086, micaceous.
1104-1110	Sandstone, " " , clusters.
1110-1115	Sandstone, " friable to clusters, 95%. Five percent dark gray (N2.5) micaceous shale.
1115-1120	Sandstone, " " " "
1120-1135	Sandstone, light yellowish gray (5Y8.5/1) " "
1135-1140	Shale, medium gray (N5).
1140-1150	No sample.
1150-1164	Shale, medium gray (N5), slightly micaceous and silty, fairly chunky.
1164-1176	Shale, as 1150-1164.
1176-1183	Shale, as 1150-1164, silty.
1183-1200	Shale, " "
1200-1217	Shale, dark gray (N3.5), slightly micaceous, some slightly silty.
1217-1225	Shale, medium gray (N5), slightly micaceous, silty.
1225-1236	Shale, " " " ; 1% light gray (N6.5) siltstone, with very slightly calcareous cement.
1236-1247	Siltstone, as 1225-1236, 40%; very light gray (N8) very fine-grained sandstone, 30%; shale, as 1225-1236, 30%.
1247-1260	Siltstone, 50%; sandstone peppered with black mineral, 30%; shale, 20%.
1260-1270	Sandstone, very light yellowish gray (5Y9/1), very fine-grained, moderately poorly sorted, friable to small clusters very slightly peppered with black mineral, 85%; siltstone, 10%; shale, 5%.
1270-1280	No sample.
1280-1282	Shale, medium dark gray (N4), slightly micaceous, some silty. Trace medium dark gray siltstone. Five percent sandstone clusters as 1260-1270.
1282-1285	Sandstone, friable to clusters, as 1280-1282; 50%; shale, 50%.

1285-1290	Sandstone, very light gray (N8.5) stained with iron, very fine-grained to medium-grained, subangular, very poorly sorted, friable to few clusters with few black and brown mineral inclusions. Numerous coarse-grained and larger clear and milky quartz fragments, appearing to be broken pebble fragments. Shale, 2%.
1290-1295	Sandstone, as 1285-1290, friable, smaller grain size.
1295-1302	Sandstone, " " " " Few quartz fragments (pebbles?).
1302-1307	No sample.
1307-1313	Sandstone, medium- to very fine-grained, as 1285-1290. Numerous coarse-grained and larger quartz fragments.
1313-1317	Sandstone, as 1307-1313, much iron staining. No noted quartz fragments.
1317-1322	Sandstone, as 1307-1313, few larger quartz fragments.
1322-1328	Sandstone, " " " " Trace mica.
1328-1338	Sandstone, " " " " "
1338-1345	Sandstone, " " " " "
1345-1350	Sandstone, very fine- to fine-grained, as 1307-1313. Trace mica.
1350-1355	Sandstone, very fine- to fine-grained, as 1307-1313. Trace mica. Numerous quartz fragments.
1355-1357	Sandstone, as 1345-1350, numerous quartz fragments.
1357-1360	Sandstone, very fine- to some medium-grained, as 1345-1350. Numerous large quartz fragments.
1360-1363	Sandstone, as 1357-1360, not
1363-1365	Sandstone, as 1357-1360. Some quartz fragments. Piece coal and little grayish black carbonaceous shale.
1365-1378	Sandstone, as 1357-1360; numerous quartz pieces. Little iron staining; about 1% grayish black small shale.
1378-1382	Sandstone, white (N9), as 1357-1360. Numerous pieces white quartz fragments.
1382-1385	Sandstone, as 1378-1382; no noted quartz fragments, but very small cut.
1385-1390	Sandstone, " several quartz fragments; iron stains.

1390-1397	Sandstone, as 1378-1382; no noted quartz fragments; iron stains.
1397-1400	Sandstone, as 1378-1382, few quartz fragments, little staining.
1405-1409	Sandstone and conglomerate. Sandstone, very light gray (stained with iron), fine- to medium-grained, subangular, poorly sorted, friable, 50%; Broken pieces of angular quartz, medium to much larger than coarse-grained size, 50%. Few pieces coal, very little grayish black shale.
1409-1416	Coal, 75%; sandstone, dark gray (N3.5) fine-grained, subrounded, poorly sorted, very locally calcareous, 15%; sandstone and conglomerate, as 1405-1409, 10%. Small cut.
1416-1419	Sample as 1409-1416. Very small cut. One piece showing dark gray sandstone on quartz fragment.
1419-1425	Sandstone, dark gray, as 1409-1416, 50%; sandstone, dark gray (N3), very fine-grained, very micaceous, appearing to have siliceous cement, 50%. Piece shaly coal.
1425-1431	Siltstone, medium-gray (N5.3), poorly sorted, shaly, micaceous.
1431-1437	Siltstone, " "
1437-1447	Coal, shaly and carbonaceous shale, 60%; sandstone, medium light gray (N6), mottled, medium-grained, subrounded, poorly sorted, slight calcareous cement, 20%. Sandstone, light gray (N7), peppered with black and green (glauconite?) minerals, medium-grained, subrounded, 20%.
1447-1456	Shale, dark gray (N3) carbonaceous, 30%; shale, medium dark gray (N4) slightly fissile, 30%; sandstone, as 1437-1447, 40%. Trace pyrite and coal.
1456-1462	Sandstone, light gray, fine-grained, subangular, poorly sorted, some black and few green and reddish grains included, locally calcareous, 75%; medium dark gray shale as 1447-1456, 25%.
1462-1468	No sample.
1468-1478	Sandstone, light gray, fine-grained, subangular to subrounded, poorly sorted (very fine to medium-grains), friable, some black and green (glauconite?) grains, micaceous, few clusters locally calcareous, 90%; shale, 10%.
1473-1482	Sandstone, as 1468-1473, more clusters, 85%; shale, 15%.
1482-1486	Sandstone, " " 95%; " 5%.

1486-1494	Sandstone, as 1468-1473, more clusters, 97%.
1494-1500	Sandstone, " , becoming more friable, 98%.
1500-1513	Shale, medium gray (N5), silty, slightly micaceous, 85%; sandstone, as 1491-1500, 15%. Few pieces of coal.
1513-1520	Shale, as 1500-1513, 90%; sandstone, medium light gray (N5), fine-grained, subangular, poorly sorted, shaly, 5%; sandstone, as 1500-1513, 5%. More coal pieces.
1520-1526	Sandstone, light gray (N7), fine- to medium-grained, subangular, poorly sorted, slightly micaceous, becoming friable, 90%; shale, as 1513-1520, 10%.
1526-1535	Shale, medium gray (N5), slightly micaceous and silty, 90%; sandstone, 10%.
1535-1547	Shale, as 1526-1535, 80%; sandstone, medium light gray (N6), very fine- to fine-grained, subangular, poorly sorted, shaly, 10%; sandstone, as above, 10%.
1547-1550	Coal. Medium dark gray (N4) slightly micaceous and silty shale, 10%.
1550-1560	Shale, as 1547-1550, 90%; coal, 10%; some carbonaceous shale. (No brown shale noted in our cut.)
1560-1566	Shale, medium gray (N5), slightly micaceous.
1566-1575	Shale, " "
1575-1600	Shale, medium gray to medium light gray, silty.
1600-1607	Sandstone, light gray (N7) strongly peppered with black mineral and little light and dark (glauconite?) green, minerals, fine-grained, subrounded, poorly sorted, micaceous; shale, 10%.
1607-1615	Sandstone, as 1600-1607, becoming friable; medium dark gray (N4) very micaceous sandstone as light gray sandstone, 10%.
1615-1624	Sandstone, light gray, friable to few clusters, as 1607-1615; medium dark gray shale, 5%.
1624-1638	Shale, medium light gray to dark gray (N3) on fresh break, slightly micaceous. Piece coal. Small cut.
1638-1645	Shale, dark gray (N3.5), some slightly micaceous; medium gray (N5) shale, 10%.
1645-1648	No sample.
1648-1656	Shale, medium gray (N5), slightly micaceous and silty.
1656-1667(?)	Shale, dark gray (N3), coated to seem medium light gray (N6), slightly micaceous and silty.

1667-1675	Shale, dark gray (N3), coated to seem medium light gray (N6), slightly micaceous and silty.
1675-1681	Shale, " " , 50%; sandstone, very light gray (N8), fine-grained to medium-grained, sub-angular, poorly sorted, mottled with green and black minerals, very calcareous cement, 50%.
1681-1686	Sandstone, friable, as above, approaching clastic, sandy limestone; shale, 20%.
1686-1690	Sandstone, as 1681-1686, cement only slightly calcareous.
1690-1695	Sandstone, very light gray (N8) to white (N9), as 1686-1690, 75%; white sandstone, fine-grained, sub-angular to subrounded, poorly sorted, very few black mineral inclusions, 25%; very slight calcareous cement.
1695-1700	Sandstone, white, as 1690-1695, micaceous, 90%; shale, medium dark gray (N3), slightly micaceous, 10%.
1700-1708	Shale, dark gray (N3), with small black mineral inclusions, 75%; siltstone, light gray (N7), 25%.
1708-1714	Siltstone, as 1700-1708, 50%; shale, 45%; brownish gray (5YR5/1) shale, 5%.
1714-1721	Sandstone, as 1690-1695, strongly peppered with black and some brown minerals, micaceous, 90%; shale, dark gray, 8%, brownish gray, 2%.
1721-1727	Sandstone, " " " "
1727-1740	Sandstone, " " " "
1740-1748	Sandstone, as 1714-1721, 90%; brownish gray shale, 5%; dark gray shale, 5%.
1748-1755	Sandstone, as 1714-1721, with black and green minerals included, 80%; shale, dark gray (N3), 10%; brownish gray shale, 10%. Trace pyrite.
1755-1765	Sandstone, as 1714-1721, very fine- to medium-grained, friable, 70%; dark gray shale, 20%; brownish gray, 10%. Trace of coal and pyrite.
1765-1767	Sandstone, light gray, as 1755-1765, 75%; shale, medium dark gray, 20%; brownish gray, 5%. Trace magnetite and pyrite.
1767-1775	Sandstone, as 1765-1767, 85%; shale, 15%. Trace pyrite.
1775-1785	Sandstone, as 1765-1767, 93%; shale, 7%.
1785-1793	Shale, brownish gray-black (5YR3/1), 35%; shale, dark gray (N3), 35%; sandstone, as 1775-1785, 30%. Some brown gray (5YR4/1) calcareous shale with black inclusions. Noted one coarse sand grain of broken quartz.

1793-1800	Shales, as 1785-1793 (non-calcareous). One quartz grain apparently broken by bit.
1800-1810	Sandstone, as 1775-1785, 75%; shale, dark, 18%, light, calcareous, 7%. Medium-grained quartz fragments, broken?
1810-1817	Sandstone, more clusters, as 1775-1785, 70%; shale, medium dark gray (N4), 20%; shale, as above, 8%; some brownish gray (5YR4/1), very slightly calcareous, some blackish red (5R2/2).
1817-1829	Sandstone, as above, 85%; dark gray shale, as above, 15%. Few broken quartz coarse-grained size, one with fine-grained sandstone attached.
1829-1837	Sandstone, as above, 93%; shale, 7%. Noted 1 quartz fragment, pebble broken?.
1837-1840	Sandstone, as above, 97%. Noted several quartz fragments.
1840-1848	Shale, medium gray (N5), very minutely calcareous.
1848-1855	Shale, grayish red (5R4/2), some slightly silty, 75%; medium gray, slightly silty, 15%; greenish gray (5GY 5/1) 10%.
1855-1860	Shale, as above, red, 80%; medium gray, 10%; greenish gray, 8%. Two percent medium olive gray (5Y5/1) shaly limestone.
1860-1870	No sample.
1870-1882	Shale, medium gray (N5), 75%; limestone, shaly, as above, 20%; red shale 5%.
1882-1887	Shale, medium gray to medium dark gray (N3), 55%. Limestone, as above to light olive gray (5Y7/1), 20% red shale, 5%, limestone, light gray (N7), clastic, sandy, 20%.
1887-1893	Sandstone, medium light gray to medium dark gray (N6-4), very fine-grained, very calcareous cement, 80%. Limestone, as above, 10%; shale, medium dark gray, 10%.
1893-1904	No sample.
1904-1909	Siltstone, light gray (N6.5), subangular, poorly sorted, calcareous cement, 60%; shale, medium gray (N5), silty, slightly micaceous, 40%. Trace white, fine-grained, poorly sorted sandstone with calcareous cement.
1909-1915	Shale, medium light gray (N6), 20%; medium dark gray slightly micaceous shale, 10%; gray red (5R4/2) to blackish red (5R2/2) shale, 5%; grayish olive shale 2%; siltstone, as 1904-1909, 10%; sandstone, medium light gray (N6), very fine-grained, subangular, poorly

	sorted, calcareous cement, 10%; sandstone, light gray, medium-grained, subrounded, rather poorly sorted, friable, 40%; pale yellowish brown (10YR6/2) slightly shaly limestone, 3%.
1915-1920	Siltstone, greenish gray (5GY6/1), and medium light gray, subrounded, rather poorly sorted, calcareous cement, 50%; shale, medium gray (N5) to medium dark gray (N4), slightly micaceous and slightly calcareous, 30%; sandstone, medium gray, friable, as above, 20%.
1920-1925	No sample.
1925-1934	Sandstone, light gray (N7.5), fine-grained to very fine-grained, subangular, poorly sorted, calcareous cement, some black mineral inclusions, large clusters to friable, covered with light gray calcareous powder.
1934-1941	Sandstone, as above, 60%; shale, medium gray (N5), chunky, 40%.
1941-1947	Sandstone, very light gray (N8), fine- to medium-grained, subangular to subrounded, poorly sorted, friable, some small clusters with black mineral inclusions, considerable iron staining, 90%; shale, medium and dark gray, little reddish and greenish, 10%. Trace of yellow-brown limestone.
1947-1956	Siltstone, very light gray (N8), very fine-grained, subrounded, very slightly calcareous.
1956-1964	Siltstone, as above, 60%; shale, brownish gray (5YR 4/1), silty, 40%.
1964-1971	Shale, as above, 60%; siltstone, as above, peppered with minute black mineral, 40%.
1971-1975	Sandstone, very light gray (N8), very fine-grained, subrounded, friable, some small clusters with some black mineral inclusions and peppered, 90%; shale, light gray to medium dark gray, some reddish and greenish, 10%. Trace of mica.
1975-1980	Sandstone and shale, as above.
1980-1997	Sandstone and shale, as above, little larger percentage of shale.
1997-2005	Shale, medium gray (N5), silty, slightly micaceous.
2005-2010	Sandstone, light gray (N7), very fine-grained, subrounded, rather well sorted, peppered with black mineral, 80%; shale, medium dark gray (N4) and micaceous, 20%.
2010-2015	Sandstone, as above, 80%; shale, dark gray (N3) to medium light gray (N6), micaceous and silty, 20%. Trace grayish red (5R4/2) shale, some slightly micaceous.

2015-2030	Sandstone, as above, 95%; shale, dark gray, slightly micaceous, greenish and grayish red, 5%.
2030-2040	Shale, medium dark gray (N4), very slightly micaceous to micaceous, slightly silty.
2040-2050	Shale, as above.
2050-2055	Shale, as above.
2055-2065	Shale, as above, trace yellow brown shale.
2065-2085	Shale, as above, 90%; shale, brownish gray (5YR4/1), 10%.
2085-2105	Shale, as above, 75%; medium light gray (N6) silty shale, 25%. (Small cut)
2105-2115	Shale, dark gray (N3) to medium light gray (N6) silty and slightly micaceous, 50%; shale, greenish gray (5GY6/1), silty, slightly micaceous, 25%; shale, light greenish gray (5GY8/1), very silty, very slightly peppered with dark mineral, slightly micaceous, 25%. Trace of grayish red (5R4/2) shale.
2115-2120	Siltstone, light greenish gray (5GY8/1), very fine-grained, subangular, poorly sorted, shaly, some peppered with minute dark mineral, 70%; shale, dark brownish gray (5YR3/1), 30%.
2120-2127	Siltstone, as above; trace medium gray (N5) micaceous shale and grayish red shale.
2127-2133	Siltstone, as above, 75%; sandstone, very light gray (N7.8), very fine-grained, subrounded, moderately well sorted, peppered with dark minute mineral, very slightly calcareous.
2133-2143	Sandstone, as above, clusters to friable. Trace mica and dark gray (N3) and reddish gray shale.
2143-2148	Sandstone, as above, 50%, to light greenish gray (5GY 8/1) micaceous siltstone, 30%; shale, dark gray (N3) slightly micaceous, 18%. Trace reddish and green gray shale.
2148-2153	Sandstone, as above; shale, as above.
2153-2159	Sandstone, as above, friable, very few clusters and much iron staining. Shale, as above, trace mica.
2159-2165	Siltstone, light gray, (N7), very fine-grained, 90%; shale, medium dark gray (N4), silty, micaceous, 10%.
2165-2170	No sample.
2170-2178	Sandstone, as 2153-2159, clusters. Trace medium gray (N5) shale with reddish streak.

2178-2190	Shale, medium light gray, slightly silty and micaceous, 50%; light gray (N7) shale, 50%.
2190-2197	Sandstone, very light gray (N8), very fine-grained, subrounded, rather well sorted, friable, few small clusters with small black, brown, and green minerals inclusions, 90%; shale, medium dark gray (N4), very small to large fragments, 10%.
2197-2219	Sandstone, as above, 75%; shale, as above, 25%.
2219-2229	Shale, medium gray (N5), slightly silty, very slightly micaceous.
2229-2250	Shale, as above.
2250-2262	Shale, medium gray (N5), silty, very slightly micaceous.
2262-2271	Limestone, medium olive gray (5Y5/1), dense to finely crystalline, slightly shaly, 50%; shale, as above, 35%; shale, medium greenish gray (5GY5/1), silty, 15%. Trace reddish shale and light greenish gray (5GY8/1) siltstone peppered with minute green mineral.
2271-2281	Limestone, as above, 30%; shale, 30%; siltstone, 30%; sandstone, very fine-grained, friable, 20%. (Sample covered with light gray powder making estimation of percentage difficult, possibly less limestone.)
2281-2290	Sandstone, light gray (N7), very fine-grained, sub-rounded poorly sorted, friable, 50%; shale, 30%; limestone, 20%. (Sample also covered with light gray powder.)

Last sample.

2295-2301 Gas pay, reported.

T. D. 2301'

Eloise T. Jacobsen, Geol.
U. S. G. S.
Lexington, Kentucky
February, 1949

W. M. Ritter No. 1-V (1461) Well

Keen Mountain Field, Buchanan County, Virginia

United Producing Company

Located 2,100 ft S. of 37° 15', 12,250 ft W. of 81° 55', Richlands Quardrangle

Elevation, 1619.2 ft.Gr.

Total depth, 2301 ft

Drilling commenced August 20, 1947; completed February 1, 1948

Gas pay, 2295-2301; shows, 714-724, 1086, 1405, 1550 ft

Coal at 264-283, 614-625, 696-698, 701-711, 726,722-756, 1409-1419, 1437-1447,1547-1560 ft.

Samples examined by Eloise T. Jacobsen, 649-2290 ft, February, 1949; and Mary Beth McFarlan, 22-649 ft, August, 1950

Sample Library Reference: Virginia Geological Survey