

EL PASO NATURAL GAS COMPANY

Fed-Spurrier 1

February 6, 1963

Sec. 5, T. 20 S., R. 44 E.

Malheur County, Oregon

Descriptions of Well Samples\*

- 230 - 240 Shale and bentonite: Light gray - greenish, silty to fine sandy.
- 240 - 260 Agglomerate (?)
- 260 - 280 Shale and bentonite: Light gray, silty.
- 280 - 290 Agglomerate (?)
- 290 - 300 Shale: Light gray, sandy.
- 300 - 340 Basalt (?): Slightly altered, dark gray - black, with small irregular cavities containing opal and calcite.
- 340 - 360 Tuffaceous sandstone: Whitish, calcareous, friable, medium grained, with partly altered feldspar grains.
- 360 - 400 Crystal tuff: Whitish, firm calcareous vitric ash, with fragments of feldspar and pyroxene (?) crystals.
- 400 - 410 Vitric tuff and tuffaceous siltstone: Pinkish and white with scattered small fragments of black crystals.
- 410 - 450 Andesite (?): Medium gray, vesicular. Some thin interbeds of ash.
- 450 - 710 Basalt: Dark gray, with calcite veining and cavity filling. Some quartz filling, microcrystalline. Some black, more dense basalt near base. A few interbeds of light-colored ash.
- 710 - 740 Rhyolite (?): Dark pinkish gray, small quartz-filled cavities, also some calcite filling.
- 740 - 750 Claystone: Pinkish - red, baked.
- 750 - 843 Claystone: Pinkish and whitish.

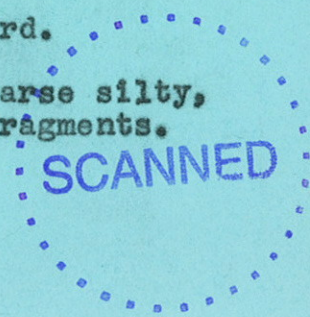
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\*By V.C. Newton, Jr., Petroleum Engineer, State of Oregon Department of Geology and Mineral Industries.

- 843 - 900 Basalt: Brownish black, microcrystalline, top portion medium-gray color. Calcite veining and cavity filling.
- 900 - 930 Ash: Pink and whitish.
- 930 - 945 Basalt: Brownish black, partly altered with calcite.
- 945 - 960 Ash: Whitish with minute black crystal fragments.
- 960 - 990 Basalt: Brownish black, microcrystalline with some calcite veining.
- 990 - 1030 Rhyolite (?): Reddish with milky-white veinlets of quartz and calcite. Some zeolite in small cavities. Medium-gray basalt at bottom.
- 1030 - 1070 Varied colored ash
- 1070 - 1110 Basalt: Pinkish dark gray with some calcite and zeolite.
- 1110 - 1240 Tuffaceous siltstone: Whitish and pinkish, with a few small pieces of chalcedony.
- 1240 - 1280 Basalt: Dark gray, somewhat altered. Contains greenish zeolite in small cavities, some calcite. Some chloritization.
- 1280 - 1310 Basalt: Dark brownish black, hard, microcrystalline.
- 1310 - 1330 Tuff: Fine, varied colored, firm.
- 1330 - 1345 Sandstone: Whitish, friable, very fine grained, containing a few small subrounded basalt fragments. Some claystone stringers included.
- 1345 - 1375 Siltstone: White, friable.
- 1375 - 1410 Rhyolite (?): Pinkish gray, with veinlets of milky-white quartz. Some dark-brownish basalt in lower portion.
- 1410 - 1425 Tuff: Whitish and pink, firm.
- 1425 - 1438 Rhyolite (?): Pinkish gray with veinlets of milky-white quartz.
- 1438 - 1460 Tuff: Grayish white and pink, firm to soft.
- 1460 - 1472 Basalt: Dark grayish black, hard, fine grained with zeolite-filled cavities.
- 1472 - 1483 Tuff: Pink and white, firm to soft.

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- 1483 - 1490 Basalt: Black, hard, fine grained.
- 1490 - 1580 Tuff: Pink and white, firm to soft.
- 1580 - 1620 Rhyolite (?): Grayish pink with wavy veinlets of milky-white quartz, some calcite, zeolite, and chlorite.
- 1620 - 1660 Tuffaceous siltstone: Pinkish, whitish, and light gray. Whitish siltstone is partially altered to clay.
- 1660 - 1740 Basalt: Brownish black, hard, fine grained. Lower portion somewhat chloritized.
- 1740 - 1770 Basalt: Dark pinkish gray, hard, microcrystalline, slightly altered.
- 1770 - 1785 Tuff: Pinkish and white with some light-green claystone and white ash.
- 1785 - 1820 Basalt: Dark grayish black, hard, fine grained, with some calcite and chlorite.
- 1820 - 1848 Tuff: White and pink, firm with some white claystone.
- 1848 - 1854 Sandstone: Whitish, firm to friable, very fine grained.
- 1854 - 1880 Tuff: White and pink as above.
- 1880 - 1890 Crystal tuff: White, very fine, firm.
- 1890 - 1985 Tuff: Grayish white and pink, firm, thin interbeds of black carbonaceous shale, few thin stringers of whitish, firm, very fine-grained sandstone with clayey matrix.
- 1985 - 1990 Welded tuff (?): Pinkish gray, hard, cemented, siliceous, contains some calcite.
- 1990 - 2080 Tuff: Pink and light brown, firm, some interbedded brown shale. Some thin beds of black carbonaceous shale containing black shiny coal.
- 2080 - 2095 Sandstone: White, firm, very fine grained, feldspathic.
- 2095 - 2108 Siltstone: Grayish white and light green, firm, with some grayish-white limestone containing pyrite. Also some thin layers of black carbonaceous shale.
- 2108 - 2147 Sandstone: Grayish white, firm, very fine grained, partially cemented, containing some pyrite.

- 2147 - 2155 Tuff: Whitish, green and pink, firm, with interbeds of grayish-black fissile shale.
- 2155 - 2175 Limestone: Grayish white, firm, hard, with light-colored interbeds of siltstone and fine, friable sandstone.
- 2175 - 2200 Basalt: Reddish gray, partially altered with quartz filling cavities.
- 2200 - 2240 Tuff: White, pink and light gray, friable and grayish-black shale with thin streaks of coal. Also a small amount of limestone.
- 2240 - 2250 Coal: Black, thinly laminated, shaly.
- 2250 - 2267 Limestone: Grayish white, hard to firm.
- 2267 - 2278 Tuff: Pink, red, green, and white. Firm.
- 2278 - 2295 Sandstone: Medium gray, friable, fine grained.
- 2295 - 2305 Tuffaceous siltstone: White, green and gray, firm to friable, and shaly black brittle coal. Thin bed of coarse sandy limestone in this section.
- 2305 - 2320 Sandstone: Whitish light green, friable, coarse, subangular, composed of fragments of limestone, siltstone, and altered volcanic rock in a silty matrix. Some interbedded grayish-white, fine-grained, firm to friable silty sandstone containing carbonaceous material.
- 2320 - 2430 Tuffaceous siltstone: Medium gray and light green, friable, containing small fragments of black carbonaceous material and interbedded with coarse sandstone above.
- 2430 - 2510 Rhyolite: Dark pinkish gray and reddish gray, some partially altered and having quartz-lined cavities. Thin layers of baked clay and interbeds of varied colored siltstones.
- 2510 - 2520 Sandstone: Whitish, fine, subrounded feldspathic. Slight gas show on analyzer (Rotary Engineering - Well Logging Service).
- 2520 - 2555 Tuff fine: White, pink and light gray, friable to firm, containing some thin layers of black shaly coal.
- 2555 - 2560 Welded tuff (?): Pinkish dark gray, hard.
- 2560 - 2570 Sandstone: White, friable to loose, coarse silty, composed of feldspar, quartz and rock fragments. Fair show on gas analyzer.



- 2570 - 2610 Siltstone: Dark to medium gray, friable, containing small splintery fragments of black carbonaceous material and some black shale. Also a small amount of light-gray, fine- to medium-grained, quartz sandstone. Gamma Ray - Neutron indicates possible gas zone. Fair show on analyzer.
- 2610 - 2645 Tuffaceous siltstone: White and light greenish gray, friable with interbeds of white, fine, hard, cemented quartz sandstone. Show on analyzer.
- 2645 - 2660 Siltstone: White, fine sandy, friable, with many slivers of white shell (?) fragments; some fine-grained, loose sand intermixed. Also thin layers of black shale.
- 2660 - 2675 Shale: Black, brittle and shaly, fissile coal.
- 2675 - 2720 Siltstone: White to medium-gray, very fine sandy, friable, and fine silty sandstone.
- 2720 - 2815 Shale: Grayish-black, and medium-gray, friable to firm siltstone with splinters of black carbonaceous material. Small amount of coal. Some silty sandstone in lower section. Fair gas show on analyzer.
- 2815 - 2890 Shale: Black, fissile with thin layers of coal and occasional layers of interbedded medium-grained, firm to hard, silty, feldspathic sandstone.
- 2890 - 2955 Sandstone: White, firm to hard, medium grained, feldspathic, cemented with lime.
- 2955 - 2970 Tuffaceous siltstone: Light gray and green, firm.
- 2970 - 2990 Welded tuff (?): Medium gray, containing large fragments of feldspar crystals.
- 2990 - 3050 Siltstone: Light gray, green and tan, firm, and dark gray, firm siltstone containing fragments of carbonaceous material. Some thin layers of black shale and coal.
- 3050 - 3085 Tuffaceous siltstone: Light gray and green, firm, and fine sandy siltstone.
- 3085 - 3090 Siltstone: Medium to dark gray, firm to hard, with small pieces of black carbonaceous material and thin layers of coal.
- 3090 - 3110 Welded tuff (?): Pinkish, grayish black, hard.

- 3110 - 3310 Tuff fine: Light gray and pink, firm, with interbedded thin layers of dark-gray shale and coal. Good gas show on analyzer 3220 - 3260.
- 3310 - 3330 Welded tuff (?)
- 3330 - 3410 Tuff: As above.
- 3410 - 3440 Shale: Medium gray, firm with scattered small fragments of carbonaceous material, some black shaly coal.
- 3440 - 3450 Sand: Medium gray, friable, fine grained containing coarse subrounded grains of black shale. Slight gas show on analyzer.
- 3450 - 3505 Sand: Tan, friable, medium to fine grained; interbeds of grayish-black shale and medium-gray shale with thin layers of coal.
- 3505 - 3568 Tuffaceous siltstone: Light gray and green, firm.
- 3568 - 3577 Sandstone: White, firm to hard, medium to coarse grained, feldspathic, cemented with lime.
- 3577 - 3599 Tuffaceous siltstone: As above.
- Core No. 1 (3598 - 3632)
- 3598 - 3599 Shale: Light gray, soft bentonite.
- 3599 - 3600 Siltstone: Light gray, very sandy, micaceous, soft.
- 3600 - 3601 Sandstone: Light green, speckled with small black mineral fragments, fine-grained, silty friable, subangular grains.
- 3601 - 3602 Shale: Light gray, soft sandy.
- 3602 - 3603 Sandstone: Light gray, silty, fine grained, partially cemented, micaceous.
- 3603 - 3604 Siltstone: Medium hard, very sandy, inclusions of quartz and shale.
- 3604 - 3607 Siltstone: Gray, dense, micaceous.
- 3607 - 3608 Sandstone: Light gray, fine grained, silty, subrounded, micaceous, poorly sorted.
- 3608 - 3610 Sandstone: White, medium grained, hard, well cemented, subangular, micaceous.
- 3610 - 3613 Siltstone: Dark gray, carbonaceous inclusions, micaceous.

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- 3613 - 3614 Siltstone: Light gray, carbonaceous streaks, micaceous, sandy.
- 3614 - 3615 Sandstone: Speckled with minute fragments of black minerals, calcareous, medium hard, micaceous, poorly sorted.
- 3615 - 3616 Sandstone: As above but harder.
- 3616 - 3632 No recovery. Gas zone indicated on Gamma Ray - Neutron log (3610 - 3618). Slight gas show on analyzer.
- 3632 - 3643 Shale: Light gray, firm, silty.
- 3643 - 3730 Sandstone: Light gray, friable, medium to coarse grained, subrounded and interbeds of light gray hard siltstone.
- 3730 - 3840 Crystal tuff, fine: White, hard, very fine, vitric with partially altered feldspar.
- 3840 - 3890 Siltstone: Medium gray, firm to hard, with some laminae of black soft carbonaceous material and coal.
- 3890 - 3895 Shale: Medium gray to dark gray, firm.
- 3895 - 3910 Sandstone: Grayish white, firm to hard, medium grained, subangular, feldspathic, cemented with lime.
- 3910 - 3950 Crystal tuff, fine: White, hard, very fine grained, silicified.
- 3950 - 3965 Sandstone: White, friable, medium grained, subangular, feldspathic. Feldspar partially altered.
- 3965 - 3970 Shale: White, limy, firm.
- 3970 - 4000 Sand: White, loose, coarse grained, subangular, feldspathic.
- 4000 - 4035 Siltstone: Light gray, firm.
- 4035 - 4060 Sandstone: White, firm, medium grained, subangular, cemented with lime and scattered fragments of partially altered pyroxene (?).
- 4060 - 4070 Sand: White, loose, subangular, feldspathic.
- 4070 - 4095 Shale: Medium gray, brittle, silty with some black carbonaceous streaks.

- 4095 - 4145 Sandstone: White, firm to friable, medium grained, angular, partially cemented with lime and scattered small fragments of dark minerals.
- 4145 - 4150 Siltstone: Medium to darkish gray and grayish tan, firm to brittle.
- 4150 - 4260 Sandstone: Dark gray, fine grained, silty, speckled with minute fragments of dark minerals.
- 4260 - 4370 Siltstone and shale: Dark gray, firm.
- 4370 - 4435 Crystal tuff, fine: White, fine grained, silicified, underlain by white fine- to medium-grained, subangular, partially lime-cemented sandstone. Many small black mineral fragments in the sandstone.
- 4435 - 4440 Shale: Dark grayish black, firm, with thin layers of coal.
- 4440 - 4460 Sandstone: Medium gray, hard, fine silty with scattered medium-sized grains of feldspar and quartz.
- 4460 - 4470 Siltstone and shale: Medium gray to grayish black, firm with thin layers of black carbonaceous material.
- 4470 - 4515 Sandstone: Medium to dark gray, firm, fine grained, containing thin layers of carbonaceous material and a little coal.
- 4515 - 4530 Shale: Medium gray, firm.
- 4530 - 4582 Sandstone: Light to medium gray, firm, fine silty, feldspathic, with thin layers of coal.
- 4582 - 4805 Siltstone: Medium to light gray, firm, sandy grading to fine sand and interbedded with grayish-black, firm shale. Some coal.
- 4805 - 4915 Diorite - gabbro (?): Medium to dark gray, fine-grained, feldspar and hornblende crystals. Some metallic sulphide mineralization. Interbedded medium-gray siltstone and fine sandstone.
- 4915 - 4980 Andesite (?): Medium gray, fine grained, hard.
- 4980 - 5010 Siltstone: Medium to light gray, firm with some black carbonaceous material.
- 5010 - 5065 Tuff, fine: Light gray, greenish and pink, firm. Greenish siltstone partially altered to clay.

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- 5065 - 5085 Sandstone: Whitish light gray, firm to friable, very fine grained, silty. Slight gas show on analyzer.
- 5085 - 5095 Shale: Medium to dark gray, firm to brittle, with pieces of black carbonaceous material.
- 5095 - 5135 Andesite (?): Light gray, firm to hard, partially altered with small areas of metallic sulphide mineralization.
- 5135 - 5150 Shale: Medium gray, firm.
- 5150 - 5170 Gabbro - diorite (?): Dark gray, microcrystalline, feldspar and hornblende.
- 5170 - 5190 Tuffaceous siltstone: Light gray and green, firm; green siltstone partially altered to clay. Interbeds of medium- to dark-gray silty shale.
- 5190 - 5240 Tuffaceous siltstone and shale: As above.
- 5240 - 5340 Gabbro - diorite: Medium dark gray, hard, fine crystalline. Few interbeds of sandy siltstone.
- 5340 - 5450 Tuffaceous siltstone: Light gray, tan, and green, firm and thin beds of black shale with some coal. Green siltstone partially altered to clay.
- 5450 - 5580 Siltstone and sandstone: White, hard, silty to silty medium grained, feldspathic, partially cemented.
- 5580 - 5650 Tuffaceous siltstone: Whitish, pink and medium to dark gray, firm with thin beds of gray, very fine-grained sandstone speckled with minute fragments of black crystals. Some thin layers of brittle black shale.
- 5650 - 5660 Tuffaceous sandstone: Medium to dark gray, hard, fine to medium grained, silicified, with slightly altered feldspar.
- 5660 - 5740 Shale: Grayish black, firm, silty.
- 5740 - 5745 Siltstone: Light gray and tan, firm, containing some friable layers of fine sandstone.
- 5745 - 5805 Shale: Grayish black, firm, and medium-gray, fine sandy siltstone with small fragments of carbonaceous material. Some coal.
- 5805 - 5850 Tuffaceous siltstone: Gray, green and white, firm siltstone with layers of fine sandy siltstone and gray, hard, fine-grained sandstone speckled with minute fragments of black crystals.

- 5850 - 5945 Sandstone: Grayish white, firm, fine silty to silty medium grained, feldspathic.
- 5945 - 6055 Shale: Grayish black, firm, silty, with medium-gray siltstone containing small irregular pieces of black carbonaceous matter. Some thin beds of gray, fine silty sandstone speckled with very small fragments of black crystals. A small amount of coal in the shale.
- 6055 - 6080 Sandstone: Medium gray, hard, medium grained, subrounded, well cemented.
- 6080 - 6090 Siltstone: Medium gray to grayish black, fine sandy, firm.
- 6090 - 6195 Sand: Light grayish white, loose, coarse grained, angular feldspathic with pieces of dark volcanic rock.
- 6195 - 6212 Siltstone: Light gray, firm and medium-gray to dark-gray, firm shale.
- 6212 - 6230 Sand: White, loose, coarse grained, angular, feldspathic with scattered weathered mica plates. Becomes more indurated toward bottom.
- 6230 - 6240 Shale: Dark gray, firm, silty with laminae of black carbonaceous material. Some fine-grained silty, firm sandstone interbedded.
- 6240 - 6265 Sandstone: Whitish, medium- to coarse-grained, friable, some weathered, sandstone composed of quartz and feldspar.
- 6265 - 6280 Sandstone: Whitish, medium to coarse grained, fairly well cemented, firm, with some pyrite.
- 6280 - 6500 Sandstone: Medium gray, hard, fine silty, calcareous, cemented, feldspathic sandstone. Some finely disseminated pyrite in portions.
- 6500 - 6535 Shale: Dark gray-black, silty, some fine silty sandstone interbedded.
- 6535 - 6550 Sandstone: Medium greenish-gray, hard, cemented sandstone, siliceous. Some pyrite.
- 6550 - 6565 Shale: Medium-gray to grayish black, silty-to-fine, sandy shale.
- 6565 - 6570 Sandstone: White, coarse, soft, with angular grains of quartz and feldspar.

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- 6570 - 6990 Altered rhyolite (?): White, calcareous, firm to very firm. Areas of finely disseminated pyrite. Becomes less limy with depth. Core No. 2 (6854-6864), rhyolite - light gray, inclusions of quartz and sanadine.
- 6990 - 7060 Andesite: Medium dark gray, hard. Core No. 3 (7053 - 7056), andesite - above.
- 7060 - 7340 Rhyolite: White, partly altered, firm to very firm. Occasional thin interbeds of fine micaceous sandstone and siltstone.
- 7340 - 7355 Andesite: Medium greenish gray, hard.
- 7355 - 7460 Rhyolite: Partly altered, small patches of chlorite and finely disseminated pyrite. Mineralization appears to increase with depth.  
T.D.

