South Willow Creek

Montana Pioneer Oil Company #1 Miller Ranch

From	To		Description
		Ellis (cont'd)	
	2028		Shale, gray
	2055		Lime
	2065		Shale, red
		Amsden	
	2082		Sandy lime - water
	2084		Lime, very hard
	2112		Lime. pink layers, orange and red colored shales
	2150		Lime
	2165		Lime, very hard
	2174		Shale, gray. sandy
	2178		Sand - some water
	2189		Lime
	2210	Total depth	Shale, red

Note: Formation tops interpreted by George Darrow

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I

INTRODUCTION

Wytana Cattle Company's Pronghorn #9 was drilled to secure a large artesian flow from the Heath sand. The Heath water was unfit for use and the well was completed in the Cat Creek sands for approximately 200 barrels of water per day.

II

OPERATIONS

Operator: Wytana Cattle Company
Lease: Pronghorn
Well No: 9
Location: 220' South of Northeast corner of the forty; thence West 250'
NE NE SE
Section 29, Township 11 North, Range 25 East
Pronghorn Ranch Area
Musselshell County, Montana

Elevation: Unknown
Contractor: Taylor Drilling Company

Dates:
Rigging Up: March 25, 1951
Spud: March 27, 1951
Under Surface: March 30, 1951
Reached Total Depth: April 25, 1951
Completed: May 5, 1951

Total Rigging Up Time: 3 days
Total Drilling and Coring Time: 29 days
Total Completion Time: 11 days
Total Time From Spudding In: 40 days

Surface Formation: Quaternary gravels overlying Colorado shale
Deepest Formation Penetrated: Heath
Total Depth: 2803 feet
Plug Back Depth: 2020 feet
Status: Small flowing water well

Drilling Equipment

Rig

Cardwell Model "E"
D. C. Hoore
Gardner-Denver
Wisconsin

Engine
Transmission
Carrier
Pump
Hydraulic Jack

Mast
Mast Jacket
Crown Block
Water Hose
Rotary Hose
Kelly Hose
Swivel
Kelly
Rotary Table
Drawworks
Sand Reel
Catheads
Tongs
Slips
Elevators
Drill Collars
Drill Pipe
Bits
Reamers
Core Barrel
Core Bit
Hole Opener
Fishing Tools
Casing
Tubing
Sucker Rods
Pump Barrel
Plunger
Valves
Tool Joints
Pipe Wrenches
Chain Tongs
Rod Tongs
Tubing Tongs
Sucker Rod Tongs
Casing Tongs
Tubing Elevators
Sucker Rod Elevators
Casing Elevators
Drill Pipe Elevators
Drill Collar Elevators
Core Barrel Elevators
Hole Opener Elevators
Fishing Tool Elevators
Casing Elevators
Tubing Elevators
Sucker Rod Elevators
Drill Pipe Elevators
Drill Collar Elevators
Core Barrel Elevators
Hole Opener Elevators
Fishing Tool Elevators

Drilling Equipment

Equipment	Make	Size
Drawworks	Cardwell Model "S"	3600 ft.
Derrick	L. C. Moore	86 ft.
Pump	Gardner-Denver	7½" x 14"
Motors (2)	Waukesha	185 HP Drawworks
		225 HP Pump
Fuel	Butane	3500 gals.
Shale Shaker	Link-Belt	146
Blowout Preventer	Hinderliter	10-3/4"
Drill Pipe	Reed	4-1/2"
Drill Collars (3)	National	6-1/4"

Hole Dimensions

Size	From	To
13-3/4"	Surface	80'
9"	80'	2803'

Casing Record

			Date Ran
10-3/4",	32# @	77' w/ 40 sx	3-28-51
7" ,	20# @	2802' w/ 450 sx	4-26-51

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Completion

Date

4-26-51 Seven inch casing set at 2802 feet and cemented with 450 sacks.

4-29-51 Perforated Heath sandstone with 120 shots from 2714 to 2744 feet using Lane-Wells Koneshot gun. Jet perforated Third Cat Creek sandstone with 120 shots from 1850 to 1870 feet using Lane-Wells Koneshot gun.

4-30-51 Reperforated Third Cat Creek with Lane-Wells Open Hole jet gun from 1850 to 1869 feet with 38 shots. Perforated Ellis sandstone with Lane-Wells Open Hole gun from 2213 to 2235 feet with 21 shots. Perforated Ellis sandstone with Koneshot gun from 2242 to 2248 feet with 24 shots. Perforated Second Cat Creek with Koneshot gun from 1719 to 1731 feet with 48 shots. Perforated First Cat Creek with Koneshot gun from 1448 to 1464 feet with 24 shots.

5-3-51 Set Lane-Wells Drillable Bridging Plug, Type D-2, Size BP-13 at 2220 feet. Went in hole with Baker 47-C, AZ-8 Retrievable Cementer on 3½" drill pipe. Set packer at 1830 feet. Acidized Third Cat Creek sandstone with 500 gallons mud acid through perforation, from 1850 to 1870 feet. Used 800# pressure to break down formation. Pressure broke from 800# to 500# to give a 400# breakdown. Circulated with water to remove spent acid.

5-4-51 Set Baker 47-C, AZ-8 Retrivable Cementer at 1820 feet to reacidize Third Cat Creek sand through perforations 1850 to 1870 with 1000 gallons mud acid. Used 800# pressure to break down formation. Pressure broke from 800# to 400# to give a 400# breakdown. Circulated with clear water to remove spent acid. Pumped 80 barrels of water into formation at 400# PSI. Circulated.

Set Lane-Wells Drillable Bridging Plug Type D-2, Size BP-13 at 1795 feet.

5-5-51 Set baker 47-C, AZ-8 Retrivable Cementer at 1705 feet to acidize Second Cat Creek sandstone through perforations from 1719 to 1731 feet with 500 gallons mud acid. Formation took acid at 1800# and broke to 800# to give 1500# breakdown. Circulated spent acid out with clear water. Pumped 50 barrels of water back into formation at 400# PSI. Circulated.

5-6-51 Drilled out Lane-Wells Bridging Plug at 1735 feet. Went in hole and checked top of plug at 2020 feet. Came out of hole laying down drill pipe. Well flowing approximately 200 barrels of water per day.

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III

GEOLOGIC SECTION PENETRATED

Formation	From	To	Thickness
Quaternary, gravel	0	50	50
Colorado shale	50	1551	1501
Kootenai	1551	1933	382
Morrison	1933	2206	273
Ellis group	2206	2440	234
Swift member	2206	2354	148
Rierdon member	2354	2407	53
Piper member	2407	2440	33
Ansden	2440	2654	214
Heath	2654	2803 T.D.	

FORMATION TOPS

Formation	Sample	Radioactivity Log
	50	
Colorado shale	750 - 830	765 - 831
Bowry sd.	1260 - 1270	1252 - 1266
Frontier sd.	1448 - 1640	1447 - 1542
First Cat Creek	1548	1651
Kootenai	1730 - 1780	1717 - 1778
Second Cat Creek	1832 - 1890	1931 - 1988
Third Cat Creek	1930	1933
Morrison	2207	2206
Ellis	2330	2354
Rierdon	2412	2407
Piper	2442	2440
Ansden	2660	2654
Heath	2705	2710
Sandstone	2803	2745
Total Depth		

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WYTANA #2 PRONGHORN RANCH
Sec. 29, T. 11 N., R. 23 E.
Musselshell County, Montana

SAMPLE DETERMINATIONS

by

George Darrow

DEPTH From	To	DESCRIPTION
80	90	Shale, grey-black, silty, slightly micaceous.
90	100	Same, with thinly interbedded bentonite.
100	110	As above; trace glauconite.
110	120	Shale, grey, silty, micaceous, with thinly interbedded bentonite.
120	130	Shale, grey-black, silty, micaceous, with accessory mineral grains; trace bentonite and calcite.
130	140	Same.
140	150	Same; trace pyrite.
150	160	Shale, grey-black, silty, with streaks of sandstone, very fine grained, light grey.
160	170	Shale, as above.
170	180	Siltstone, grey-black, finely arenaceous, with thin streaks of sandstone, very fine grained, light grey.
180	190	Same.
190	200	Same, increasingly sandy.
200	210	As above.
210	220	Same.
220	230	Same, decreasingly sandy.
230	240	As above.
240	250	Same.
250	260	Shale, grey-black, very silty, slightly micaceous.
260	270	Same, some finely arenaceous streaks.
270	280	Shale, black, fissile, micaceous.
280	290	Same.
290	300	Same; trace olive green bentonite.
300	310	As above.
310	320	Shale, grey-black, fissile; trace tan siltstone.
320	330	As above.
330	340	Same, with fish scales.
340	350	Same, with bentonite, light grey and olive green, sandy and biotitic in part.
350	360	Shale, grey-black, silty, siliceous, brittle, hard.
360	370	Same.
370	380	Same, with tan siltstone.
380	390	Shale, as above.
390	400	Bentonite, white, impure.
400	410	Shale, grey-black, finely arenaceous, hard, siliceous.
410	420	Same, very arenaceous with sandy streaks.
420	430	As above.
430	440	Shale, grey-black, silty, fissile, moderately hard, siliceous.
440	450	Same, micaceous.
450	460	As above.
460	470	Same.

DEPTH From	To	DESCRIPTION
470	480	Same, with trace very fine sandstone, light grey, glauconitic.
480	490	Siltstone, grey-black and dark grey, finely arenaceous, trace green bentonite in grains.
490	500	Same, a few disseminated calcite crystals.
500	510	Same, much calcite.
510	520	Siltstone, dark grey, very finely arenaceous with specks of green bentonite, micaceous.
520	530	Same, intergraded with dark grey shale.
530	540	Shale, light grey, very bentonitic, also some green bentonite specks.
540	550	Shale, dark grey, silty, micaceous.
550	560	Same.
560	570	Same, with fine sandy streaks.
570	580	Siltstone, dark grey, finely arenaceous, with intercalated grey-white bentonite.
580	590	Siltstone, grey-black, micaceous, slightly arenaceous, hard.
590	600	Sandstone, fine to medium grained, salt and pepper, argillaceous cement interealations of dark grey shale.
600	610	Siltstone, dark grey, arenaceous with some intercalated sandstone as above.
610	620	Shale, dark grey, silty, slightly micaceous, with specks of green bentonite.
620	630	Same, some fine sandy streaks.
630	640	Shale, grey-black, silty, slightly micaceous.
640	650	Same.
650	660	Limestone, dark brown, micro-crystalline to dense, slightly dolomitic and argillaceous with intercalated grey shale.
660	670	Shale, grey-black, micaceous.
670	680	Bentonite, cream-white.
680	690	Shale, dark grey, silty, with thinly interbedded sandstone, light grey, very fine grained.
690	700	Same.
700	710	Same, sandstone is fine grained in part, salt and pepper.
710	720	As above.
720	730	Same, with light grey bentonite intercalations.
730	740	As above.
740	750	Same.
750	760	Bentonite, cream-white with interbedded shale, dark brown, limy.
760	770	Sandstone, very fine to fine grained, salt and pepper, argillaceous cemented, with thinly interbedded dark grey shale.
770	780	Same, sandstone is fine grained.
780	790	Sandstone as above, with thin partings of dark grey shale.
790	800	Same, sandstone is very argillaceous.
800	810	Same.
810	820	Same, increasingly shaly.
820	830	Same, increasingly shaly, bentonitic in part.
830	840	Sandstone as above, intergraded with siltstone, dark grey, slightly bentonitic.
840	850	Shale, dark grey, very silty with some sandy streaks, and intercalations of white bentonite.
850	860	Sandstone, very fine to fine grained, salt and pepper, bentonitic, dirty, argillaceous, with intercalated dark grey shale.
860	870	Siltstone, dark grey, very arenaceous, very bentonitic, with some intercalated white bentonite.
870	880	Shale, grey-black, silty, with white bentonite.
880	890	Shale, grey-black, silty, micaceous with specks of green bentonite.
890	900	Same.
900	910	Same, slightly arenaceous, no bentonite specks.
910	920	As above.
920	930	Same.

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DEPTH From	To	DESCRIPTION
930	940	Same, with interbedded fine sandstone.
940	950	As above; trace siltstone, dark brown, hard.
950	960	Shale, grey-black, micaceous, slightly silty, fissile.
960	970	Same, with grey-white bentonite.
970	980	Same.
980	990	Same, finely arenaceous in part.
990	1000	As above.
1000	1005	Same.
1005	1010	Same.
1010	1015	Same.
1015	1020	Same.
1020	1025	Same, with interbedded sandstone, very fine grained, salt and pepper, argillaceous.
1025	1030	Same.
1030	1035	Same, arenaceous in part; trace white bentonite.
1035	1040	Sandstone, very fine to fine grained, light grey, hard and tight, with interbedded shale as above.
1040	1045	Same.
1045	1050	Shale, grey-black, micaceous, fissile.
1050	1055	Same, with brown, dolomitic siltstone.
1055	1060	Shale, grey-black, silty and arenaceous with interbedded gre, and white bentonite, and fine grained light gre, sandstone.
1060	1065	Shale, grey-black, micaceous, fissile.
1065	1070	Same, sandy in part.
1070	1075	As above.
1075	1080	Same.
1080	1085	Same.
1085	1090	Same; trace calcite.
1090	1095	Shale, grey-black, micaceous, fissile, slightly silty.
1095	1100	Same.
1100	1105	Same.
1105	1110	Same.
1110	1115	Same.
1115	1120	Same, very finely arenaceous in part.
1120	1125	Shale, grey-black, micaceous, fissile, slightly silty.
1125	1130	Shale, dark grey, slightly micaceous, homogeneous.
1130	1135	Shale, grey-black, micaceous, slightly silty.
1135	1140	Same.
1140	1145	Same, with interbedded white bentonite.
1145	1150	As above.
1150	1155	Shale as above.
1155	1160	Shale, grey-black, micaceous, fissile.
1160	1165	Same.
1165	1170	Same.
1170	1175	Same, with trace intercalated very fine sandstone.
1175	1180	Same, silty in part.
1180	1185	Shale, dark grey, slightly silty.
1185	1190	Shale, grey-black, micaceous, slightly silty.
1190	1195	Same; trace white bentonite.
1195	1200	Same.
1200	1205	Same.
1205	1210	Same.
1210	1215	Same.
1215	1220	Same, slightly arenaceous in part.
1220	1225	Same.

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DEPTH From	To	DESCRIPTION
1225	1230	Same, slightly arenaceous with specks of green bentonite.
1230	1235	As above.
1235	1240	Same.
1240	1245	Siltstone, grey-black, slightly arenaceous with specks of green bentonite.
1245	1250	Same.

TOP OF SAND - 1250

1250	1255	Sandstone, fine to medium grained, salt and pepper, grains euhedral to subrounded, fair porosity, cement is calcareous and argillaceous, also some green bentonite specks.
1255	1260	Same, fine grained.
1260	1265	Same.
1265	1270	Same, very silty with interbedded grey-black shale.
1270	1275	Siltstone, dark grey, bentonitic, slightly arenaceous with interbedded white bentonite.
1275	1280	Shale, grey-black, silty, slightly micaceous.
1280	1285	Shale, black, homogeneous, very fissile, with some interealated white bentonite.
1285	1290	Shale, grey, homogeneous, with interbedded white bentonite.
1290	1295	Same.
1295	1300	Shale, dark grey, silty in part.
1300	1305	Same, with specks of green bentonite.
1305	1310	Same.
1310	1315	Shale, grey-black, micaceous.
1315	1320	Same.
1320	1325	Same, much aragonite.
1325	1330	Same.
1330	1335	Siltstone, dark grey and dark brown.
1335	1340	Siltstone, dark grey, slightly arenaceous.
1340	1345	Shale, grey-black, fissile, with pyrite and aragonite.
1345	1350	Same.
1350	1355	Shale, grey-black, slightly micaceous, fissile.
1355	1360	Siltstone, grey-black, dolomitic, hard, has distinctive brown spots, possibly calicastic, with shale as above.
1360	1365	Same.
1365	1370	Shale, grey-black, fissile.
1370	1375	Same.
1375	1380	Same.
1380	1385	Same.
1385	1390	Same, micaceous, glistens.
1390	1395	As above.
1395	1400	Same.
1400	1405	Same.
1405	1410	Same.
1410	1415	Sandstone, silt size to very fine grained, light grey, micaceous, clean, interbedded with shale as above.
1415	1420	Siltstone, grey-black, very finely arenaceous, with thinly interbedded sandstone, light grey, very fine grained, micaceous.
1420	1425	Shale, grey-black, very silty, micaceous.
1425	1430	Siltstone, grey-black, very finely arenaceous, micaceous.
1430	1435	Same.
1435	1440	Shale, grey-black, micaceous.
1440	1445	Same, silty in part.

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DEPTH From	To	DESCRIPTION
		TOP OF FIRST CAT CREEK - 1448
1445	1450	Sandstone, very fine to fine grained, angular, glassy, clean, white, micaceous, argillaceous and siliceous cement, hard and tight, quartzitic in part, some pale green specks of bentonite, with thin partings of grey-black shale.
1450	1455	Same, some interbedded grey-black shale.
1455	1460	Sandstone as above, fair porosity.
1460	1465	Same.
1465	1470	Same, some interbedded grey-black shale.
1470	1475	As above.
1475	1480	Sandstone, very fine grained, light grey, clean, micaceous, slightly calcareous, with intercalated grey-black siltstone and shale, sandstone is hard and tight.
1480	1485	Same, sandstone fine grained in part.
1485	1490	Sandstone as above, very fine to fine grained with partings of black shale.
1490	1495	Same.
1495	1500	Sandstone as above, very fine grained, grading to siltstone with interbedded grey-black shale.
1500	1505	Sandstone as above, very fine to fine grained, with intercalated grey-black shale.
1505	1510	Same.
1510	1515	Same.
1515	1520	Same.
1520	1525	Same.
1525	1530	Same, silty and argillaceous.
1530	1535	As above.
1535	1540	Same.
1540	1545	Siltstone, grey-black, micaceous, with interbedded very fine sandstone.
1545	1550	Same, shaly in part,; trace fine sandstone.
		TOP OF KOOTENAI - 1548
1550	1555	Sandstone, medium to coarse grained, light green-grey, grains angular and glassy to sub-round and frosted, micaceous, some amber quartz grains; trace accessory minerals, bentonitic and argillaceous cement, slightly calcareous, friable, fair porosity.
1555	1560	Same, sandstone is micro-conglomeritic.
1560	1565	As above, grains more rounded.
1565	1570	Same; trace intercalated bentonite.
1570	1575	As above, sandstone is extremely friable.
1575	1580	Same, with imbedded granules of limestone and black shale.
1580	1585	Sandstone, micro-conglomerate as above, medium to very coarse grains, with coarse flakes of muscovite and micro-pebbles of maroon, hematitic siltstone, which streaks sandstone, maroon; trace siltstone, maroon, micaceous.
1585	1590	Same, sandstone streaked maroon and light green.
1590	1595	Sandstone as above, light green-grey, salt and pepper, with coarse, sub-round grains of black accessory minerals; trace maroon coloring.
1595	1600	Same, with soft maroon and purple shale, bentonitic, silty in part.
1600	1605	Shale and siltstone, maroon, soft, bentonitic in part, silty in part, with intercalated sandstone as above; trace intercalated white bentonite; siltstone is arenaceous in part; trace black shale partings.
1605	1610	Same, shale is olive green, grey-green in part.
1610	1615	Shale and siltstone, maroon and purple, soft, bentonitic, with thin partings of splintery black shale, imbedded sand grains, fine to coarse, sub-round; siltstone is hematitic.

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DEPTH From	To	DESCRIPTION
1615	1620	Shale and siltstone as above, siltstone is hematitic, finely arenaceous in part.
1620	1625	Same, some sand streaks.
1625	1630	Shale and siltstone, maroon, bentonitic, with streaks and spots of grey-green and olive green.
1630	1635	Siltstone, maroon, micaceous, hematitic, shaly in part.
1635	1640	Shale, grey-green, with maroon stains, soft, bentonitic.
1640	1645	Shale and siltstone, maroon and grey-green, bentonitic in part.
1645	1650	Siltstone, maroon, micaceous, hematitic.
1650	1655	Sandstone and shale intergraded, shale is green-grey and maroon, bentonitic, arenaceous, sandstone is micro-conglomeratic, argillaceous and shaly, grey and purple.
1655	1660	Shale, maroon and green-grey, arenaceous, soft, bentonitic, with some thin sand streaks.
1660	1665	Same, with some interbedded hematitic siltstone.
1665	1670	As above.
1670	1675	Shale as above, maroon and grey.
1675	1680	Shale, grey and green-grey, very bentonitic, soft.
1680	1685	Same, streaked with maroon in part; trace dense brown limestone.
1685	1690	Same, silty and very finely arenaceous, shale is firmer (slightly calcareous).
1690	1695	Shale, green-grey, moderately soft, calcareous and bentonitic, with maroon stains.
1695	1700	Same; trace dense brown limestone (probably pebbles or nodules).
1700	1705	Shale, grey, calcareous, slightly bentonitic with imbedded nodules and aggregates of dense brown limestone (clastic), some poorly developed oolites; pyrite.
1705	1710	Siltstone, grey-black, with paper thin carbonaceous streaks, some pyrite aggregates, very finely arenaceous in part.
1710	1715	Same.
1715	1720	Shale, light grey, very soft, very bentonitic.
1720	1725	Same.
1725	1730	Same.
1730	1735	Sandstone, medium to coarse grained, light grey, clean, with pink and amber grains, grains sub-round, calcareous cement, some quartzitic streaks, much interealated white and grey bentonite.
1735	1740	Limestone, light buff, micro-fragmental, some fragments are green-white, limestone is argillaceous in part.
1740	1745	Sandstone, light grey, dolomitic, very fine to silt size, grains hard and tight, with interealated micro-conglomeratic sandstone as above.
1745	1750	Sandstone, light grey, very dolomitic, very fine to silt size, grains hard and tight, almost a dolomitic siltstone.
1750	1755	Same, with interealated maroon shale and siltstone.
1755	1760	Same, with interealated soft, yellow-brown shale.
1760	1765	Sandstone, fine grained to silt size, light grey and maroon, hard and tight, dolomitic with some interealated shale, maroon, soft.
1765	1770	Sandstone, light grey, very dolomitic, very fine to silt size grains, grading to silty and finely arenaceous dolomite.
1770	1775	Sandstone, fine to very fine grained, light grey, sub-angular to sub-round; trace accessory minerals, calcareous and dolomitic cement, poor porosity; trace interealated maroon siltstone.
1775	1780	Sandstone, medium to coarse grained, angular and euhedral to sub-round, salt and pepper, with buff matrix, black accessory minerals, argillaceous and bentonitic cement, good porosity, friable.
1780	1785	Shale, maroon and interbedded dolomite, maroon, micro-crystalline and micro-sucrosic with some paper thin partings of black carbonaceous shale.

DEPTH From	To	DESCRIPTION
1785	1790	Shale and siltstone, maroon and purple; trace dolomite as above, with interbedded black siltstone and shale, lenses or nodules of dense, buff and grey limestone and streaks of sandstone, fine grained and micro-conglomeratic.
1790	1795	Shale, maroon with disseminated limestone nodules and pebbles, a few scattered sand grains.
1795	1800	Same.
1800	1805	Same to 1803, then shale, light grey and buff, slightly calcareous with imbedded disseminated sand grains and micro-pebbles, with streaks of fine, hard sandstone.
1805	1810	Same, purple, green and maroon in part, with limestone nodules.
1810	1815	Limestone, buff to purple, dense, with imbedded sand grains, some thin partings of green and maroon shale; trace interbedded white gypsum, some thin sand streaks.
1815	1820	Same to 1818, then sandstone pale green, very fine grained, limy, hard and tight, slightly micaceous.
1820	1825	Sandstone as above, with some lime streaks.
1825	1830	Same, sandstone is green-white.
		TOP OF THIRD CAT CREEK - 1832
1830	1835	Same to 1832, then sandstone, medium to very coarse grained, angular and subedral to sub-round, glassy, with black accessory minerals, bentonite and argillaceous cement, friable, good porosity, pyritic.
1835	1840	Same, mostly medium grained.
1840	1845	As above.
1845	1850	Same, very friable.
1850	1855	Same, with chert, micro-pebbles and large percentage very coarse quartz grains.
1855	1860	Same.
1860	1865	Same, with micro-pebbles of dolomite (?), dark grey, dense, siliceous, pitted, cherty.
1865	1870	As above.
1870	1875	Sandstone as above, sandstone is better cemented.
1875	1880	As above, high percentage black accessory minerals, sandstone is silty and argillaceous, salt and peppery.
1880	1885	Same.
1885	1890	Same.
1890	1895	Same.
1895	1900	Same, sandstone is harder.
1900	1905	Sandstone, fine grained, angular, glassy, clean, some black accessory minerals, some quartzitic streaks, slight porosity, tight.
1905	1910	Sandstone, medium to very coarse grained, salt and pepper, black accessory minerals, argillaceous and bentonitic matrix, moderately well cemented, grains angular and subedral, glassy surfaces, fair porosity, friable.
1910	1915	Same.
1915	1920	Same, much pyrite.
1920	1925	As above; trace lignite, very friable.
1925	1930	Same, very friable.
		TOP OF MADISON - 1930
1930	1935	Sandstone, very fine grained to silt size, hard and tight, micaceous, slightly calcareous, light grey, limy in part.

DEPTH From	To	DESCRIPTION
1935	1940	Same, fine grained, grains sub-angular to sub-round.
1940	1945	Same, much pyrite, with interealated limestone, buff, dense, slightly arenaceous
1945	1950	Same, sandstone hard and tight, partings of black pyritic shale.
1950	1955	Same, sandstone dark grey, hard and tight, with partings of black carbonaceous shale.
1955	1960	Shale, black and varicolored, variegated in part; black shale has paper thin laminae; shale is silty and finely arenaceous in part; trace limestone, micro-pebbles.
1960	1965	Sandstone, silt size to fine grained, poorly sorted, light green to purple, very argillaceous and silty, white mineral grains give sandstone white spotted effect, sandstone is hard and tight, micaceous.
1965	1970	Same, argillaceous and shaly.
1970	1975	Sandstone as above, grey with interbedded grey shale.
1975	1980	Sandstone fine and very fine grained, grey, grains sub-round, argillaceous matrix, micaceous; with distinctive paper thin laminae of black carbonaceous material and some imbedded carbonaceous plant fragments, pyritized in part; black accessory minerals, tight.
1980	1985	Same.
1985	1990	Sandstone fine to medium grained, grains angular to sub-round, argillaceous matrix, some calcareous cement, inclusions of black carbonaceous material, low percentage accessory minerals, tight.
1990	1995	Same, fair porosity, friable.
1995	2000	As above, medium grained.
2000	2005	Same.
2005	2010	Same.
2010	2015	Same, harder, shaly.
2015	2020	Shale and silt, black, red, green, purple, varicolored and variegated, slightly arenaceous in part.
2020	2025	Same.
2025	2030	Same; trace limestone, dark brown, dense.
2030	2035	Shale and siltstone, maroon and light green, mottled, slightly arenaceous with imbedded phosphatic(?) nodules.
2035	2040	Siltstone, light green, finely arenaceous, bentonitic, with purple and black shale and phosphatic(?) nodules.
2040	2045	Same, mostly grey with green shale, some fine sandy streaks.
2045	2050	Siltstone, purple, finely arenaceous with interealated green shale, some fine sandy streaks.
2050	2055	Siltstone, light green, finely arenaceous with interealated shale, green, purple and black.
2055	2060	Same, siltstone mottled with maroon.
2060	2065	Same.
2065	2070	Same.
2070	2075	Siltstone as above, more arenaceous.
2075	2080	Siltstone, green-grey with interealated grey-black shale.
2080	2085	Sandstone, grey-green, very fine grained, micaceous, argillaceous matrix, calcareous.
2085	2090	Same.
2090	2095	Same, grades to sandstone fine grained, light grey, calcareous, clean, tight.
2095	2100	Sandstone, fine to medium grained, angular to sub-angular, calcareous, fair porosity.
2100	2105	Same, harder.
2105	2110	Shale, dark grey, green-grey and varicolored, calcareous and bentonitic, with sandstone as above.

GEORGE DARROW
CONSULTING GEOLOGIST
BILLINGS MONTANA

DEPTH From	To	DESCRIPTION
2110	2115	Siltstone, dark grey and green-grey, finely arenaceous, with intercalated fine sandstone.
2115	2120	Sandstone, fine to medium grained, light grey, calcareous, hard and tight, grains sub-round, with partings and intercalations of shale, grey and green-grey.
2120	2125	Same.
2125	2130	Same.
2130	2135	Siltstone, grey, finely arenaceous, grading to very fine grained sandstone, argillaceous.
2135	2140	Shale and siltstone, green, grey, maroon, and varicolored, calcareous, arenaceous in part, with intercalated limestone, brown, dense.
2140	2145	Same.
2145	2150	Siltstone, green-grey, calcareous, finely arenaceous, maroon and varicolored in part, with interbedded black shale, fissile, splintery, some micro-pebbles of dense brown limestone.
2150	2155	Same, shaly in part.
2155	2160	Siltstone, green and dark brown, mottled, very limy, grades to argillaceous limestone.
2160	2165	Siltstone, grey-green, mottled with maroon, calcareous.
2165	2170	Siltstone, grey-green, very limy, some imbedded micro-pebbles.
2170	2175	Shale, green, bentonitic, with partings of black carbonaceous shale.
2175	2180	Sandstone, very fine grained to silt size, grades to siltstone in part, light grey and green, calcareous, tight, micaceous, argillaceous matrix.
2180	2185	Limestone dark buff and olive green, crypto-crystalline, dense, argillaceous with shaly partings.
2185	2190	Same, very argillaceous.
2190	2195	Same.
2195	2200	Siltstone, grey-green, very finely arenaceous, limy, grades to very fine, limy sandstone in part.
2200	2206	Siltstone, grey and green-grey, limy in part, with intercalated white crystalline anhydrite.

TOP OF ELLIS - 2207

2205	2210	Same to 2207, then sandstone, light grey, fine to medium grained, grains sub-angular to sub-round, glauconitic, calcareous, small percentage accessory minerals, poor porosity.
2210	2215	Same, medium grained.
2215	2220	As above, fair porosity.
2220	2225	As above.
2225	2230	Sandstone as above, fine to medium grained, with partings of black shale.
2230	2235	Same.
2235	2240	Same.
2240	2245	Same, very fossiliferous, fragments of mega-fossils, limy.
2245	2250	Sandstone, light grey, fine grained, calcareous, glauconitic, with thin partings of black shale, poor porosity.
2250	2255	Same.
2255	2260	Same, very fossiliferous, fragments of mega-fossils, limy, slightly anhydritic.
2260	2265	Sandstone as above, fine to very coarse, and conglomerate, hard and tight.
2265	2270	Sandstone, light grey, fine to medium grained, calcareous, a few fossil fragments, fair porosity.
2270	2275	Sandstone as above, mostly fine grained.
2275	2280	As above, with thin partings of grey-black shale.
2280	2285	Same, sandstone is hard and tight, shaly and argillaceous.

DEPTH From	To	DESCRIPTION
2285	2290	As above, limy.
2290	2295	Same.
2295	2300	Same, fossil fragments and partings of dark grey, limy shale.
2300	2305	Siltstone, grey and dark grey, limy in part, finely arenaceous in part, with trace glauconite.
2305	2310	Same.
2310	2315	Same, dark grey and grey-black, homogeneous.
2315	2320	Limestone, brown, crypto-crystalline, dense, argillaceous and silty, slightly glauconitic, with intergraded siltstone as above.
2320	2325	Sandstone, fine to very fine grained, silty, limy, glauconitic, tight.
2325	2330	Siltstone, grey, finely arenaceous, glauconitic, limy in part, grades to very fine sandstone in part.
2330	2335	Same.
2335	2340	Same.
2340	2345	Same to 2342, then shale, grey and green-grey, very limy, glistens.
2345	2350	Shale as above.
2350	2355	Same; trace intercalated black shale.
2355	2360	Same.
2360	2365	Same, mottled with red in part, grades to argillaceous limestone in part, slightly chalky, imbedded mega-fossils.
2365	2370	Limestone, grey, fragmental, argillaceous and silty, fossiliferous, slightly glauconitic, marly in part; trace maroon coloring.
2370	2375	Same.
2375	2380	Same to 2378, then siltstone, grey and green-grey, mottled with red in part, very limy, finely arenaceous in part, fossiliferous.
2380	2385	Same, grades to argillaceous limestone in part.
2385	2390	Same.
2390	2395	Same, chaly and bentonitic in part.
2395	2400	As above; trace very fine sandstone.
2400	2405	Siltstone, grey, sandy, limy, grades to finely arenaceous limestone in part, limy sandstone in part, fossiliferous.
2405	2410	Same, light green, chaly in part; trace orange chert.
		TOP OF PIPER - 2412
2410	2415	Same to 2412; then siltstone, red-brown and chocolate-brown, dolomitic, slightly micaceous, mottled with green in part.
2415	2420	Same.
2420	2425	Same.
2425	2430	Same; trace intercalated white and pink, finely crystalline anhydrite.
2430	2435	As above.
2435	2440	Same.
		TOP OF AMSDEN - 2442
2440	2445	Same to 2442; then dolomite, buff-white, crypto-crystalline, dense, hard, siliceous; trace paper thin partings of green shale.
2445	2450	Same, anhydrite, pink and light brown in part, with partings of soft, red shale.
2450	2455	Dolomite, buff, crypto-crystalline, dense, anhydritic, very argillaceous.
2455	2460	Dolomite, grey, crypto-crystalline, dense, anhydritic.
2460	2465	Dolomite, grey, clastic, with dolomite rhombs as grains, argillaceous, anhydritic, chalky in part.
2465	2470	Same, more argillaceous.
2470	2475	Shale and siltstone, red, purple, green, and grey, soft, with thin bedded, dense, buff dolomite.

DEPTH From	To	DESCRIPTION
2475	2480	Same, with interbedded purple dolomite.
2480	2485	Dolomite, buff, grey, purple, dense, anhydritic, with thinly interbedded red and purple shale.
2485	2490	Dolomite, buff, crypto-crystalline and fragmental, siliceous, anhydritic, stained pink and purple in part.
2490	2495	Same.
2495	2500	Dolomite, light brown and buff, dense to fragmental, anhydritic, argillaceous; trace intercalated red and green shale.
2500	2505	Dolomite, buff, micro-sucrosic, argillaceous, homogenous.
2505	2510	Dolomite, buff, crypto-crystalline, dense, slightly anhydritic with thinly intercalated red and purple shale.
2510	2515	Dolomite as above, pink and purple.
2515	2520	Dolomite, grey, buff and purple, dense, and limy, with interbedded shale and siltstone, red, purple, and green.
2520	2525	Dolomite, buff, limy, anhydritic, crypto-crystalline.
2525	2530	Dolomite, grey, buff, purple, dense to fragmental, limy, anhydritic with interbedded soft red shale and siltstone.
2530	2535	Same, dolomite is mostly purple.
2535	2540	Dolomite, grey and buff, dense to fragmental, anhydritic.
2540	2545	Dolomite, buff and pink, finely sucrosic, slightly anhydritic.
2545	2550	Dolomite, light grey to red and purple, dense and fragmental, anhydritic.
2550	2555	Dolomite, grey, crypto-crystalline, dense, hard, anhydritic.
2555	2560	Same, purple and crypto-sucrosic in part.
2560	2565	Dolomite, buff, crypto-crystalline, with intercalated purple dolomitic siltstone, anhydritic.
2565	2570	Limestone, buff and grey, dense, anhydritic, dolomitic.
2570	2575	Dolomite, purple, micro-sucrosic, argillaceous, with interbedded soft red shale; trace fine sandstone.
2575	2580	Limestone, grey and buff, crypto-crystalline and fragmental, anhydritic, ostracodal, with dolomite as above and interbedded shale, soft, red-brown.
2580	2585	Limestone as above, some intercalated purple siltstone and dolomite.
2585	2590	Same, interbedded with siltstone, grey, salt and pepper.
2590	2595	Limestone, grey to purple, crypto-crystalline, argillaceous, with interbedded maroon shale.
2595	2600	Limestone, grey and buff, crypto-crystalline, fossiliferous, argillaceous in part, with interbedded shale, grey, grey-black, and red.
2600	2605	Shale, grey-black and red and green mottled, with limonite and hematite stains.
2605	2610	Same, with interbedded and intercalated limestone, buff and purple, dense.
2610	2615	Shale and siltstone, black, green, maroon, purple, with interbedded limestone, buff, dense.
2615	2620	Limestone, grey and buff, with red spots and streaks, fragmental, argillaceous, with intercalated shale as above.
2620	2625	Same, arenaceous in part, fossiliferous, possibly conglomeratic; hematitic.
2625	2630	Same, limestone is brown in part, very ostracodal, shells are pink, calcareous, filled with calcite.
2630	2635	Limestone, buff to brown and black, dense, anhydritic, very ostracodal, stained with limonite, some shaly intercalations.
2635	2640	Same, with shale, dark grey, maroon.
2640	2645	Limestone, buff to grey, crypto-crystalline, anhydritic, with shale and siltstone intercalations, variocolored; trace fine sandstone.
2645	2650	Limestone, light grey and buff, mottled with purple, micro-crystalline to dense, argillaceous, some thin shaly intercalations, hematitic stains; trace orange chert.

DEPTH From	To	FORMATION
2650	2655	Limestone, grey-buff, crypto-crystalline, anhydritic.
2655	2660	Same, mottled with purple in part, with thinly interbedded soft red shale and maroon siltstone.
2660	2665	Siltstone, maroon and limonitic tan, limy in part, with interbedded sandstone, white, very fine grained to silt size, clean.
2665	2670	Siltstone as above, with shale, red, soft.
2670	2675	Siltstone as above, slightly fossiliferous, very finely arenaceous in part.
2675	2680	Siltstone, grey, calcareous, argillaceous and slightly bentonitic, very finely arenaceous in part, shaly in part.
2680	2685	Siltstone as above, with imbedded micro-pebbles of quartzite, limestone; almost a micro-conglomerate; with intercalations white crystalline anhydrite and carbonaceous plant fragments, and interbedded maroon siltstone.
2685	2690	Limestone, brown, fragmental, dense, anhydritic, with intercalated chert, brown, pink, amber.
2690	2695	Same.
2695	2700	Same, with maroon and variolored shale.
2700	2705	Sandstone, buff, silt size to very fine grained, limy, micaceous, tight.
2705	2710	Sandstone, white, medium to coarse grained, well rounded, high sphericity, some limonitic stains, with interbedded siltstone, also limonitic stained; trace intercalated soft green shale; sandstone is hard and tight, calcareous cement.
2710	2715	Sandstone as above, red and limonitic tan, hematitic, with intercalated hematitic and limonitic siltstone, anhydritic, poor porosity; trace intercalated maroon and green shale.
2715	2720	Sandstone, white to maroon and purple, medium grained, angular to sub-angular, glassy, hematitic, with intercalated shale and siltstone, maroon and green, some white crystalline anhydritic cement, fair porosity.
2720	2725	Same, sub-angular to sub-round, sandstone mostly light purple, good porosity.
2725	2730	As above.
2730	2735	Same.
2735	2740	Same.
2740	2745	Same, very friable.
2745	2750	Same.
2750	2755	Sandstone, medium grained, sub-angular to sub-round, limonitic, brown, glassy, cemented with limonite, fair porosity, friable.
2755	2760	Same, very friable.
2760	2765	Same, very friable.
2765	2770	Shale and siltstone, maroon, green, and grey, with interbedded sandstone, green, medium grained, sub-angular.
2770	2775	Shale and siltstone, maroon and green, with interbedded sandstone, mottled red and green, fine to medium grained, sub-angular to sub-round, hard and tight.
2775	2780	Siltstone, maroon, hematitic, soft in part, arenaceous with interbedded sandstone as above.
2780	2785	Same.
2785	2790	Shale and siltstone, maroon, grey, green and olive, with interbedded sandstone as above.
2790	2795	Same, interbedded sandstone is very hematitic.
2795	2800	Same.
2800	2803	Sandstone, fine to medium grained, angular to sub-round, mottled red and green, hard and tight.
2803	(Circ)	Same, with interbedded maroon siltstone.
T.D.		

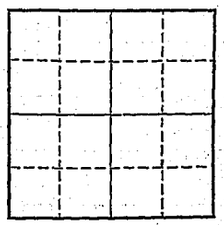
29

T. 11N R. 23E

County

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

WATER WELL LOG



Owner: Pearlsea Oil & Gas Company, Wyrens Ranch Division — Address: Pearlsea Incorporated, 1670 Denver Club Bldg., Denver 2, Colorado

Driller: Ferguson — Address: Lewistown

Date Started — Date Completed

Location: Sec. 29 T. 11N R. 23E ¼ sec. NE NE SW

Type of well: Drilled (Dug, driven, bored, or drilled) — Equipment used: Churn Drill (Churn drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock XX Irrigation XX

Industrial ☐ Drainage ☐ Other:

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or Screened: Ft. to ft. Ft. to ft.

Type of screen or perforations

Static Water level, for non-flowing well: feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level feet at gal. per min.

How tested:

Length of test

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

(over)

Log of Well | Description of Material Drilled | Depth in feet To

Pronghorn Ranch Well No. 2 - 1948

Driller - Ferguson, Lewistown

Location - Upper Ranch headquarters barn lot, Section 29, NE NE NW
Township 11 N, Range 23 E.

Size of hole - 10 inches

Size of casing - 8 inches

Depth of hole - 30 feet

Case - 20 feet slotted 5 feet

This is a gravel packed surface well with electric pump.
Rated 100 gallons per minute.

29

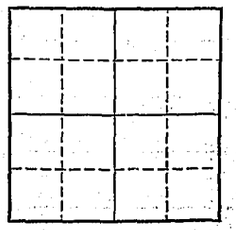
T 11N R 23E

County

MONTANA BUREAU OF MINES AND GEOLOGY

Butte, Montana

WATER WELL LOG



Owner Peerless Oil & Gas Comapny Wytana Ranch Division Address Peerless Incorporated 1670 Denver Club Build. Denver 2, Colorado

Driller Ferguson Address Lewistown

Date Started Date Completed

Location: Sec. 29 T 11N R 23E ¼ sec. NE NE SW

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Churn Drill (Churn drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☒

Industrial ☐ Drainage ☐ Other:

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or Screened: Ft. to ft. Ft. to ft.

Type of screen or perforations

Static Water level, for non-flowing well: feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level feet at gal. per min.

How tested:

Length of test

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

(over)

Description of Material Drilled

Log of Well

WATER WELLS ON PRONGHORN RANCH

Pronghorn Ranch Well No. 1 - 1948

Driller - Ferguson, Lewistown

Location - Upper Ranch headquarters house, Section 29, NE NE
Township 11 N, Range 23 E.

Size of hole - 10 inches

Size of casing - 8 inches

Depth of hole - 30 feet

Case - 20 feet slotted 5 feet

This is a gravel packed surface well with electric pump.
Rated 100 gallons per minute.

29

T. 11 N. R. 23 E.

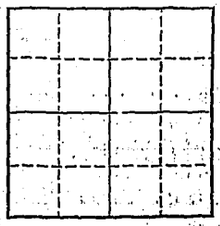
County Musselshell

MONTANA BUREAU OF MINES AND GEOLOGY

Butte, Montana

WATER WELL LOG

c/o Fearless Incorporated
1670 Denver Club Bldg.
Denver 2, Colorado



Owner Fearless Oil & Gas Company Wytana Ranch Division Address

Driller Gordon Scannon Address Roundup, Montana

Date Started December 16, 1958 Date Completed February 26, 1959

Location: Sec. 29 T. 11N R. 23E Center of ¼ sec.

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Churn drill (Churn drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☒

Industrial ☐ Drainage ☐ Other:

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or Screened: Ft. to ft. Ft. to ft.

Type of screen or perforations

Static Water level, for non-flowing well: feet.

Shut-in pressure, for flowing well: 480# lb./sq. in. on: (date)

Pumping water level feet at gal. per min.

How tested:

Length of test

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

Cementing

(over)

Peerless Oil & Gas Company
Wytana Ranch Division
Pronghorn Ranch
Well No. 28
Center of Section 29, T. 11 N., R. 23 E.
Musselshell County, Montana

Surface pipe: 60' of 8-5/8" cemented with 70 sacks
Production pipe: 1147' of 4½" cemented with 50 sacks

Date spudded: December 16, 1958
Date completed: February 26, 1959

Samples: Analysed by Herbert D. Hadley, Geologist, Billings, Montana
Contractor: Gordon Scammon, Roundup, Montana

Tentative Sample Tops

Top Mowry	590 Feet
Base Mowry	740
Top Muddy Zone	1140
Zone of porosity in Muddy Zone	1153 - 1162
Total depth	1170

Drill-Stem-Tests

February 22, 1959
Packer set at 1147 feet, total depth 1170 feet.
Tool open 210 minutes. Shut in 30 minutes.
Initial flow pressure 15# - Final flow pressure 425#.
Shut in pressure 480# - Hydrostatic pressure 585#
Recovered 1,080 feet of water. Water still rising in hole at end of test.

Remarks

The analysis of the water secured in the drill-stem-test is attached to this report. Total solids calculated to be 2,234 but it is believed total solids will decrease 100 to 300 p.p.m. when the well has flowed or pumped for several days.

While the total solids are higher than hoped for, the water is potable and should not have a bad taste or odor. The water is slightly alkaline and soft. It will be excellent for all washing purposes.

Pressures taken during the drill-stem-test indicate that the water will rise to near the surface and may flow a small stream.

Fifty sacks of cement, theoretically, should fill 600 feet of space between the casing and well bore and provide a safe, permanent installation.

The water is coming from the Muddy Sandstone. No other zone in the hole has any water productive capabilities.

HERBERT D HADLEY
CONSULTING GEOLOGIST
BILLINGS MONTANA

0 -	500	No samples available.
500 -	515	Sandstone, dark gray, very silty to shaly, hard, pyritic, micaceous, trace glauconite, non-permeable, much dark gray, silty shale. Trace tan, cryptocrystalline limestone and bentonite.
515 -	540	Shale, dark gray to black, sandy to silty, trace tan limestone and bentonite and glauconite. Much pyrite and very sandy 530-540.
540 -	590	Shale, black, blocky to sub-flaky, partly silty to finely sandy. Much gray-white bentonite 550-560. Much surface cavings 560-570. Much bentonite and tan limestone 580-590.
590 -	605	Sandstone, fine grained, gray, dark gray, silty to shaly, hard, non-permeable, trace mica and glauconite. Much black shale as above. Some bentonite. Sandstone, medium grained in part, with salt and pepper appearance. Few brown fish scales. Sandstone and shale probably thinly interbedded.
605 -	610	Bentonite; some black shale.
610 -	625	Sandstone and shale, as 590-605, interbedded, partly siliceous.
625 -	630	Shale, partly siliceous, dark gray to black, to sandy and hard. Some hard, fine grained, shaly sandstone, non-permeable.
630 -	660	Sandstone and shale, as 590-605. Very hard, siliceous, many brown, chitinous (?) spots, trace bentonite. Very sandy 635-640. Trace glauconite and increase in shale 650-660.
660 -	665	Sandstone and shale, thin interbeds, hard; sandstone fine grained to medium grained, hard, non-permeable.
665 -	700	Sandstone, white-gray, medium grained, salt and pepper, hard, trace porosity and permeability but mostly non-porous, fossiliferous, fish scales. Thin interbeds of black, hard shale. Very hard and siliceous 690-700.
700 -	740	Sandstone, fine grained and shale in thin interbeds, as 660-665. Much bentonite 730-740.
740 -	790	Shale, black, blocky to flaky. Some fine grained, dark gray, shaly sandstone. Some bentonite. Gradual decrease in sandy shale. Bentonite 770-780. Shale blacker and softer at 780-790.
790 -	845	Shale, black, blocky to partly sub-flaky. Much light gray bentonite and metabentonite. Red silty material 830 probably caving but could be "ironstone concretions".
845 -	855	Shale, as next above, plus some gray, poorly sorted, hard, non-permeable, fine grained, salt and pepper, glauconitic sandstone. Shale black and partly fissile.
855 -	880	Shale, dark gray to black, blocky to sub-flaky. Trace pyrite and bentonite.

Pronghorn Ranch Water Well #26

880 - 900	Shale, dark gray to black, blocky, fissile. Much white bentonite and metabentonite
900 - 920	No samples.
920 - 990	Shale and bentonite, as 880-900.
990 - 1015	Shale, dark gray to black, blocky, partly very silty to finely sandy. Trace gray, slightly glauconitic, fine grained sandstone, non-permeable.
1015 - 1050	Shale, dark gray to black, silty to finely sandy. Some dark gray, sandy siltstone. Much pyrite. Some black, blocky to sub-splintery, fissile shale. Increase in fine grained, silty, tight sandstone 1045-1050.
1050 - 1070	Shale, black, blocky, partly silty to finely sandy. Trace fine grained, granular, tight sandstone. Some bentonite 1065-1070.
1070 - 1100	Shale, black, blocky to platy to sub-splintery, fissile, partly silty. Bentonite. Pyrite.
1100 - 1120	Shale, black, blocky, silty to finely sandy, pyritic. At 1115 a few streaks gray, tight, fine grained, siliceous sandstone.
1120 - 1130	Shale, black, as 1070-1100.
1130 - 1140	Shale, black, blocky, silty to finely sandy. Pyrite.
1140 - 1153	Shale, black, sandy, hard. Some dark gray, shaly, fine grained sandstone.
1153 - 1162	Sandstone, gray-white, salt and pepper, medium angular grained, slightly glauconitic, slightly calcareous. Drills up partly as loose grains. Fair to good porosity and permeability. Slight indication of gas with Hcl. Pyrite.
1162 - 1165	Sandstone, gray, silty to shaly, medium-fine grained. Drills up partly in grains. Possibly poor porosity and permeability.
1165 - 1170	Sandstone, gray-white, fine grained, angular, calcareous, salt and pepper, tight, no porosity and permeability.
1170	Total depth.

YAPUNCICH, SANDERSON & BROWN LABORATORIES

P. O. BOX 593 — BILLINGS, MONTANA — 13 N. 32ND ST

WATER ANALYSIS REPORT

Lab. No. 3921-1

Field PRONGHORN RANCH — County MUSSELSHELL — State MONTANA
Well No. 28 — Location NW 29-11N-23E
Formation MUDDY — Depths 1170'
Operator WYTANA RANCH COMPANY-PRONGHORN — Date Sampled 2-22-59
DST No. 2 — Sample TOP — Date Analyzed 2-23-59
Other Data TOOL OPEN 2½ HRS. SI 30 MIN. RECOVERED 1080' WATER. SIP 480 LBS., FP 15-425 LBS., HP 585 LBS. BENTONITE TYPE DRILLING MUD. MUDDY WATER. CLEAR COLORLESS FILTRATE.

Constituents	PPM	MEQ.	MEQ. %
Sodium	755	32.82	46.42
Calcium	16	0.80	1.13
Magnesium	21	1.73	2.45
Sulfate	950	19.76	27.95
Chloride	157	4.43	6.27
Carbonate	84	2.80	3.96
Bicarbonate	510	8.36	11.82

Total Solids in Parts per Million
By evaporation ____
After ignition ____
Calculated 2234

pH 8.7

Specific Gravity @ 60°F 1.002

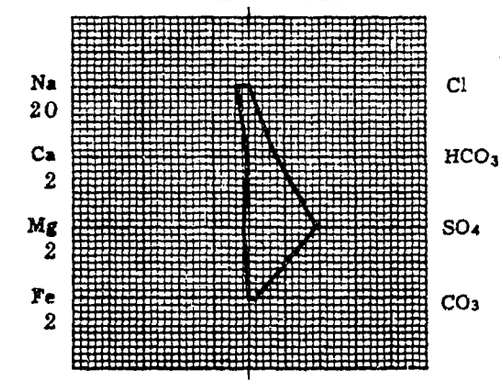
Resistivity @ 68°F
ohms/meter³ 3.11

Chloride as NaCl 259 PPM. Total Solids From Resistivity as NaCl 1684 PPM.

NOTE: Sodium and potassium reported as sodium. MEQ.=milliequivalents per liter. PPM=parts per million (milligrams per liter). 1 PPM equivalent to 0.0001%

WATER ANALYSIS PATTERN

Scale MEQ. Per Unit



FAIRLY SOFT WATER. MINERALLY CAN BE USED FOR DOMESTIC USE.

SPECIALIZING IN CORE, WATER, GAS AND CRUDE OIL ANALYSES

YAPUNCICH, SANDERSON & BROWN LABORATORIES

P. O. BOX 593 — BILLINGS, MONTANA — 13 N. 22ND ST

WATER ANALYSIS REPORT

Lab. No. 3921-2
1977-W

Field PRONGHORN RANCH — County MUSSELSHELL — State MONTANA
Well No. 28 — Location NW 29-11N-23E
Formation MUDDY — Depths 1170'
Operator WYTANA RANCH COMPANY-PRONGHORN — Date Sampled 2-22-59
DST No. 2 — Sample (BOTTOM) — Date Analyzed 2-23-59
Other Data TOOL OPEN 2½ HRS. SI 30 MIN. REC. 1080 FT. WATER. SIP 480 LBS., FP 15-425 LBS., HP 585 LBS. BENTONITE TYPE DRILLING MUD. MUDDY WATER. CLEAR COLORLESS FILTRATE.

Constituents	PPM	MEQ.	MEQ. %
Sodium	799	34.75	46.36
Calcium	20	1.00	1.33
Magnesium	21	1.73	2.31
Sulfate	1050	21.84	29.14
Chloride	161	4.54	6.05
Carbonate	50	1.67	2.22
Bicarbonate	575	9.43	12.59

Chloride as NaCl 265 PPM.

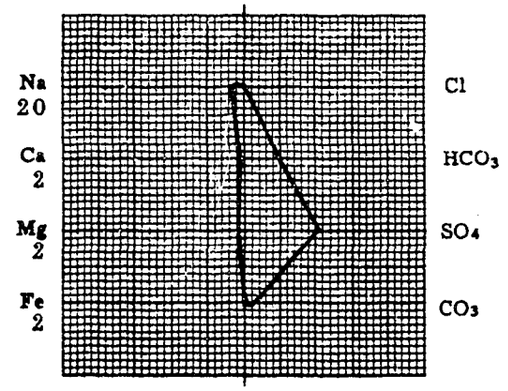
Total Solids in Parts per Million
By evaporation
After ignition
Calculated 2384
pH 8.2
Specific Gravity @ 60°F 1.002
Resistivity @ 68°F ohms/meter³ 3.11

Total Solids From Resistivity as NaCl 1776 PPM.

NOTE: Sodium and potassium reported as sodium. MEQ.=milliequivalents per liter. PPM=parts per million (milligrams per liter). 1 PPM equivalent to 0.0001%

WATER ANALYSIS PATTERN

Scale MEQ. Per Unit



FAIRLY SOFT WATER. MINERALLY CAN BE USED FOR DOMESTIC USE.

SPECIALIZING IN CORE, WATER, GAS AND CRUDE OIL ANALYSES

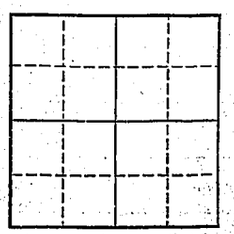
32

T 11 R 23

County

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

WATER WELL LOG



Owner Peerless Oil & Gas Company Wytana Ranch Division Address Peerless Incorporated 1670 Denver Club Bldg. Denver 2, Colorado

Driller Gordon Scammon Address Roundup, Montana

Date Started Date Completed

Location: Sec. 32 T. 11 R. 23 ¼ sec. SW ¼ SW ¼

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Churn Drill (Churn drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☒

Industrial ☐ Drainage ☐ Other:

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or Screened: Ft. to ft. Ft. to ft.

Type of screen or perforations

Static Water level, for non-flowing well: feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level 205 feet at gal. per min.

How tested:

Length of test

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

(over)

JUN 2 1955

GORDON SCAMMON
Drilling Contractor and Well Service
P. O. Box 431
Roundup, Montana

Wytana Cattle Co., Water Well No. 15

0 to 5 ft. Top soil

5 to 42 ft. Yellow Clay

42 to 135 ft. Light Grey Shale

135 to 156 ft. Grey Sandstone, thin layers of sandy shale (Water)

156 to 205 ft. Dark grey shale.

205 Total Depth, water level 105 feet from top of ground

Casing perforated 135 ft to 157 ft., cave catcher set at 130 ft.

205' of 6" O.D. casing used in this well.

Billings CORE-LAB

5 NORTH 25TH ST.
BILLINGS, MONTANA

WATER ANALYSIS REPORT

Lab. No. 1134

Date 5-24-52

To Wytana Cattle Company

Address Roundup, Montana P.O. Box 431 c/o Mr. Gordon Scammon

Sample from Well No. 15 Depth 205 feet

Intended use Domestic and stock

Constituents	Parts per Million
Sodium	447
Calcium	234
Magnesium	221
Sulfate	1721
Chloride	32
Carbonate	0
Bicarbonate	763
Total Silica	
Soluble Silica	
Iron	

Total Solids in Parts per Million

By evaporation	3572
After ignition	3096
Calculated	3033

pH 7.7

Specific gravity 60°F 1.008

Resistivity : 68°F
ohms per meter cubed 3.2

Total hardness as calcium carbonate 87.3 grains U. S. gallon

Remarks: Not suitable for domestic use. Suitable for stock use.
Hard water.

SPECIALIZING IN CORE, WATER, GAS AND CRUDE OIL ANALYSES

33

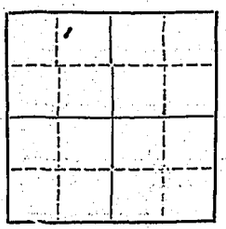
T. 11 R. 27

County Musselshell

RECEIVED
AUG 24 1960
STATE ENGINEER

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

WATER WELL LOG



Owner Nebraska Feeding Company Address Winnett, Montana

Driller Livingston Estate Address Winnett, Montana

Date Started August 5, 1960 Date Completed August 9, 1960

Location: Sec. 33 T. 11 R. 27 ¼ sec. N.W.

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Rotary (Churn drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☐

Industrial ☐ Drainage ☐ Other:

Casing: 0 ft. to 84 ft. Type steel gauge Size 6"

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or Screened: Ft. 36 to ft. 60 Ft. to ft.

Type of screen or perforations Slot perforations

Static Water level, for non-flowing well: about 10 feet from top feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level feet at gal. per min.

How tested: Bailer

Length of test

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)
Packer above perforations

(over)

Log of Well

Depth, feet From	Depth, feet To	Description of Material Drilled
0	35	top soil, some gravel and shale
35	60	gravel
60	84	shale

GROUNDWATER INDEX

County Musselshell Twp. 11N Rge. 24E

Sec.	Name of Appropriator	Type of Form	County File No.	Remarks
2	Iversen, Andrew	GW4	169730	
3	Graves Ranch Co.	GW4	169385	
3	" " "	57L06		
4	" " "	GW4	169388	
4	" " "	57L06		
10	" " "	57L06		
10	" " "	57L06		
11	" " "	57L06		
14	" " "	57L06		
14	" " "	57L06		
15	" " "	GW2	184971	
20	" " "	57L06		
22	" " "	57L06		
25	" " "	57L06		
28	" " "	57L06		
28	" " "	57L06		
28	" " "	57L06		
28	" " "	57L06		
28	" " "	GW4	169392	
28	" " "	GW2	181491	
28	" " "	GW4	169389	
28	" " "	GW4	169387	
30	" " "	57L06		
36	Graves, Jay & Cleon	57L06		

2

GW 4

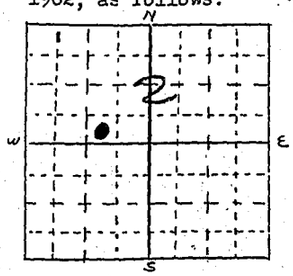
T. 11 N. R. 24 E.
County MUSSELSHELL

State of Montana
Administrator of groundwater Code
Office of State Engineer

RECEIVED
JAN 3 1964
ENGINEER

DECLARATION OF VESTED GROUNDWATER RIGHTS
(Under Chapter 237, Montana Session Laws, 1961)

1. Andrew Iversen, of Roundup.
(Name of Appropriator) (Address) (Town)
County of Musselshell State of Montana
have appropriated groundwater according to the Montana laws in effect prior to January 1, 1962, as follows:



....¼....Sec.....T.....R

Indicate point of appropriation and place of use, if possible. Each small square represents 10 acres.

2. The beneficial use on which the clain is based. Stock Water

3. Date or approximate date of earliest beneficial use; and how continuous the use has been 3/22/61

4. The amount of groundwater claimed (in miner's inches or gallons per minute) 10 gals per min

5. If used for irrigation, give the acreage and description of the lands to which water has been applied and name of the owner thereof

6. The means of withdrawing such water from the ground and the location of each well or other means of withdrawal
electric pumps

7. The date of commencement and completion of the construction of the well, wells, or other works for withdrawal of ground water Commenced 2/3/61
completed 3/22/61

8. The depth of water table 80 ft

9. So far as it may be available, the type, size and depth of each well or the general specifications of any other works for the withdrawal of groundwal of groundwater
360 ft deep 6 inch casing
2 inch pipe

10. The estimated amount of groundwater withdrawn each year 30,000 gals

11. The log of formations encountered in the drilling of each well if available
gravel

12. Such other information of a similar nature as may be useful in carrying out the policy of this act, including reference to book and page of any count record

Signature of Owner Andrew Iversen

Date 12/31/63

20574

169730

STATE OF MONTANA, } ss.
MUSSELSHELL COUNTY.

FILED THIS 31 DAY OF
December A. D. 19 63
AT 3:37 O'CLOCK M.
R. H. MATZKE
COUNTY RECORDER
Frances L. Dawson
DEPUTY

1—Helena Independent Record

File No.....

T 11 N R 24 E

DUPLICATE

County Mussel—

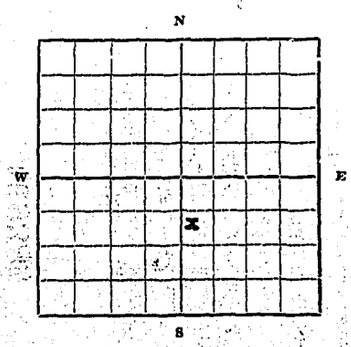
STATE OF MONTANA
ADMINISTRATOR OF GROUNDWATER CODE
OFFICE OF STATE ENGINEER

RECEIVED
DEC 3? 19?
STATE ENGINEER

Declaration of Vested Groundwater Rights

(Under Chapter 237, Montana Session Laws, 1961)

1. GRAVES RANCH COMPANY, of ROUNDUP
(Name of Appropriator) (Address) (Town)
County of MUSSELSHELL State of MONTANA
have appropriated groundwater according to the Montana laws in effect prior to January 1, 1962, as follows:



NE ¼ 3 Sec. 3 T 11 R 24E

Indicate point of appropriation and place of use, if possible. Each small square represents 10 acres.

2. The beneficial use on which the claim is based STOCK WATERING

3. Date or approximate date of earliest beneficial use; and how continuous the use has been ~~1925~~ Nov 1954

4. The amount of groundwater claimed (in miner's inches or gallons per minute) 10 gal minute BALER TEST

5. If used for irrigation, give the acreage and description of the lands to which water has been applied and name of the owner thereof

6. The means of withdrawing such water from the ground and the location of each well or other means of withdrawal PUMP

7. The date of commencement and completion of the construction of the well, wells, or other works for withdrawal of groundwater NOV 1954

8. The depth of water table ~~NOW~~ 55 ft.

9. So far as it may be available, the type, size and depth of each well or the general specifications of any other works for the withdrawal of groundwater ~~pump~~ 128 ft., depth

10. The estimated amount of groundwater withdrawn each year ~~as needed for stock—gallons~~ 2,592,000 gals.

11. The log of formations encountered in the drilling of each well if available
~~0 to 40' Gray shale; 40 to 110' Dark shale; 110 to 128' Gray sandstone~~

12. Such other information of a similar nature as may be useful in carrying out the policy of this act, including reference to book and page of any county record

GRAVES RANCH COMPANY
Signature of Owner Clem B. Graves
President
Date 9/23/63

Three copies to be filed by the owner with the County Clerk and Recorder of the county in which the well is located.

Please answer all questions. If not applicable, so state, otherwise the form will be returned.

Original to the County Clerk and Recorder; duplicate to the State Engineer; Triplicate to the Montana Bureau of Mines and Geology and Quadruplicate for the Appropriator.

13597

169385

STATE OF MONTANA, }
MUSSELSHELL COUNTY. } ss.

FILED THIS 26 DAY OF
Dec IN
A. D. 19 63
AT 1:21 O'CLOCK P M.

B. H. MATZKE
COUNTY RECORDER

Elaine J. Gassman
DEPUTY

$2.00

3

Form No. 18
8-60

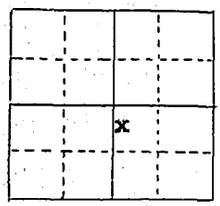
T. 11 R. 24

County Musselshell

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

RECEIVED
DEC 15 1954
STATE ENGINEER

Water Well Log



Owner ~~Graves Ranch Company~~ Address ~~Roundup, Mont.~~

Driller ~~Matt Jesbeck~~ Address ~~Roundup, Mont~~

Date Started Nov. 1954 Date Completed Nov. 1954

Location: Sec. 3 T. 11 R. 24 ¼ sec. SE¼

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Churn (Churn, drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☐
Industrial ☐ Drainage ☐ Other

Casing: 0 ft. to 128 ft. Type 20 Ga. Galv. Size 6"

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or screened: Ft. 65 to ft. 128 . Ft. to ft.

Type of screen or perforations XE 20 Ga. Galv. Screen type

Static water level, for non-flowing well: 55 feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level 110 feet at 10 gal. per min.

How tested: Bailer

Length of test 1hr.

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

(over)

Log of Well

Depth, feet From	Depth, feet To	Description of Material Drilled
0	40	Grey Shale
40	110	Dark Shale
110	128	Grey Sandstone

(1—Helena Independent Record

File No.....

DUPLICATE

T 11N R 24E

County Mussel

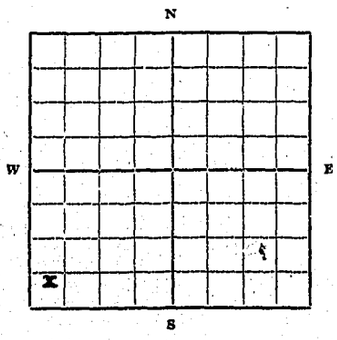
STATE OF MONTANA
ADMINISTRATOR OF GROUNDWATER CODE
OFFICE OF STATE ENGINEER

RECEIVED
DEC 2 7 1963
STATE ENGINEER

Declaration of Vested Groundwater Rights

(Under Chapter 237, Montana Session Laws, 1961)

1. GRAVES RANCH COMPANY (Name of Appropriator), of ROUNDUP (Address) (Town)
County of MUSSELSHELL State of MONTANA
have appropriated groundwater according to the Montana laws in effect prior to January 1, 1962, as follows:



SW ¼ Sec. 4 T. 11 R. 24

Indicate point of appropriation and place of use, if possible. Each small square represents 10 acres.

2. The beneficial use on which the claim is based
STOCK WATER

3. Date or approximate date of earliest beneficial use; and how continuous the use has been
OLD WELL DRILLED ABOUT 1920

4. The amount of groundwater claimed (in miner's inches or gallons per minute) 8 gal per min - pump

5. If used for irrigation, give the acreage and description of the lands to which water has been applied and name of the owner thereof

6. The means of withdrawing such water from the ground and the location of each well or other means of withdrawal
pump

7. The date of commencement and completion of the construction of the well, wells, or other works for withdrawal of groundwater ABOUT 1920 data not available

8. The depth of water table unknown

9. So far as it may be available, the type, size and depth of each well or the general specifications of any other works for the withdrawal of groundwater 96 ft.

10. The estimated amount of groundwater withdrawn each year 8 ga per minute - pump 993,600

11. The log of formations encountered in the drilling of each well if available
not available

12. Such other information of a similar nature as may be useful in carrying out the policy of this act, including reference to book and page of any county record

GRAVES RANCH COMPANY
Signature of Owner Glenn B. Graves
President
Date 9/23/63

Three copies to be filed by the owner with the County Clerk and Recorder of the county in which the well is located.

Please answer all questions. If not applicable, so state, otherwise the form will be returned.

Original to the County Clerk and Recorder; duplicate to the State Engineer; Triplicate to the Montana Bureau of Mines and Geology and Quadruplicate for the Appropriator.

13600

169388

STATE OF MONTANA, }
MUSSELSHELL COUNTY. } ss.

FILED THIS 26 DAY OF
Dec A. D. 1963
AT 1:24 O'CLOCK P M.

B. H. MATZKE
COUNTY RECORDER

By Elaine J. Erasmus
DEPUTY

2.00

4

Form No. 18
8-60

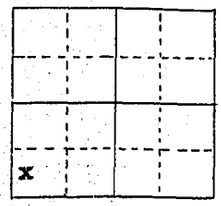
T. 11 R. 24

County Musselshell

RECEIVED
DEC 13 1951
STATE ENGINEER

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

Water Well Log



Owner Graves Ranch Company Address Roundup, Montana

Driller Unknown Address

Date Started Date Completed

Location: Sec. 4 T. 11 R. [illegible] ¼ sec. SW¼

Type of well Drilled Equipment:
(Dug, driven, bored, or drilled) (Churn, drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☐
Industrial ☐ Drainage ☐ Other

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or Screened: Ft. to ft. Ft. to ft.

Type of screen or perforations

Static water level, for non-flowing well: 35 feet.

Shut-in pressure, for flowing well: lb./sq. in. on:
(date)

Pumping water level 80 feet at 8 gal. per min.

How tested: pump

Length of test 8 hours

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

This is an old well that was drilled about 1920 and no log is available.

(over)

10

Form No. 18
8-60

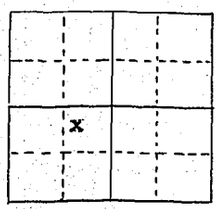
T. 11 R. 24

County

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

RECEIVED
DEC 15 1961
STATE ENGINEER

Water Well Log



Owner Graves Ranch Company Address Roundup, Mont.

Driller Unknown Address

Date Started Date Completed

Location: Sec. 10 T. 11 R. 24 1/4 - c. SW1/4

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used (Churn, drill, rotary, other)

Water use: Domestic [x] Municipal [ ] Stock [x] Irrigation [ ]
Industrial [ ] Drainage [ ] Other

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or screened: Ft. to ft. Ft. to ft.

Type of screen or perforations

Static water level, for non-flowing well: 15 feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level 30 feet at 15 gal. per min.

How tested: pump

Length of test 4 hours

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

This is an old well that was drilled about 1920 and no log is available.

(over)

10

Form No. 18
8-60

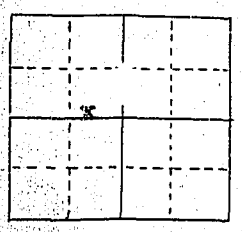
T. 11N R. 24E

County Musselshell

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

RECEIVED
AUG 2 1961
STATE ENGINEER

Water Well Log



Owner Graves Ranch Company Address Roundup, Montana

Driller Eugene Rice Address Roundup, Montana

Date Started July 8, 1960 Date Completed Same

Location: Sec. 10 T. 11N R. 24E $\frac{1}{4}$ sec. SW$\frac{1}{4}$

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Rotary (Churn, drill, rotary, other)

Water use: Domestic [X] Municipal [ ] Stock [X] Irrigation [X]

Industrial [ ] Drainage [ ] Other

Casing: 0 ft. to 40 ft. Type 20 Ga. Gal Size 5"

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or screened: Ft. 20 to ft. 40. Ft. to ft.

Type of screen or perforations $\frac{3}{8}$" holes

Static water level, for non-flowing well: 15 feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level 35 feet at 30 gal. per min.

How tested: Compressed air on drill

Length of test 1 hour

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

(over)

Log of Well

Depth, feet From	Depth, feet To	Description of Material Drilled
0	5	Red clay
5	25	Grey shale
25	27	Red rock
27	35	Grey sandstone
35	40	Red "

11

Form No. 18
8-60

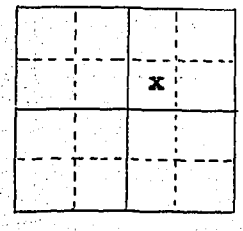
T. 11 R. 24

County Musselshell

RECEIVED
DEC 15 1961
STATE ENGINEER

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

Water Well Log



Owner Graves Ranch Company Address Roundup, Montana

Driller Western Geophysical Co. Address L.A. Calif

Date Started August 1958 Date Completed same

Location: Sec. 11 T. 11 R. 24 ¼ sec. NE¼

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Rotary (Churn, drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☐
Industrial ☐ Drainage ☐ Other

Casing: 0 ft. to 75 ft. Type 20 ga. Galv Size 4"

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or screened: Ft. to ft. Ft. to ft.

Type of screen or perforations None

Static water level, for non-flowing well: Ground level feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level 200 feet at 20 gal. per min.

How tested: Air pressure

Length of test 1 hour

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

No log was kept on this well, as it was drilled as a test hole for an artesial flow.

(over)

14

Form No. 18
8-60

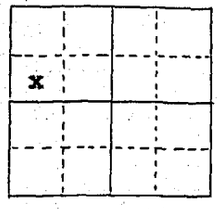
T. 11 R. 24

County Musselshell

MONTANA BUREAU OF MINES AND GEOLOGY
Butte, Montana

RECEIVED
DEC 15 1981
STATE ENGINEER

Water Well Log



Owner Graves Ranch Company Address Roundup, Montana

Driller Matt Jasbeck Address Roundup, Montana

Date Started November 1956 Date Completed Nov. 1966

Location: Sec. 14 T. 11 R. 24 1/4 sec. NE1/4

Type of well Drilled (Dug, driven, bored, or drilled) Equipment used Churn (Churn, drill, rotary, other)

Water use: Domestic ☐ Municipal ☐ Stock ☒ Irrigation ☐
Industrial ☐ Drainage ☐ Other

Casing: 0 ft. to 34 ft. Type 20 Ga. Galv. Size 6"

Casing: ft. to ft. Type Size

Casing: ft. to ft. Type Size

Perforated or screened: Ft. 16 to ft. 34 . Ft. to ft.

Type of screen or perforations 20 Ga. Galv. Screen type

Static water level, for non-flowing well: 15 feet.

Shut-in pressure, for flowing well: lb./sq. in. on: (date)

Pumping water level 25 feet at 30 gal. per min.

How tested: bailer

Length of test 1 hour

Remarks: (Gravel packing, cementing, packers, type of shut-off, depth of shut-off)

(over)

Log of Well

Depth, feet From	Depth, feet To	Description of Material Drilled
0	12	Surface
12	22 34	Grey Sandstone

C —Helena Independent Record

File No.....

DUPLICATE

T. 11N R. 24E

County MUSSELSHELL

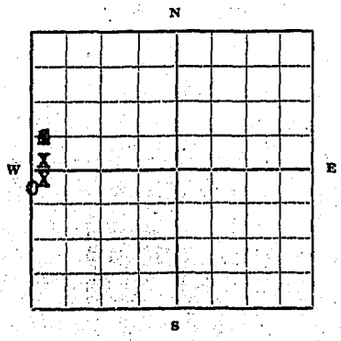
STATE OF MONTANA
ADMINISTRATOR OF GROUNDWATER CODE
OFFICE OF STATE ENGINEER

RECEIVED
DEC 2?
STATE ENGINEER

Declaration of Vested Groundwater Rights

(Under Chapter 237, Montana Session Laws, 1961)

1. GRAVES RANCH COMPANY, of ROUNDUP
(Name of Appropriator) (Address) (Town)
County of MUSSELSHELL State of MONTANA
have appropriated groundwater according to the Montana laws in effect prior to January 1, 1962, as follows:



NE¼ Sec. 14 T. 11 R. 24
Indicate point of appropriation and place of use, if possible. Each small square represents 10 acres.

2. The beneficial use on which the claim is based
STOCK WATER

3. Date or approximate date of earliest beneficial use; and how continuous the use has been NOVEMBER 1956

4. The amount of groundwater claimed (in miner's inches or gallons per minute) 30 gal per minute baler test

5. If used for irrigation, give the acreage and description of the lands to which water has been applied and name of the owner thereof

6. The means of withdrawing such water from the ground and the location of each well or other means of withdrawal
pump

7. The date of commencement and completion of the construction of the well, wells, or other works for withdrawal of groundwater NOVEMBER 1956

8. The depth of water table ~~XXXXX~~ 15 ft.

9. So far as it may be available, the type, size and depth of each well or the general specifications of any other works for the withdrawal of groundwater ~~XXXXX~~ pump 34 ft.

10. The estimated amount of groundwater withdrawn each year as needed for stock ~~unknown~~ 8,773,000 gals.

11. The log of formations encountered in the drilling of each well if available
0 to 128 surface 12 to 34 gray sandstone

12. Such other information of a similar nature as may be useful in carrying out the policy of this act, including reference to book and page of any county record none

GRAVES RANCH COMPANY
Signature of Owner Glenn B. Graves
Date 9/23/63 President

Three copies to be filed by the owner with the County Clerk and Recorder of the county in which the well is located.

Please answer all questions. If not applicable, so state, otherwise the form will be returned.

Original to the County Clerk and Recorder; duplicate to the State Engineer; Triplicate to the Montana Bureau of Mines and Geology and Quadruplicate for the Appropriator.

13603

169391

STATE OF MONTANA,
MUSSELSHELL COUNTY, } ss.

FILED THIS 26 DAY OF
Dec A. D. 1963
AT 1:27 O'CLOCK P M.

B. H. MATZKE
COUNTY RECORDER

Elaine J. Sorenson
DEPUTY

$2.00

11N 24E (15)

Orrin Ferris

March 29, 1974

Mr. Thomas M. Ask
Attorney at Law
Wall Building
P.O. Box 685
Roundup, Montana 59072

Dear Mr. Ask:

This is in response to your letter of November 21, 1973, which stated the following:

"Enclosed herewith is Notice of Completion of Water Development and Well Log Report pertaining to the Graves Ranch Company's water right. They received a permit prior to July 1, 1973, instrument number 184971.

"Also enlcosed is our check in the sum of $35, which I believe is the correct amount for the filing of this water development. If there is any further information that you need, please advise."

This Department has reviewed your letter and enclosures and find your situation to be rather unique.

First, the permit number you referred to in your letter as being received prior to July 1, 1973, is the Musselshell County Clerk and Recorder's recording instrument number for the form filed by Graves Ranch Company. The form (see enclosed Xerox copy) that was filed was the Notice of Appropriation of Groundwater. This form was filed at 2:24 p.m. on January 16, 1973, instrument number 184971. This particular form was designed and used pursuant to Section 89-2913, R.C.M. 1947 (this section was repealed in 1973 by the Montana Water Use Act, Section 89-865, R.C.M. 1947, et seq.). This Notice of Appropriation of Groundwater form is merely a notice form of intention to develop groundwater. Section 89-2913(d), R.C.M. 1947, stated, "After filing a notice of appropriation, in order to acquire a right based thereon, the person must, within ninety (90) days, commence actual excavation and diligently prosecute construction of a well

and, upon its completion, file a notice of completion with the county clerk and recorder of the county in which the appropriation is located. The county clerk shall handle and transmit such filed notices as in the case of a filed notice of appropriation." The first sentence of Section 89-2913(e), R.C.M. 1947, stated, "A failure to file a notice of appropriation deprives the appropriator of his right to relate his date of appropriation back, and results in the dating of his appropriation as of when he files a notice of completion."

It appears that Graves Ranch Company's intentions were good and intended to follow through with the filing of the notice of completion after the well was completed. Unfortunately, in the meantime the Montana Water Use Act of 1973 was passed and became effective on July 1, 1973. This Act repealed many previous surface- and ground-water laws, including Section 89-2913 R.C.M. 1947. Since this section was repealed the forms prepared pursuant to that section could no longer be used. It also appears apparent that Graves Ranch Company did the best they could under the circumstances and filed with this Department the Form 602, Notice of Completion of Water Development, prepared pursuant to Section 89-865, R.C.M. 1947, et seq.

Assuming then, since the well was started under the provisions of Section 89-2913 (now repealed) and the Notice of Appropriation of Groundwater form was filed and subsequently the water laws changed and the Notice of Completion of Water Development Form 602, was filed with this Department pursuant to the Montana Water Use Act, it appears Graves Ranch Company has fulfilled the requirements of the law as in existence when the well was started to be constructed. In this case, it appears the priority date of this well was the date the Notice of Appropriation of Groundwater form was filed at 2:24 p.m. on January 16, 1973, instrument number 184971.

Based on the foregoing discussion, we would suggest that the following action be taken:

1. We are returning the enclosed Form 602, Notice of Completion of Water Development. (We will retain a Xerox copy and attach it to our copy of the Notice of Appropriation of Groundwater form.) We would suggest that the Form 602 be taken to the county clerk and recorder and have it filed to fulfill the requirements of Section 89-2913, R.C.M. 1947 (now repealed), and preferably have it attached to the original filing. This Department would appreciate receiving a notice to the effect showing the time and date the completion form was recorded and its instrument number.

2. We will be refunding the $35 to you, as sent to us with your letter dated November 21, 1973. This will be done by a state warrant at a later date.

3. We will retain our copy of the Well Log Report, Form 603, sent to us on the well in compliance with Section 89-2903.1, R.C.M. 1947.

As you can see, this is a rather unique problem. If we can be of further assistance or if you disagree with the foregoing discussion, feel free to contact us at your convenience.

Sincerely,

Ronald J. Guse, Assistant Chief
Water Rights Bureau

RG/slp
Enclosures (2)
cc. Graves Ranch Company

ASK & PRATT
ATTORNEYS AT LAW
WALL BLDG. - P.O. BOX 605
ROUNDUP, MONTANA 59072

TELEPHONE 323-1600

THOMAS M. ASK
JOHN L. PRATT

November 21, 1973

RECEIVED
NOV 26 1973
MONT. DEPT. of NATURAL RESOURCES & CONSERVATION

Montana Department of Natural Resources
and Conservation
Water Resources Division
Mitchell Building
Helena, Montana 59601

Re: Graves Ranch Company Water Right

Gentlemen:

Enclosed herewith is Notice of Completion of Water Development and Well Log Report pertaining to the Graves Ranch Company's water right. They received a permit prior to July 1, number 184971.

Also enclosed is our check in the sum of $35.00 which I believe is the correct amount for the filing of this water development. If there is any further information that you need, please advise.

Very truly yours,

THOMAS M. ASK

TMA:clw

Encs.

THOMAS M. ASK
ATTORNEY AT LAW
ROUNDUP, MONTANA 59072

T-49a

MONTANA NATIONAL BANK
ROUNDUP, MONTANA 59072

15660

November 21 19 73 $ 93-507/921

PAY TO THE ORDER OF Montana Department of Natural Resources and Conservation $ 35.00

Thrity-five and no/100---------- DOLLARS

THOMAS M. ASK
TRUSTEE ACCOUNT

Filing Graves Ranch Co.
Water Development

⑈092⑈0507⑈ 10 032 3⑈

GW 1

File No. ..... T. ..... R. .....

TRIPLICATE

County Musselshell

STATE OF MONTANA
ADMINISTRATOR OF GROUNDWATER CODE
OFFICE OF STATE ENGINEER

Notice of Appropriation of Groundwater

(Under Chapter 237, Montana Session Laws, 1961)

1. I, Graves Ranch Company (Name of Appropriator), of Box 746 Roundup (Address) (Town), County of Musselshell, State of Montana, intend to appropriate groundwater in accordance with Chapter 237, Montana Session Laws of 1961.

2. The beneficial use to which water is to be applied is Irrigation & stock water of lands in Sections 3,9,10,11,14,15 Township 11 North Range 24 E. (describe lands to be benefited, if for irrigation) That are now owned by the appropriator.

3. The rate of use in gallons per minute or miner's inches of groundwater claimed 750 Montana statutory miner's inches

4. The annual period (inclusive dates) of intended use April 1 to November 1.

5. The probable or intended date of first beneficial use April 1, 1974

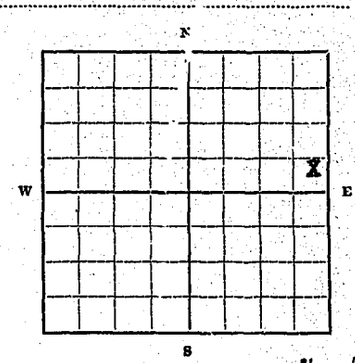
6. The probable or intended date of commencement and completion of the well* or wells* Commencement, January 6, 1973. Intended completion, Sept.1, 1973.

7. The location, type, size and depth of well or wells contemplated Location: SE¼-NE¼ Sec. 15 T.11 N-24. Size: 100 feet by 100 feet by 40 foot depth

8. The probable or estimated depth of the water table or artesian aquifer 10 feet

9. Name, address and license number of the driller engaged Kelley Drilling Co. Roundup, Montana, License No. 169

10. Give such other similar information as may be useful in carrying out the policy of this act .....



N. E.
NE ¼ Sec. 15 T. 11 R. 24 R.J.D.

Locate well or other means of development as accurately as possible on the plat.

RECEIVED
JAN 23 1973
MONTANA DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION

Doc. No. 184971
Filed for record
this 16th day of Jan.
A. D. 19 73, at 2:24
o'clock P.M.

Signature of Appropriator .....

Date 1/15/73

* As defined in the Code Sec. 1 (c) "Well" means any artificial opening or excavation in the ground, however made, by which groundwater can be obtained or through which it flows under natural pressures or is artifically withdrawn."

Three copies of this notice are to be filed with County Clerk and Recorder of the county in which the well is located.

Please answer all questions. If not applicable, so state, otherwise the form will be returned.

Original to the County Clerk and Recorder; duplicate to the State Engineer; Triplicate to the School of Mines and Quadruplicate for the Appropriator.

F.

52,273

184971

STATE OF MONTANA,
MUSSELSHELL COUNTY, ss.

FILED THIS 16th DAY OF

[signature] A. D. 1923

AT 2:24 O'CLOCK P. M.

CLAUDE F. FLETCHER

COUNTY RECORDER

[signature] DY

FORM NO. 603 New 7-73

RECEIVED NOV 26 1973 MONT. DEPT. of NATURAL RESOURCES & CONSERVATION

File No. _____

STATE OF MONTANA
Department of Natural Resources and Conservation

WHITE — DEPARTMENT
PINK — BUREAU
CANARY — WELL OWNER
GOLDENROD — DRILLER

WELL LOG REPORT

State law requires that this form be filed by the water well driller on any water well completed by him on and after July 1, 1973 within sixty (60) days after completion of the well.

1. WELL OWNER: Name Graves Ranch Co. Adaress Box 746 Roundup, Montana 59072

2. WELL LOCATION: County Musselshell ; SE¼ SE¼ NE¼, Sec. 15, Twp. 11 N-S, Rg. 24 E-W

3. PROPOSED USE: ___Domestic ___Stock ___Municipal ___Industrial ___Lawn and Garden
__X__Irrigation ___Other (*if other, specify*) _____

4. METHOD DRILLED: ___Cable ___Bored
___Forward Rotary ___Reverse Rotary
___Jetted __X__Other (*if other, specify*)
Back hoe & Dozers

5. WELL CONSTRUCTION:
Diameter of hole 100 ~~inches~~ Ft. Sq. Depth ___ft.
Casing: ___Steel ___Plastic ___Concrete
___Threaded ___Welded ___Other (*if other, specify*) None
Pipe Weight: Dia.: From: To:
___lb/ft. ___inches ___feet ___feet
___lb/ft. ___inches ___feet ___feet
___lb/ft. ___inches ___feet ___feet
Was perforated pipe used? ___Yes ___No
Length of pipe perforated _____feet
Was casing left open end? ___Yes ___No
Was a well screen installed? ___Yes ___No
Material _____ Dia. ___inches
(*stainless steel, bronze, etc.*)
Perforation type: ___slots ___holes
Size ___ set from ___ feet to ___ feet
Size ___ set from ___ feet to ___ feet
Size ___ set from ___ feet to ___ feet
Was a packer or seal used? ___Yes ___No
If so, what material _____
Well type: ___Straight screen ___Graveled
Was the well grouted? ___Yes ___No
To what depth? _____feet
Material used in grouting _____
Well head completion: Pitless adapter ___
12" above grade ___ Other ___
(*If other, specify*) _____
Was the well disinfected? ___Yes ___No

6. WATER LEVEL:
Static water level 6 ft.below land surface
If flowing: closed-in pressure _____psi
GPM flow _____through _____inch pipe
Controlled by: ___Valve ___Reducers
___Other, *specify* _____

7. WELL TEST DATA: X Pump ___Bailer ___Other
(*If other, specify*) _____
Pumping level below land surface:
38 ft. after 200 hrs. pumping 800 gpm
___ft. after ___hrs. pumping ___gpm

8. WELL LOG:

Depth (ft.) From	To	Formation
0	8	Red Soil
8	40	Grey & Brown Sandstone with Red Clay Beds

(*Use separate sheet if necessary*)

9. DATE STARTED: 1-6-73

10. DATE COMPLETED: 10-20-73

11. WAS WELL PLUGGED OR ABANDONED? ___Yes __X__No
If so, how _____

12. DRILLER'S CERTIFICATION:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge.

Kelly Drilling Co. 169
Driller's or Firm Name *License No.*

Box 246 Roundup, Montana 59072
Address

Charles Kelly 11-21-73
Signed by *Date*

Form No. 602 Rev 7-73

Application No. _____
Permit No. _____
Notice No. _____

STATE OF MONTANA
Department of Natural Resources and Conservation

NOTICE OF COMPLETION OF WATER DEVELOPMENT

(Please Type or Print in Ink)

1. Name of Appropriator or Permit Holder Graves Ranch Company.
2. Post Office Address Box 746, Roundup, Montana.

3. Date of Priority that you are prepared to establish (*if applicable----------see instruction sheet*): January 15, 1973.

4. Permit Number (*if applicable*) 184971.

5. Source from which water was appropriated Well and dam.

6. Location of the point of diversion: SE ¼ of NE ¼ of Section 15, Township 11 North, Range 24 East; Other points of diversion:
_____.

7. The amount of water and use to which the water has been applied:
Amount 2 cfs for irrigation purpose from April 1 to November 1 incl.
(*cfs ~~and/or A.F.~~ per annum*) (*use*) (*month-day*) (*month-day*)
Amount _____ for _____ purpose from _____ to _____ incl.
(*cfs and/or A.F. per annum*) (*use*) (*month-day*) (*month-day*)
Amount _____ for _____ purpose from _____ to _____ incl.
(*cfs and/or A.F. per annum*) (*use*) (*month-day*) (*month-day*)

8. Total amount appropriated 300 ~~cfs and/or~~ acre feet per annum.

9. Describe how and by whom measurement of rate of flow or amount of storage was made and the qualifications of the person making the measurement: 500 gallons per minute in flow - determined by Cleon Graves by pumping from well for 200 hours.
_____.

10. If the means of diversion and conveyance are owned by someone other than the Appropriator or Permit Holder:
a) Give the name or description of the canal, ditch or other works by which the water is conducted to the place of use: _____
_____.
b) Describe the agreement or understanding by which you take water from the works: _____
_____.

11. Briefly describe the works for diverting and conveying the water to the place of use, (*If from a ground-water source, give the pump size, motor size, size of well casing, depth of well; if from a surface-water source, give a brief description of the diversion structure and/or canal or ditch*): Well is 100 feet long by 100 feet wide and 40 feet deep. IT IS located in the bottom of a coulee and a 50H.P. pump will be used to pump the water from the well to the irrigated fields nearby which would pump through an 8 inch pipeline. The land will be irrigated by sprinkler system which will take the water from the 8 inch pipeline from the well. 200 yard earthen dam was constructed across the coulee above the dug well described above for the purpose of storing water for the well and to divert excess water in the coulee from a runoff around the well to keep the well from filling up or being flooded.

Describe the type and size of measuring device which you have installed at your point of diversion: None - measuring will be by capacity of the pump.

13. Give the water well drillers name, address and license number if constructed by a Montana licensed water well driller (*if developed by another means give the persons name, address and business name, if any*): Part of the work done on the well was done by Kelly Drilling Company of Roundup, Montana, license #169.

14. Date construction started Jan. 6, 1973 ; Date completed October 20, 1973.

15. Has a WELL LOG REPORT (*Form No. 603*) been filed by the Montana licensed water well driller? X Yes or ____No. If No is checked, indicate below the character, color, thickness of strata such as soil, clay, sand, gravel, shale, sandstone, etc. encountered in constructing the well. Show depth at which water is found and height to which water rises in well: Hit water at 12 feet below surface of ground and water raised to within 6 feet of the top.

16. Non-irrigation purposes: Describe the beneficial use(s) to which you have applied the water and the place of use: Fish Pond

17. For Irrigation Purposes Only: Describe below the lands irrigated by giving the acreages irrigated within each 40 acre subdivision:

Twp.	Rge.	Sec	NE1/4				NW1/4				SW1/4				SE1/4				Totals
			NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	NE	NW	SW	SE	
11	24	14						35	30										
11	24	15	35	25														10	
11	24	10									40			40		25	40	25	
																			300

Total number of acres irrigated

18. Remarks:

The large well, 100x100x40 feet deep, was constructed in the bottom of a coulee as described on the attached plat. The purpose of the large well was to have a storage capacity of underground water for irrigation. The dam above the well was constructed to feed water to the well and also to divert water around the well to keep it from washing out or filling with silt and to keep it from being flooded. The water will be pumped from the well to the irrigated fields north of the well which is shown on the attached diagram. The dam also has a pipeline constructed at the bottom of the dam to allow water to flow from storage in the dam to the well if needed.