



WELL CHARACTERISTICS AND PERFORMANCE

Records of wells in the area were evaluated for total depth, yield, and depth to water. Most of the wells are 6 in. (152 mm) in diameter (see diagram of typical well installation) and are uncased opposite the aquifer. The data were taken from 650 well-drillers' reports submitted to the Oregon State Water Resources Department from 1955 through 1977. Of these wells, 189 were actually field located during the study. Data for the located wells are listed in the table of well records, and the locations are shown on the geohydrologic map.

The well-characteristics map summarizes the number of drilled wells; the range and median values of well depth, yield, specific capacity, and depth to water of wells in those townships and sections containing wells. These data should be used with caution because the reported locations of many wells were found to be inaccurate. In one area, for example, about 20 percent of the wells were found to be reported in the wrong section of land within the township. However, in sections where several wells are reported, the statistics should give the user a reasonable estimate of the probable range of ground-water conditions.

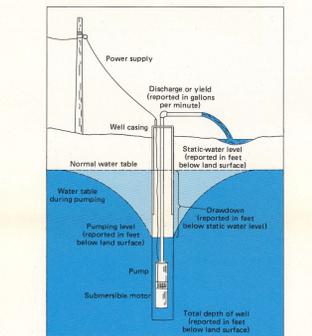


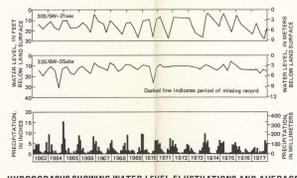
DIAGRAM OF TYPICAL WELL INSTALLATION

The median values reported on the well-data map are the values for which half are larger and half are smaller. For example, in T. 32 S., R. 6 W., sec. 31, the median well yield was 6 gal/min (0.4 L/s). This means that of the values reported, half were smaller than the 6 gal/min (0.4 L/s) and half were larger. The median depth of wells was 125 ft (38 m), and depths ranged from 42 to 257 ft (13 to 78 m). The specific capacity of the wells ranged from 0.01 to 1.62 (gal/min)/ft (0.002 to 0.34 (L/s)/m) and the median was 0.07 (gal/min)/ft (0.01 (L/s)/m). The specific capacity of a well is its rate of yield divided by the drawdown, expressed in gallons per minute per foot of drawdown. For example, if a well has a yield of 20 gal/min (1.3 L/s) and the drawdown is 10 ft (3 m), the specific capacity is 2 (gal/min)/ft of drawdown (0.4 (L/s)/m). The specific capacity of more than half the wells in the study area is equal to or less than 0.1 (gal/min)/ft of drawdown (0.02 (L/s)/m). The specific-capacity value provides a useful index of the potential capacity of a well.

The duration of most well-production tests was short (1 hour); therefore, the reported yield of a well is not always a reliable indicator of the sustained yield for a longer period of time. This is particularly true of wells where a short production test indicated that the drawdown was substantial or to the bottom of the well. In such a well, the sustained yield would be significantly smaller than the yield reported in the well table or on the well-data map.

WATER-LEVEL FLUCTUATIONS

Records of water levels in wells show that the levels start to rise as precipitation and infiltration increase, starting about November. Levels are highest near the end of the rainy season and decline as rainfall diminishes. Ground-water levels are generally at their lowest during summer and fall. The hydrographs of wells 30S/SW-21acc and 32S/GW-35ba, measured quarterly, show water-level fluctuations that are probably typical.



HYDROGRAPHS SHOWING WATER-LEVEL FLUCTUATIONS AND AVERAGE PRECIPITATION AT RIDDLE, OREGON

CHEMICAL CHARACTER OF THE GROUND WATER

Variations in chemical quality of the ground water are generally related to the geologic environment. These variations depend on the rock type forming the aquifer, the topographic setting of the well, and, in places, the depth of the well. The chemical diagrams shown on the geohydrologic map illustrate that there is no definite pattern in the distribution of the various chemical types of water. Water with high dissolved-solids content generally has a high sodium chloride or calcium chloride and bicarbonate concentration. Available water-quality data are listed in the chemical-analysis table. The well-records table shows specific-conductance values for water from wells in the area. Specific conductance is a measure of the ability of water to conduct electrical current and is expressed in micromhos per centimeter at 25° C. Numerically, the dissolved-solids content of water, in milligrams per liter, is generally 55 to 75 percent of the specific-conductance value.

Recommended limits for drinking water have been established by the National Academy of Sciences and National Academy of Engineering (1974) and from preliminary regulations of the U.S. Environmental Protection Agency (1975). Standards are in accordance with the Safe Drinking Water Act, which became effective in June 1977. The standards apply to all drinking-water systems that serve at least 25 persons daily or have at least 15 service connections. Some of the standards that apply to samples listed in the chemical analysis table include:

Constituent	Recommended limit of concentration (milligrams per liter)	
	NAS, NAE(1974)	EPA(1975)
Iron (Fe)	0.3	--
Manganese (Mn)	0.05	--
Sulfate (SO ₄)	250	--
Chloride (Cl)	250	--
Fluoride (F)	1/1.8	1/1.8
Boron (B)	2/2	1
Arsenic (As)	0.05	0.05
Nitrite (NO ₂) + nitrate (NO ₃), expressed as N	3/10	10

- 1/ Value based on average maximum daily air temperature in vicinity of Riddle.
- 2/ For tolerant crops; for sensitive crops limit is 0.75 mg/L.
- No recommended limit for human consumption.
- 3/ A separate limit of 1.0 mg/L recommended for nitrite.

The preceding recommended limits are for public supplies; however, concentrations exceeding these values may be acceptable to many users.

Excessive iron causes staining of plumbing fixtures and laundry and can give a peculiar taste to the water. Iron and manganese are excessive in some ground water that otherwise is of good quality. Ten of the water samples analyzed equaled or exceeded the recommended limit for iron.

Sulfate causes permanent (noncarbonate) hardness of water, and excessive concentrations can have a laxative effect on persons not accustomed to the water. None of the samples analyzed contained excessive amounts of sulfate.

Chloride in excess of 500 mg/L and dissolved solids in excess of 1,000 mg/L give a salty taste to the water. Four of the samples analyzed exceeded the recommended limit for chloride (250 mg/L) and one exceeded 1,000 mg/L of total dissolved solids.

CHEMICAL ANALYSES OF WATER

Analyzed by U.S. Geological Survey Central Laboratory, unless otherwise noted.

Well or spring number	Water-bearing material	Date of collection	Dissolved constituents (Milligrams per liter)														Total dissolved solids (sum of constituents)	Total hardness (as CaCO ₃)	Non-carbonate hardness (as CaCO ₃)	Sulfate (as SO ₄)	Chloride (as Cl)	Nitrite (as NO ₂)	Nitrate (as NO ₃)	Orthophosphate (as P)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc (Zn)	Selenium (Se)	Fluoride (F)	Silica (SiO ₂)	Calcium (Ca)	Magnesium (Mg)	Sulfate (SO ₄)	Chloride (Cl)	Nitrite (NO ₂)	Nitrate (NO ₃)	Orthophosphate (PO ₄)	Boron (B)	Arsenic (As)	Iron (Fe)	Manganese (Mn)	Cadmium (Cd)	Lead (Pb)	Copper (Cu)	Zinc 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