Contents

Figures

Tables

Plates

Appendices

Definition of Selected Terms

Acre-foot: The volume required to cover 1 acre to a depth of 1 foot. This volume equals 43,560 cubic feet or 325,851 gallons.

Aquifer: A body of rock and/or sediments that will yield water in a usable quantity to a well or spring.

Alluvium: Clay, silt, sand, gravel or similar material deposited by running water.

Andesite: A fine grained, gray to grayish black volcanic rock, typically containing the minerals plagioclase, augite, biotite, or hornblende.

Barometric Efficiency: A ratio of the water level change in a well to the inverse barometric pressure change (converted to feet of water).

Basalt: A very fine grained, dark gray to black volcanic rock. The minerals it contains (pyroxene, plagioclase, olivine) are relatively high in iron and magnesium.

Confined Aquifer: An aquifer bounded above and below by material of distinctly lower permeability than the aquifer itself. Ground water in the aquifer is under sufficient pressure to rise above the level at which it is encountered by a well. The water in a well may or may not rise above land surface.

Earth Tide: The rising and falling of the earth crust in response to the same forces that produce ocean tides. During high (maximum) tides, the crust dilates which reduces pressure on ground water and causes water in a well to drop (generally less than 0.10 foot). During low tide, the crust relaxes which increases pressure on ground water and causes water in a well to rise.

Effective Transmissivity and Storage Coefficient: This investigation used the Theis equation to calculate the potential ground water drawdown at the Lost River and at springs due to pumping at individual wells. The actual drawdown is related to the pumping rate, the hydraulic properties of the geologic units (transmissivity and storage coefficient), and boundary influences. The Theis equation does not include boundary influences. That can lead to incorrect drawdown calculations, too much or too little depending upon the boundary influence. This investigation indirectly added boundary influences by using an effective transmissivity and storage coefficient for the actual values in the Theis equation calculations. The effective values are the actual values adjusted to include boundary influences. They were obtained by iteratively using an aquifer test derived storage coefficient and a range of aquifer test derived tranmissivities in Theis equation calculations. The values that best reproduced observed drawdown and/or recovery at different locations were used.

Excessively Declining Water Levels as defined in Oregon Administrative Rule OAR 690-08-001 (6) means any ongoing lowering of the water level in a ground water reservoir or part thereof which: (a) precludes, or could preclude, the perpetual us of the reservoir; or (b) represents an average downward trend of three or more feet per year for at least 10 years; or (c) represents, over a five year period, an average annual lowering of the water level by 1% or more of the initial saturated thickness as determined by observation or investigation in the affected area; or (d) results in water quality deterioration.

Fault: A fracture or zone of fractures in the earth's crust along which there has been displacement of one side relative to the other.

Geologic Structure: A general term for features created by movement, bending, tilting, or breaking of rock layers or units.

Hydraulic Conductivity: A measure of the capacity of rock and/or sediment to transmit water. It is expressed as the rate (volume/time) at which water moves through a unit area of an aquifer under a unit hydraulic gradient. Its value depends upon the physical properties of the water and the aquifer. Larger values means water can move more easily.

Hydraulic Gradient: A measure of the slope of the potentiometric surface. It is the change in total head per unit distance measured in the direction of steepest change. This gradient drives ground water flow.

$$\text{Hydraulic Gradient} = \frac{\text{(Total Head at Point A)} - \text{(Total Head at Point B)}}{\text{Distance Between A and B}}$$

Lithology: The description of rocks on the basis of color, mineral composition, and grain size.

Palagonite: Basaltic glass weathered to a yellow or orange mineral.

Paleomagnetism: The intensity and direction of residual magnetization in ancient rocks. The magnetic particles in the rock were oriented by the earth's magnetic field as it existed when the rock was formed.

Phenocryst: A crystal conspicuously larger than most crystals in the rock.

Phyric (porphyritic): A basalt rock texture in which larger crystals (phenocrysts) are set in a matrix of finer grained crystals and glass (groundmass).

Pillow Lava: Lobes of lava stacked one upon another resembling a pile of bed pillows. They are formed by lava flowing into water.

Pillow-Palagonite (Pillow Breccia): Pillow lava surrounded by yellow or orange minerals formed as the pillow lava weathers.

Potentiometric Surface: A surface that represents the total head in an aquifer. It is defined by the elevation at which water stands in cased wells that penetrate the aquifer. A water table is a particular potentiometric surface for unconfined ground water.

Saturated: The condition in which the pores and/or fractures in rock and/or sediment are filled with water.

Sediment: Solid fragmental material that settled down from a state of suspension in wind, water, or ice, was chemically precipitated from solution, or was secreted by organisms. The settling process forms layers.

Specific Capacity: The yield (rate of discharge) from a pumped well divided by the water level drawdown in the well due to the pumping. It is often expressed as gallons per minute per foot of drawdown (gpm/ft).

Speicifc Yield (Unconfined Storativity): The volume of water released from or added to storage in a unit prism of an unconfined aquifer per unit change in the water table. Water released is due to dewatering of aquifer pore spaces and water added is due to filling of aquifer pore spaces.

$$\text{Specfic Yield} = \frac{\text{(volume of water released)(aquifer thickness)}}{\text{(aquifer volume with unit base)(unit decline of water table)}}$$

Storage Coefficient (Storativity): The volume of water released from or added to storage in a unit prism of a confined aquifer per unit change in total head. Water released is due to compaction of the aquifer and expansion of water when pressure is relieved. Water added is due to expansion of the aquifer and compaction of the water associated with an increase of pressure.

$$\text{Storage Coefficient} = \frac{\text{(volume of water released)(aquifer thickness)}}{\text{(aquifer volume with unit base)(unit decline of total head)}}$$

Stratigraphy: The branch of geology which treats the formation, composition, sequence, and correlation of rock layers.

Total Head: Total Head = Elevation Head + Pressure Head

Elevation Head = the elevation of a point of interest in an aquifer relative to some reference measuring point (i.e. sea level).

Pressure Head = the water column height that can be supported by the pressure at the point of interest in the aquifer.

Transmissivity: A measure indicating how easily water can move through an aquifer. The rate at which water is transmitted through a unit width of aquifer under a unit hydraulic gradient.

Transmissivity = (hydraulic conductivity)(aquifer thickness)

Tuffaceous: A rock containing up to 50 percent volcanic ash.

Unconfined Aquifer Water Table Aquifer): An aquifer in which a water table forms the upper ground water surface.

Volcanic Breccia (agglomerate): A rock composed of angular volcanic fragments (larger than 64 mm) set in finer volcanic material.

Volcaniclastic: A rock composed of volcanic fragments.

Water Table: The upper ground water surface in an unconfined aquifer where the pressure of the water in the porous medium equals atmospheric pressure.