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10 GLOSSARY

Aquifer	a formation, group of formations, or part of a formation that contains saturated permeable rocks capable of transmitting groundwater to water wells or springs in economical quantities.
Aquitard	a confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer.
Available Drawdown	in a confined aquifer, the distance between the non-pumping water level and the top of the aquifer. in an unconfined aquifer (water table aquifer), two thirds of the saturated thickness of the aquifer.
Deltaic	a depositional environment in standing water near the mouth of a river.
Facies	the aspect or character of the sediment within beds of one and the same age (Pettijohn, 1957)
Fluvial	produced by the action of a stream or river.
Friable	poorly cemented
Hydraulic Conductivity	the rate of flow of water through a unit cross-section under a unit hydraulic gradient; units are length/time.
Kriging	a geo-statistical method for gridding irregularly-spaced data.
Lacustrine	fine-grained sedimentary deposits associated with a lake environment and not including shore-line deposits.
Piper tri-linear diagram	a method that permits the major cation and anion compositions of single or multiple samples to be represented on a single graph. This presentation allows groupings or trends in the data to be identified.
Surficial Deposits	includes all sediments above the bedrock.
Till	a sediment deposited directly by a glacier that is unsorted and consisting of any grain size ranging from clay to boulders.
Transmissivity	the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient: a measure of the ease with which groundwater can move through the aquifer. Apparent Transmissivity: the value determined from a summary of aquifer test data, usually involving only two water-level readings. Effective Transmissivity: the value determined from late pumping and/or late recovery water-level data from an aquifer test. Aquifer Transmissivity: the value determined by multiplying the hydraulic conductivity of an aquifer by the thickness of the aquifer.
Yield	a regional analysis term referring to the rate a properly completed water well could be pumped, if fully penetrating the aquifer. Apparent Yield: based mainly on apparent transmissivity. Long-Term Yield: based on effective transmissivity.

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Appendix B

MAPS AND FIGURES ON CD-ROM

A) Database
B) ArcView Files
C) Query
D) Maps and Figures

1) General

Index Map
Surface Casing Types used in Drilled Water Wells
Location of Water Wells
Depth of Existing Water Wells
Depth to Base of Groundwater Protection
Bedrock Topography
Bedrock Geology
Cross-Section A - A'
Cross-Section B - B'
Geologic Column
Generalized Cross-Section (for terminology only)
Risk of Groundwater Contamination
Relative Permeability
Summer Precipitation vs Water Levels in AEP Obs WW No. 320
Hydrographs - AEP Observation Water Wells
Water Wells Recommended for Field Verification

2) Surficial Aquifers

a) Surficial Deposits

Thickness of Surficial Deposits
Non-Pumping Water-Level Surface in Surficial Deposits
Total Dissolved Solids in Groundwater from Surficial Deposits
Sulfate in Groundwater from Surficial Deposits
Chloride in Groundwater from Surficial Deposits
Fluoride in Groundwater from Surficial Deposits
Total Hardness of Groundwater from Surficial Deposits
Piper Diagram - Surficial Deposits
Amount of Sand and Gravel in Surficial Deposits
Thickness of Sand and Gravel Aquifer(s)
Water Wells Completed in Surficial Deposits
Apparent Yield for Water Wells Completed in Sand and Gravel Aquifer(s)

b) First Sand and Gravel

Thickness of First Sand and Gravel
First Sand and Gravel - Saturation

c) Upper Sand and Gravel

Thickness of Upper Surficial Deposits
Thickness of Upper Sand and Gravel (not all drill holes fully penetrate surficial deposits)
Apparent Yield for Water Wells Completed through Upper Sand and Gravel Aquifer

d) Lower Sand and Gravel

Structure-Contour Map - Top of Lower Surficial Deposits
Depth to Top of Lower Surficial Deposits
Thickness of Lower Surficial Deposits
Thickness of Lower Sand and Gravel (not all drill holes fully penetrate surficial deposits)
Apparent Yield for Water Wells Completed through Lower Sand and Gravel Aquifer
Non-Pumping Water-Level Surface in Lower Sand and Gravel Aquifer

3) Bedrock Aquifers

a) General

Apparent Yield for Water Wells Completed in Upper Bedrock Aquifer(s)
Total Dissolved Solids in Groundwater from Upper Bedrock Aquifer(s)
Sulfate in Groundwater from Upper Bedrock Aquifer(s)
Chloride in Groundwater from Upper Bedrock Aquifer(s)
Fluoride in Groundwater from Upper Bedrock Aquifer(s)
Total Hardness of Groundwater from Upper Bedrock Aquifer(s)
Piper Diagram - Bedrock Aquifers
Recharge/Discharge Areas between Surficial Deposits and Upper Bedrock Aquifer(s)
Non-Pumping Water-Level Surface in Upper Bedrock Aquifer(s)

b) Upper Lacombe Aquifer

- Depth to Top of Upper Lacombe Member
- Structure-Contour Map - Top of Upper Lacombe Member
- Non-Pumping Water-Level Surface - Upper Lacombe Aquifer
- Apparent Yield for Water Wells Completed through Upper Lacombe Aquifer
- Total Dissolved Solids in Groundwater from Upper Lacombe Aquifer
- Sulfate in Groundwater from Upper Lacombe Aquifer
- Chloride in Groundwater from Upper Lacombe Aquifer
- Piper Diagram - Upper Lacombe Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Upper Lacombe Aquifer

b) Lower Lacombe Aquifer

- Depth to Top of Lower Lacombe Member
- Structure-Contour Map - Top of Lower Lacombe Member
- Non-Pumping Water-Level Surface - Lower Lacombe Aquifer
- Apparent Yield for Water Wells Completed through Lower Lacombe Aquifer
- Total Dissolved Solids in Groundwater from Lower Lacombe Aquifer
- Sulfate in Groundwater from Lower Lacombe Aquifer
- Chloride in Groundwater from Lower Lacombe Aquifer
- Piper Diagram - Lower Lacombe Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Lower Lacombe Aquifer

c) Haynes Aquifer

- Depth to Top of Haynes Member
- Structure-Contour Map - Top of Haynes Member
- Non-Pumping Water-Level Surface - Haynes Aquifer
- Apparent Yield for Water Wells Completed through Haynes Aquifer
- Total Dissolved Solids in Groundwater from Haynes Aquifer
- Sulfate in Groundwater from Haynes Aquifer
- Chloride in Groundwater from Haynes Aquifer
- Piper Diagram - Haynes Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Haynes Aquifer

c) Upper Scollard Aquifer

- Depth to Top of Upper Scollard
- Structure-Contour Map - Top of Upper Scollard
- Non-Pumping Water-Level Surface - Upper Scollard Aquifer
- Apparent Yield for Water Wells Completed through Upper Scollard Aquifer
- Total Dissolved Solids in Groundwater from Upper Scollard Aquifer
- Sulfate in Groundwater from Upper Scollard Aquifer
- Chloride in Groundwater from Upper Scollard Aquifer
- Piper Diagram - Upper Scollard Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Upper Scollard Aquifer

d) Lower Scollard Aquifer

- Depth to Top of Lower Scollard
- Structure-Contour Map - Top of Lower Scollard
- Non-Pumping Water-Level Surface - Lower Scollard Aquifer
- Apparent Yield for Water Wells Completed through Lower Scollard Aquifer
- Total Dissolved Solids in Groundwater from Lower Scollard Aquifer
- Sulfate in Groundwater from Lower Scollard Aquifer
- Chloride in Groundwater from Lower Scollard Aquifer
- Piper Diagram - Lower Scollard Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Lower Scollard Aquifer

e) Upper Horseshoe Canyon Aquifer

- Depth to Top of Upper Horseshoe Canyon Formation
- Structure-Contour Map - Top of Upper Horseshoe Canyon Formation
- Non-Pumping Water-Level Surface - Upper Horseshoe Canyon Aquifer
- Apparent Yield for Water Wells Completed through Upper Horseshoe Canyon Aquifer
- Total Dissolved Solids in Groundwater from Upper Horseshoe Canyon Aquifer
- Sulfate in Groundwater from Upper Horseshoe Canyon Aquifer
- Chloride in Groundwater from Upper Horseshoe Canyon Aquifer
- Piper Diagram - Upper Horseshoe Canyon Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Upper Horseshoe Canyon Aquifer

f) Middle Horseshoe Canyon Aquifer

- Depth to Top of Middle Horseshoe Canyon Formation
- Structure-Contour Map - Top of Middle Horseshoe Canyon Formation
- Non-Pumping Water-Level Surface - Middle Horseshoe Canyon Aquifer
- Apparent Yield for Water Wells Completed through Middle Horseshoe Canyon Aquifer
- Total Dissolved Solids in Groundwater from Middle Horseshoe Canyon Aquifer
- Sulfate in Groundwater from Middle Horseshoe Canyon Aquifer
- Chloride in Groundwater from Middle Horseshoe Canyon Aquifer
- Piper Diagram - Middle Horseshoe Canyon Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Middle Horseshoe Canyon Aquifer

g) Lower Horseshoe Canyon Aquifer

- Depth to Top of Lower Horseshoe Canyon Formation
- Structure-Contour Map - Top of Lower Horseshoe Canyon Formation
- Non-Pumping Water-Level Surface - Lower Horseshoe Canyon Aquifer
- Apparent Yield for Water Wells Completed through Lower Horseshoe Canyon Aquifer
- Total Dissolved Solids in Groundwater from Lower Horseshoe Canyon Aquifer
- Sulfate in Groundwater from Lower Horseshoe Canyon Aquifer
- Chloride in Groundwater from Lower Horseshoe Canyon Aquifer
- Piper Diagram - Lower Horseshoe Canyon Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Lower Horseshoe Canyon Aquifer

h) Bearpaw Aquitard

- Depth to Top of Bearpaw Aquitard
- Structure-Contour Map - Top of Bearpaw Aquitard

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Appendix C

GENERAL WATER WELL INFORMATION

Domestic Water Well Testing

Purpose and Requirements

The purpose of the testing of domestic water wells is to obtain background data related to:

1) the non-pumping water level for the aquifer - Has there been any lowering of the level since the last measurement?
2) the specific capacity of the water well, which indicates the type of contact the water well has with the aquifer;
3) the transmissivity of the aquifer and hence an estimate of the projected long-term yield for the water well;
4) the chemical, bacteriological and physical quality of the groundwater from the water well.

The testing procedure involves conducting an aquifer test and collecting of groundwater samples for analysis by an accredited laboratory. The date and time of the testing are to be recorded on all data collection sheets. A sketch showing the location of the water well relative to surrounding features is required. The sketch should answer the question, "If this water well is tested in the future, how will the person doing the testing know this is the water well I tested?"

The water well should be taken out of service as long as possible before the start of the aquifer test, preferably not less than 30 minutes before the start of pumping. The non-pumping water level is to be measured 30, 10, and 5 minutes before the start of pumping and immediately before the start of pumping which is to be designated as time 0 for the test. All water levels must be from the same designated reference, usually the top of the casing. Water levels are to be measured during the pumping interval and during the recovery interval after the pump has been turned off; all water measurements are to be with an accuracy of ± 0.01 metres.

During the pumping and recovery intervals, the water level is to be measured at the appropriate times. An example of the time schedule for a four-hour test is as follows, measured in minutes after the pump is turned on and again after the pump is turned off:

1,2,3,4,6,8,10,13,16,20,25,32,40,50,64,80,100,120.

For a four-hour test, the reading after 120 minutes of pumping will be the same as the 0 minutes of recovery. Under no circumstance will the recovery interval be less than the pumping interval.

Flow rate during the aquifer test should be measured and recorded with the maximum accuracy possible. Ideally, a water meter with an accuracy of better than ±1% displaying instantaneous and total flow should be used. If a water meter is not available, then the time required to completely fill a container of known volume should be recorded, noting the time to the nearest 0.5 seconds or better. Flow rate should be determined and recorded often to ensure a constant pumping rate.