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Appendix B

MAPS AND FIGURES ON CD-ROM

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
- Hydrographs - AEP Observation Water Wells

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- Sulfate in Groundwater from Surficial Deposits
- Chloride in Groundwater from Surficial Deposits
- Fluoride in Groundwater from Surficial Deposits
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- Amount of Sand and Gravel in Surficial Deposits
- Thickness of Sand and Gravel Aquifer(s)
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b) First Sand and Gravel

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

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- Thickness of Upper Surficial Deposits
- Thickness of Upper Sand and Gravel (not all drill holes fully penetrate surficial deposits)
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- Piper Diagram - Bearpaw Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Bearpaw Aquifer

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- Sulfate in Groundwater from Oldman Aquifer
- Chloride in Groundwater from Oldman Aquifer
- Piper Diagram - Oldman Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Oldman Aquifer

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- Apparent Yield for Water Wells Completed through *continental* Foremost Aquifer
- Total Dissolved Solids in Groundwater from *continental* Foremost Aquifer
- Sulfate in Groundwater from *continental* Foremost Aquifer
- Chloride in Groundwater from *continental* Foremost Aquifer
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- Total Dissolved Solids in Groundwater from *marine* Foremost Aquifer
- Sulfate in Groundwater from *marine* Foremost Aquifer
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- Apparent Yield for Water Wells Completed through Ribstone Creek Aquifer
- Recharge/Discharge Areas between Surficial Deposits and Ribstone Creek Aquifer
- Water-Level Summary - PCP North Bodo Deep Obs WW

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- Depth to Top of Victoria Aquifer
- Structure-Contour Map - Top of Victoria Aquifer
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- Depth to Top of Brosseau Aquifer
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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 $\pm$ 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 $\pm$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.

Groundwater samples should be collected as soon as possible after the start of pumping and within 10 minutes of the end of pumping. Initially only the groundwater samples collected near the end of the pumping interval need to be submitted to the accredited laboratory for analysis. All samples must be properly stored for transportation to the laboratory and, in the case of the bacteriological analysis, there is a maximum time allowed between the time the sample is collected and the time the sample is delivered to the laboratory. The first samples collected are only analyzed if there is a problem or a concern with the first samples submitted to the laboratory.

Procedure

Site Diagrams

These diagrams are a map showing the distance to nearby significant features. This would include things like a corner of a building (house, barn, garage etc.) or the distance to the half-mile or mile fence. The description should allow anyone not familiar with the site to be able to unequivocally identify the water well that was tested.

In lieu of a map, UTM coordinates accurate to within five metres would be acceptable. If a hand-held GPS is used, the post-processing correction details must be provided.

Surface Details

The type of surface completion must be noted. This will include such things as a pitless adapter, well pit, pump house, in basement, etc. Also, the reference point used for measuring water levels needs to be noted. This would include top of casing (TOC) XX metres above ground level; well pit lid, XX metres above TOC; TOC in well pit XX metres below ground level.

Groundwater Discharge Point

Where was the flow of groundwater discharge regulated? For example was the discharge through a hydrant downstream from the pressure tank; discharged directly to ground either by connecting directly above the well seal or by pulling the pump up out of the pitless adapter; from a tap on the house downstream from the pressure tank? Also note must be made if any action was taken to ensure the pump would operate continuously during the pumping interval and whether the groundwater was passing through any water-treatment equipment before the discharge point.

Water-Level Measurements

How were the water-level measurements obtained? If obtained using a contact gauge, what type of cable was on the tape, graduated tape or a tape with tags? If a tape with tags, when was the last time the tags were calibrated? If a graduated tape, what is the serial number of the tape and is the tape shorter than its original length (i.e. is any tape missing)?

If water levels are obtained using a transducer and data logger, the serial numbers of both transducer and data logger are needed and a copy of the calibration sheet. The additional information required is the depth the transducer was set and the length of time between when the transducer was installed and when the calibration water level was measured, plus the length of time between the installation of the transducer and the start of the aquifer test.

All water levels must be measured at least to the nearest 0.01 metres.

Discharge Measurements

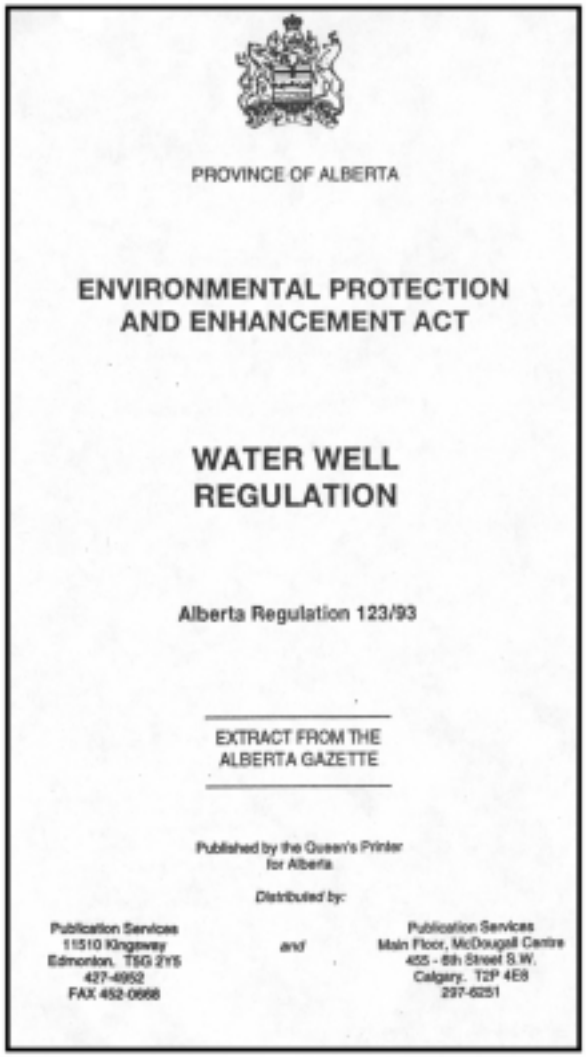
Type of water meter used. This could include such things as a turbine or positive displacement meter. How were the readings obtained from the meter? Were the readings visually noted and recorded or were they recorded using a data logger?

Water Samples

A water sample must be collected between the 4- and 6-minute water-level measurements, whenever there is an observed physical change in the groundwater being pumped, and 10 minutes before the end of the planned pumping interval. Additional water samples must be collected if it is expected that pumping will be terminated before the planned pumping interval.

Environmental Protection and Enhancement Act

Water Well Regulation



PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT

WATER WELL REGULATION

Alberta Regulation 123/93

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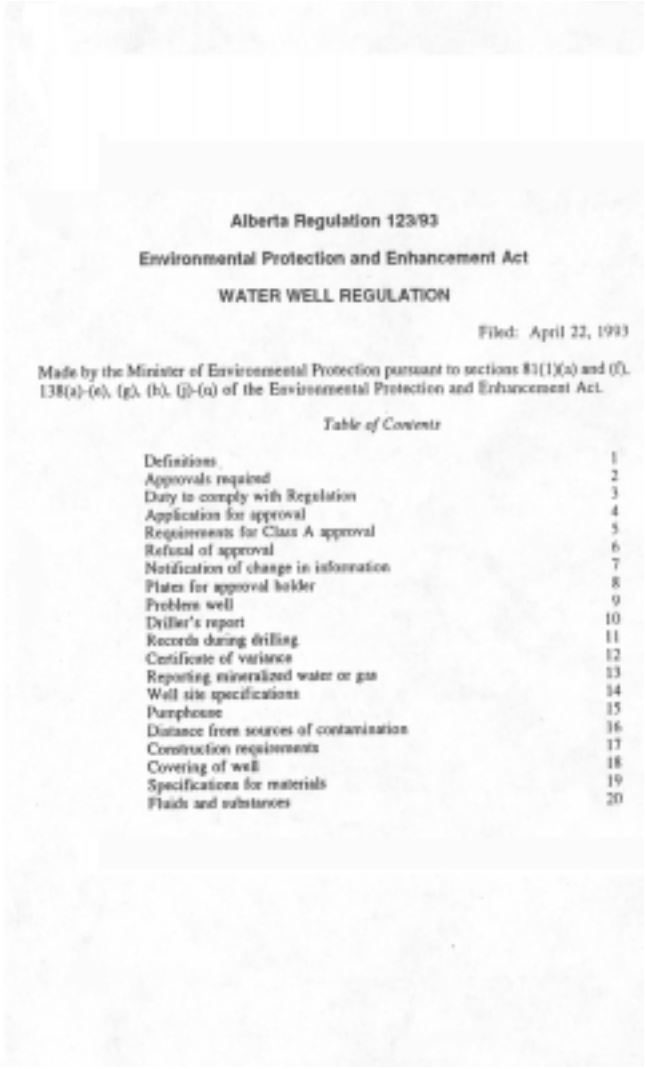

Alberta Regulation 123/93

Environmental Protection and Enhancement Act

WATER WELL REGULATION

Filed: April 22, 1993

Made by the Minister of Environmental Protection pursuant to sections 81(1)(a) and (f), 138(a)-(e), (g), (h), (j)-(n) of the Environmental Protection and Enhancement Act.

Table of Contents

Additional Information

VIDEOS

Will the Well Go Dry Tomorrow? (Mow-Tech Ltd.: 1-800 GEO WELL)
Water Wells that Last (PFRA – Edmonton Office: 403-495-3307)
Ground Water and the Rural Community (Ontario Ground Water Association)

BOOKLET

Water Wells that Last (PFRA – Edmonton Office: 403-495-3307)

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