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Siobhan Burland-Ross
Manager, Municipal & Industrial Environmental Approvals
Manitoba Sustainable Development
123 Main Street (Box 80)
Winnipeg, Manitoba R3C 1A5

Dear Ms. Burland-Ross,

RE: BRANDON AND SELKIRK GENERATING STATIONS (GS) – REVIEW AND MODIFICATION OF GROUNDWATER MONITORING PROGRAMS

Brandon and Selkirk GS are governed by Environment Act Licenses 1703R and 1645R5, respectively. The licenses outline monitoring and reporting requirements pertaining to GS operations, which includes groundwater wells. The licenses, Clause 41 for Brandon and Clause 31 for Selkirk, also indicate groundwater well monitoring and reporting requirements can be periodically reviewed for modification and/or termination.

Annual groundwater reports have been provided to Manitoba Sustainable Development since the mid-1990s. Brandon GS maintains groundwater wells surrounding the ash lagoon and coal pile and provides annual assessments and trending of the monitoring results. Selkirk GS completes the same for the former ash lagoon and former coal pile, both decommissioned in 2004. The reports summarize “indicator” water quality parameters, currently sampled on a quarterly basis, as well as “general” parameters sampled on an annual basis.

For both stations, general water quality parameters are:

- Dissolved Calcium
- Carbonate
- Conductivity
- Total Dissolved Solids
- Dissolved Potassium
- Dissolved Magnesium
- Bicarbonate
- Chlorides
- Nitrate
- Total Hardness
- Total Alkalinity
- Sulphates
- Dissolved Sodium

For both stations, indicator water quality parameters are:

- Water Table Elevation
- Dissolved Barium
- Dissolved Chromium
- Dissolved Lead
- pH
- Soluble Boron
- Dissolved Copper
- Dissolved Manganese
- Dissolved Arsenic
- Dissolved Cadmium
- Dissolved Iron
- Dissolved Nickel

- Dissolved Selenium
- Dissolved Zinc

In 1997, Manitoba Hydro received approval from then Manitoba Environment to reduce indicator parameter sampling and reporting frequency from monthly to quarterly at both stations. However, no changes to the groundwater monitoring programs have been requested or implemented since that time.

Manitoba Hydro recently conducted a review of the entire groundwater data record from both stations. Based on this review, Manitoba Hydro recommends the changes below to the programs at Brandon and Selkirk GS.

Brandon GS – General Water Quality Parameters

Manitoba Hydro proposes no changes to the current, annual monitoring and reporting requirements for general parameters at Brandon GS. Analysis over the full reporting period revealed no trends or other results of note. However, sampling and analyzing the general water quality parameters on an annual basis will continue to provide trending data for these standard water quality indicators and describe the geochemical groundwater setting.

Brandon GS – Indicator Water Quality Parameters – Ash Lagoon

Manitoba Hydro proposes no changes to the current, quarterly monitoring and reporting requirements for indicator parameters from groundwater wells that surround the Brandon GS ash lagoon. Certain indicator parameters (e.g., arsenic and nickel) have displayed increasing concentration trends in the recent past in certain wells surrounding the ash lagoon. Continued quarterly monitoring will capture changing data trends.

Brandon GS – Indicator Water Quality Parameters – Coal Pile

After reviewing the trends for the parameters for the coal pile wells it is evident that, for the most part, they have been stable for several years. Arsenic concentrations exemplify this trend and are illustrated in Figure 1, attached. After a period of instability, arsenic concentrations have remained stable since roughly 2003.

Tracking of certain indicator parameters from the coal pile wells revealed less stability over the reporting period. However, despite the relative instability, no obvious seasonal trend is evident. Furthermore, continued annual sampling, analysis, and reporting would capture these trends. Boron concentrations illustrate this phenomenon and are shown in Figure 2, attached. In some wells, a very gradual decreasing trend is evident between approximately 2000 to 2006. Starting in about 2010 to the present, a very gradual increasing trend can now be observed. Annual monitoring would continue to reveal these trends.

Therefore, **Manitoba Hydro proposes reducing the current, quarterly frequency to annual for indicator parameters from groundwater wells that surround the Brandon GS coal pile.** Annual sampling will continue to confirm stability of the indicator parameters while capturing changing trends.

Selkirk GS – General Water Quality Parameters

Manitoba Hydro proposes no changes to the current, annual monitoring and reporting requirements for general parameters at Selkirk GS. Analysis over the full reporting period revealed no trends or other concerning results. However, sampling and analyzing the general water quality parameters on an annual basis will continue to provide trending data for these standard water quality indicators and describe the geochemical groundwater setting.

Selkirk GS – Indicator Water Quality Parameters

After reviewing the trends for these parameters, it is evident that, for the most part, they have been stable for several years. As shown in Figure 3A and 3B, nickel concentrations fluctuated somewhat over the monitoring record but trends for specific wells and overall only very gradually increased, decreased, or remained stable. Nickel concentrations shown in these figures exemplify the general stability of groundwater concentrations at Selkirk GS.

Boron concentrations in the former ash lagoon wells are shown in Figure 4A and also illustrate this observation. Although concentrations in certain wells are somewhat elevated and fluctuated over the record, overall changes in boron concentrations were either very gradual or not present at all.

Figure 4B shows boron concentrations in the former coal pile wells. Trends in all wells, with the exception of Well No. 1, were very stable. Boron concentration in Well No. 1 is increasing; however, continued annual monitoring would continue to track this outlying trend. This is also the case for the few other indicator parameters and specific wells at Selkirk GS displaying increasing trends and/or instability (i.e., As, Fe, and Mn).

Therefore, **Manitoba Hydro proposes reducing the current, quarterly frequency to annual for indicator parameters from groundwater wells that surround the Selkirk GS former ash lagoon and coal pile.** Annual sampling will continue to confirm stability of the indicator parameters while capturing changing trends where they now occur or should they develop.

Please contact me for any clarifications or questions you may have concerning this proposal.
Yours truly,

Marcus Smith
Senior Environmental Specialist
Environment Operations Support
Plant Programs & Environmental Support
Manitoba Hydro

mos/2017 02 10 BURLAND-ROSS GW programs change req.docx

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attach: Figure 1 – Arsenic concentration variation over the entire monitoring record of the Brandon GS coal pile groundwater observation wells.
Figure 2 – Boron concentration variation over the entire monitoring record of the Brandon GS coal pile groundwater observation wells.
Figure 3A – Nickel concentration variation over the entire monitoring record of the Selkirk GS ash lagoon groundwater observation wells.
Figure 3B – Nickel concentration variation over the entire monitoring record of the Selkirk GS coal pile groundwater observation wells.
Figure 4A – Boron concentration variation over the entire monitoring record of the Selkirk GS ash lagoon groundwater observation wells.
Figure 4B – Nickel concentration variation over the entire monitoring record of the Selkirk GS coal pile groundwater observation wells.