CHAPTER V
CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The main conclusions based on the present work are as follows:

- Considering the hydrogen diffusivity, using the HEP to monitor corrosion is limited to metals of high hydrogen permeability such as carbon steel and low alloy iron.
- Installation of the HEPs at Coleson Cove Generating Station, Point Lepreau Generating Station, and Loop1 can provide valuable information about the effect of operating parameters on the corrosion rate. This work proved that the HEP can be used as an on-line corrosion monitoring device by measuring the hydrogen produced from corrosion.
- After starting up the process, it takes several days before the HEP pressure rise to reach steady state due to a decrease of the corrosion rate and the hydrogen diffusion time lag. Nevertheless, when the steady state is reached, the HEP is responsive to changes in the corrosion rate within the system, and has relatively short response times.
- The HEP is sensitive to the quality of the instruments sealing. Any small leaks can lead to a significant error of the corrosion rate determination.
- The FAC-produced hydrogen diffusion through steel is affected by the oxide film formation and its structure on the exposed steel.
- No hydrogen is produced if there is any measurable dissolved oxygen in the solution.
- The non-linear hydrogen pressure rise due to the change of diffusion rate can only account for a small curve. Thus the non-linear pressure rise may be due primarily to a leak in one of the HEP components.

5.2 Recommendations

- Experiments for measuring the hydrogen permeabilities of carbon steel and other metals are required for a better fundamental understanding of hydrogen transport through steel and possible commercial applications.
- The limitations of using an HEP to monitor corrosions should be studied and specified for commercial purposes.
- More investigation of the non-linearity of the HEP pressure rise is nescessary.