ABSTRACT

Water is a basic essential for every human being. In many remote parts of Western Australia, the water quality often ranges from brackish to saline. The provision of a safe and reliable water supply is essential for every community to avoid the spread of water-borne diseases and to provide the foundation for a satisfactory standard of living. The conventional water supply system is a means of providing a safe and reliable water. However, due to the diseconomies of small scale, many small remote communities are not able to enjoy the benefits provided by the conventional water supply system.

This thesis is an attempt to design a solar powered electrodialysis reversal (S.P.E.D.) desalination system suitable for application in small remote communities. Two designs were presented -- the Indirectly-coupled S.P.E.D. and the Directly-coupled S.P.E.D. systems. In the Indirectly-coupled S.P.E.D. system, solar energy is collected and stored in battery bank to enable the system to operate throughout the 24 hour day. In the Directly-coupled S.P.E.D. system, the solar panel array is directly coupled to the electrodialysis unit. Such a system operates only when the sun shines.

The S.P.E.D. systems proposed in this thesis compare favourably, in terms of energy consumption, to two reverse osmosis systems of similar capacity. Though the proposed designs may just be a dream, an illusion at this present moment, it is hoped that they will have the opportunity to materialize in the near future for there is potential for them to become a means of treating brackish waters in remote communities.