Seawater Desalination Package
For Greater Availability of Potable Water

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1. INTRODUCTION

In areas where freshwater sources have already been developed to their maximum and/or where people are chronically stricken by drought, developing new water sources to meet greater demands on water supplies is of great concern.

At the same time, water scarcities will continue with only limited conventional water sources.

New water sources must be developed to bridge the gap between the demands and the supplies of water. Desalination is now found to be an easy and immediate method of securing water from unlimited sources of water - seawater.

Installation of small- to mid-capacity units at various areas, and/or the availability of transferable desalination units, is an immediately workable solution.

2. DESALINATION PROCESS

Desalination systems help to upgrade potable water availability in drought stricken areas.

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Reverse osmosis systems and/or evaporation systems - small- to mid sized seawater desalination units in remote areas should be evaluated based on reliability and operation cost - especially their energy cost.

There are a number of technologies for seawater desalination. They basically fall under two general categories – thermal process and membrane process.

Thermal processes

Heat is used to boil seawater and the steam is condensed and converted into fresh water. The following systems are available.

(a) Multi-stage flash distillation (MSF)
(b) Multiple-effect distillation (ME)
(c) Vapor compression distillation (VC)

Membrane (RO) process

Reverse osmosis is a process by which the seawater is separated into two streams - product water and brine, by forcing the seawater through membranes. The major energy requirement is for operating pumps. This system is very simple. High pressure pumps and reverse osmosis membranes are the major components. Seawater is pressurized up to 50-60 kg/cm^2 to overcome the natural osmotic pressure of seawater. As the pressurized seawater flows through the membrane, the salt is removed and permeate is produced as potable water.

In recent years, RO has become a more attractive and economical technology for seawater desalination compared to thermal processes because of lower energy requirements and simplicity.

ADVANTAGES OF RO PROCESS

1. Lower energy cost

   No need to heat seawater.

   High pressure pump is the only major energy consuming equipment.

   Pressurized seawater (brine) energy is utilized, instead of wasted, to energize a high pressure pump. In this way, energy is reused, thus reducing total power requirements. The power consumption to produce 1m3 of potable water is 3.6-4.8 kWh while the power consumption in a distillation system is three times higher.

2. Disinfection is the only chemical dosing for post treatment.

   RO permeate water is germ-free. If it is stored in a tank, disinfection is required.

3. No other chemical post treatment is necessary.

   RO product water pH is around 7. Thus, no need for pH adjustment.

   RO product water is palatable without mineral dosing. Thus, no need for mineral dosing.

4. Upgraded quality water

   RO product water quality from seawater (seawater TDS is 35,000 mg/l) is as good as 300mg/l/TDS or greater.

5. Immediate stable operation is achieved

Within a few minutes after starting operation, product water can be stored in a tank for human consumption.

6. Declining cost of RO membranes

The cost of RO membranes has dropped drastically in recent years. When replaced with new membranes, a completely new system is restored and initial performance is obtained. The replacement of membranes can be performed by local technicians. No expertise is required.

7. Typical desalination unit for small communities

DESALINATION PACKAGE SO-KQC65

The ***Desalination Package SO-KQC65*** can produce potable water as shown below.

A	***From seawater***	***Max. 65m3/D (normal 50 m3/D)***
B	***From brackish water***	***Max. 90 m3/D (normal 70 m3/D)***
C	***High pressure pump***	***15 kW***

It is designed and built to be easily transported. A 20-foot container-enclosed desalination package has all necessary equipment and units including pretreatment system.

This containerized desalination package can be put into service immediately upon connection at site.