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**Evaluation Of the "Challenger" Pump for Radionuclide Oceanographic
Sample Collection**

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The measurement of radionuclides in the marine environment often requires concentrating the isotopes of interest from large volumes of water. This generally leads to long sampling times on board ship thereby restricting the number of samples that can be collected. The large volumes also make handling and movement of these samples difficult. Samples are generally concentrated on board ship so that huge volumes need not be transported back to the laboratory. Many of these problems can be eliminated with the use of an in-situ pump. A commercially available "Challenger" pump has been used in several marine environments over the past few years for filtering and concentrating dissolved and particulate radionuclides in-situ. The pump configuration consists of a filter holder, 4 cartridge housings to hold various cartridges types and a flow meter. The pump is powered using sixteen 2 V batteries, either alkaline or rechargeable, which power the pump for up to three hours and are quoted to have flow rates up to 1000 l/hour. The batteries are either changed before reusing or recharged in five hours.

The pumps have been used with glass fiber filters, Nuclepore filters and cartridges (pore size of 0.2 to 1 μm), manganese oxide cartridges and potassium cobalt ferrocyanide (KCFC) cartridges. Radium (^{226}Ra , ^{228}Ra) and thorium (^{234}Th , etc.) are concentrated on the manganese oxide cartridges and cesium (^{137}Cs and ^{134}Cs) on the KCFC cartridges. Total activities are determined using recoveries calculated from activities measured on two cartridges arranged in series.

The pump operates to 5500 m and has been used in arctic, open ocean and coastal marine environments. The pump operation, flow rates, volumes collected will be discussed in terms of the type and number of filters and cartridges used, SPM concentrations and environmental influences. Examples of water profiles for Th-234, Cs-137 and Ra-226 using four pumps will be shown for the Arctic Ocean and coastal areas and compared with profiles measured by other techniques.