An Appraisal of the Application of Surface and Borehole Geophysical Techniques to Groundwater Assessment in Wellfields in The Bahamas.

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Abstract

An increase in composite salinity as a reaction to an increase in abstraction rate and a decline in composite salinity as a reaction to an increase in rainfall coupled with a decline in abstraction rate are classical characteristics displayed by an overstressed system. The identification and location of localized upconing are vital to wellfield rehabilitation and expansion schemes which can lead to reductions in composite salinity.

The application of surface and borehole geophysical techniques;

a. Surface resistivity (Offset Wenner Method)
b. Electromagnetic ground conductivity (EM34-3)

and c. Borehole fluid conductivity and temperature versus depth profiling

to the assessment of groundwater in wellfields in The Bahamas are evaluated. Surface and borehole geophysical exploration techniques can provide very rapid and accurate information on the status of freshwater lenses, for example, freshwater lens thickness, depth to the fresh/salt water interface and the identification and mapping of salt water encroachment.

INTRODUCTION

The Commonwealth of the Bahamas is an archipelago of more than seven hundred islands that extends over nine hundred kilometres in a south easterly direction away from the east coast of South Florida [Fig. 1]. Its total land mass is approxiimately thirteen thousand and eighty square kilometres, but only sixteen islands have a land mass that exceeds fifty square kilometres. The main annual rainfall varies from fifteen hundred millimetres in the north to seven hundred millimetres in the south.

Pleistocene limestones and Holocene sands dominate the geology of the islands. Fossil coral reefs are evident along the coastlines. The reefs outcrop as terraces and are indicators

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