EXECUTIVE SUMMARY

Water is a scarce resource in South Africa and many parts of the country have limited access to water either from natural rainfall, rivers, dams and localised boreholes. The Northern Cape depends on water supply from the Vaal and Orange Rivers as well as groundwater resources. The borehole water supply has several constrains in that it is limited in supply, often very brackish and hard and many times very high in mineral contents like fluoride.

The aim of the project was to determine the fluoride in drinking water and its effects on human health and nutrition. The objectives of the project were to determine: a) the levels of fluoride in the groundwater supply used for human consumption in the Northern Cape; b) the nutritional status of the selected samples of children in terms of outcomes related to high and low fluoride levels; c) fluoride toxicity as measured by the teeth using the TF Index, and d) to initiate a pilot project with appropriate and inexpensive technology for safe and sustainable drinking water supply in the Northern Cape.

Samples of drinking water were collected for the analysis of free fluoride ions rom 81 towns in the Northern Cape. Specific samples were collected from different school sites in Diamond fields (Kimberley and peri-urban area), De Aar, Leliefontein and Kamassies.

A total number of 954 school children were examined for nutritional status (height & weight), caries and fluorosis in the Kimberley, De Aar, Leliefontein and Kamassies areas of the Northern Cape. A stratified sample of schools was selected for true representation of the province.

The fluoride levels for Northern Cape ranged from <0.05 to 8.2 ppm. (The average fluoride levels of major towns with centralised water supply were 0.31 to 0.35 ppm). De Aar, with borehole water supply, had a fluoride level of 0.71 ppm. The fluoride levels of two rural areas with borehole water supply were 0.2-2.5 ppm for Leliefontein and 2.4-8.2 ppm for Kamassies.

The percentage of caries-free children for 3-5 years old ranged from 25% in De Aar to 45% in Kimberley. The results of the decayed, missing and filled permanent teeth showed very low prevalence of dental caries (DMFT=0.49-1.31) in the 11-13 years of age in the whole Northern Cape Province.

There was no difference in nutritional status of the sample population in Diamond fields (Kimberley and peri-urban areas) and De Aar. According to WHO criteria, approximately 21.5% in Diamond fields and 20% in De Aar showed malnourishment or stunting (i.e. HAZ > -2.0).

Mild-to-severe fluorosis was seen in different parts of the province. Peri-urban areas in the Diamond field, Kamassies and Leliefontein areas showed higher percentage of TF Index scores of 1-4.

In conclusion, the study indicates that fluoride levels of 0.3 ppm have a beneficial effect on permanent teeth with little effect on primary teeth of children 3-5 years. Furthermore some 20.21% of children suffer from malnutrition or stunting.