USGS

WATER RESOURCES RESEARCH GRANT PROPOSAL

Project ID: 2003GU26B

Title: Speciation Studies of Arsenic in Guam Waters.

Project Type: Research

Focus Categories: Water Quality, Toxic Substances

Keywords: Arsenic speciation, solid phase extraction, stripping voltammetry, vapor generation

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Matching Funds: $0.00

Congressional District: N/A

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Abstract: Arsenic contamination in water has received significant attention over the last few years due to its carcinogenic properties. There had been reported incidences of arsenic contamination in drinking waters in the US and also internationally. USA EPA has recently revised the Maximum Contamination Level for As to 10ppb. The total arsenic concentrations in natural waters represent several forms of arsenic compounds in the environment. Speciation of the organic and inorganic forms of arsenic is often as important as total quantification because of the varying degrees of toxicity and removal mechanisms. Data available show that very little studies has been undertaken on the levels of arsenic in Guam waters while no studies on arsenic speciation. Part of the reason is the very low levels that reported for ground waters. However, a study conducted in 2001 along the springs at Tumon Bay reveal unusually high levels of arsenic. One likely source of arsenic in these spring waters would be from anthropogenic input, however, no follow up studies has been undertaken to confirm this finding. Tumon Bay is the major tourist attraction in Guam and it is where all the major hotels are located. Previous studies have shown high levels of nutrients and fecal coliform due to the high level of discharge from the hotel industries along the bay catchment area.The objectives of this study would be:

i. To investigate the levels of Arsenic in Tumon Bay and the connecting freshwater wells on Guam.

ii. To conduct speciation studies of arsenic to ascertain the levels of the different forms of As both organic and inorganic.
iii. To correlate the levels of arsenic to the likely sources.

Water samples will be collected from the Tumon Bay area and ground water well. Sampling sites will taken from some previously used sites together with new sites that will be identified in this study. Total arsenic levels would be measured using atomic absorption spectroscopy under vapor generation technique. Organic arsenic levels would be determined by solid phase extraction followed by HPLC analysis. The different oxidation states, As (III) and As (V) would be determined using stripping voltammetry. Data from these three different methods would provide a clear indication on levels and the possible sources of As. This study will provide useful information on the level of As pollution along the Tumon Bay. The data will assist the relevant authorities in monitoring and designing management guidelines to address any potential threat to the environment.
