GEOLOGIC CONTROLS ON THE DISTRIBUTION OF URANIUM AND ASSOCIATED RADON IN THE CLARENDON SPRINGS DOLOMITE (UPPER CAMBRIAN-LOWER ORDOVICIAN), MILTON, VERMONT.

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The Clarendon Springs Dolomite has been the suspected source of anomolous radon concentrations in private drinking water wells in the Milton, Vermont area for many years. In order to verify this contention, a portable Gamma Ray Spectrometer was used during field area traverses to pinpoint radiometric sources and determine the nature of their occurrence.

Three intensities of gamma emission were recorded: 1.) Background - 10 to 100 counts per second (cps) 2.) Moderate intensity - 100 to 700 cps and 3.) High intensity - > 700 cps. Background levels characterize most of the field area, moderate intensities occur as sporadic patches of small areal extent and high intensities are found only in one localized area. The high intensity gamma emissions correspond with the area of elevated groundwater radon supporting the utility of field Gamma Ray Spectroscopy as a screening tool for radon potential.

Scanning Electron Microscope and Energy Dispersive X-ray analyses of samples from moderate and high gamma emission areas revealed an association of uranium phases with detrital and authigenic minerals. In one moderate area, uranium is observed as finely disseminated, 1-5 micron sized "grains" that are associated with detrital zircon, monazite, apatite and sphene. In high intensity areas, uranium phases occur as larger "grains" that are associated with sphalerite, galena, apatite, and pyrite. High intensity occurrences appear to be controlled by dominant fracture fabrics in the bedrock.

The uranium mineralization in the Clarendon Springs is explained by the deposition of sediment containing an U-bearing accessory suite -- perhaps as heavy mineral placers. During subsequent tectonism, remobilization accompanied flushing of the fracture overprinted pore system by hydrothermal fluids.

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