CONVECTION MODEL FOR THERMAL SPRINGS IN THE SOUTHEAST

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In many areas of the world there are warm or thermal springs which have temperatures a few tens of degrees above the mean annual air temperature. Examples of these in the southeast are the thermal springs in Georgia, Virginia and North Carolina. The temperature of these springs is believed to be derived from downward circulation and heating by the normal geothermal gradient. Suitable geologic structures, such as faults and fractures provide a mode for return flow to the surface. Since the driving mechanism for this circulation may be a thermo-artesian pressure resulting from the temperature difference between the descending and ascending fluid, a model for thermal springs is developed on the basis of steady state convection in vertical fractures. It is found that the convective flow depends mainly on the fracture width and that fractures of a few millimeters in width can maintain a substantial flow. The temperature loss in the ascending fluid is probably less than 10% for fractures greater than one millimeter wide. These results are in reasonable accord with the data on thermal springs in the southeast.

USE OF ROCK PHOSPHATE IN THE TREATMENT OF ACID MINE DRAINAGE

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Preliminary tests were undertaken to determine the usefulness of rock phosphate in the treatment of acid mine drainage. Ground rock phosphate, ground limestone (<120 mesh) and a 1:1 mixture of limestone and rock phosphate were added to aliquots of acid mine water from eastern Ohio. A quarter gram of rock was added for every 100 ml of acid mine water (initial pH = 2.85, Fe = 77.5 ppm). The pH was noted at regular intervals for two hours and the total iron and phosphate were determined on a treated, filtered sample after 24 hours. The limestone treatment raised the pH to 6.8 in two hours. After 24 hours the water showed 0.09 ppm Fe and 0.17 ppm PO_4. The phosphate rock treatment raised the pH to only 2.9, but reduced the iron content to 1.35 ppm; the total phosphate in solution was only 0.16 ppm. The treatment with a 1:1 mixture of rock phosphate and limestone raised the pH to 6.8 in two hours and reduced the iron content to 0.07 ppm and the phosphate content was only 0.06 ppm. These preliminary tests indicate a mixture of rock phosphate and limestone may be superior to limestone alone in the treatment of acid mine water. Phosphate-rich sludges created by water treatment may be useful in reclamation of mined areas.

APPLICATION OF ERTS IMAGERY IN TEACHING ENVIRONMENTAL GEOLOGY

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Education for environmental geology has become an interdisciplinary effort dealing with the entire spectrum of man's use of the