

ABSTRACT

CALCITE PRECIPITATION IN LAKE POWELL

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Field and laboratory studies of Lake Powell suggest that precipitation of calcite is the most quantitatively important chemical process that alters water quality as a result of impoundment. Evidence for calcite deposition is based on (1) salt flux data at Lee's Ferry before and after construction of the dam, (2) computer processing of analytical data on water samples which indicates that the surface waters are oversaturated in calcium carbonate, and (3) x-ray diffraction determinations of calcite coating on instruments that were suspended in the lake for a period of months.

Calcite precipitation is believed to be caused by photosynthesis. The Colorado River is somewhat oversaturated in CO_2 . This condition persists because heavy loads of suspended sediment severely limit light penetration and photosynthesis. Impoundment in Lake Powell allows the settling of suspended sediment and the resulting clarification of the water favors the development of low but significant densities of phytoplankton in the upper levels of the lake. Photosynthetic withdrawal of carbon dioxide causes an increase in pH and a concomitant precipitation of calcite. Unlike marine waters, oversaturation in calcite need not be extreme in order to initiate nucleation and promote crystallization of calcium carbonate from typical Lake Powell waters.