



# UTSA® Geological Sciences

And

## Institute of Water Research, Sustainability and Policy (IWRSP)

*Seminar Presentation*

*By*

*D. Kirk Nordstrom, Ph.D.  
U.S. Geological Survey, Emeritus  
Boulder, CO.*

*On*

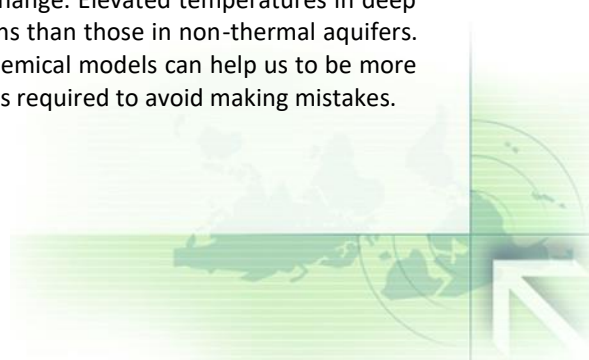
*Friday, April 23, 2021  
4:00 P.M.*

*“Worldwide occurrences of fluoride in groundwater: Some insights and mistakes to avoid”*

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### **Abstract**

Fluoride concentrations in groundwater frequently exceed the recommended limit for drinking water of 1.5 mg/L (or the new recommendation of 0.7 mg/L). More than 200 million people worldwide are estimated to be exposed to unhealthy fluoride concentrations in their water supply. The occurrence and distribution of high-fluoride groundwaters are a consequence of the (1) geological cycle of petrogenesis and (2) water-rock interactions during the evolution of groundwater aquifers. The dominant hydrogeochemical process is the formation of Na-HCO<sub>3</sub> type waters through organic matter oxidation, calcite precipitation, and ion exchange. Elevated temperatures in deep basins and in geothermal areas often give rise to even higher concentrations than those in non-thermal aquifers. Examples will be shown from USA, England, China, India, and Africa. Geochemical models can help us to be more quantitative in these interpretations, but considerable skill and experience is required to avoid making mistakes.





DR. D. KIRK NORDSTROM has 46 years experience with the US Geological Survey. Although retired since 2018 he continues his research as USGS emeritus. He has a B.A. in chemistry, an M.S. in geology, and a Ph.D. in geochemistry (Stanford University, 1977). Dr. Nordstrom is recognized internationally for his research on acid mine drainage, radioactive waste disposal, geothermal chemistry, geomicrobiology, analytical chemistry, thermodynamic data, trace element geochemistry, and geochemical modeling. He has published more than 275 papers including 2 books. He has won several awards for his research and given numerous plenary and keynote lectures at scientific meetings. He consults with state, federal, and international governments and universities on problems related to mine wastes, radioactive waste disposal, and arsenic and fluoride contamination of groundwaters.

