URANIUM OCCURRENCES AS INDICATORS OF LONG-TERM GEOCHEMICAL STABILITY IN THE FINNISH BEDROCK

by

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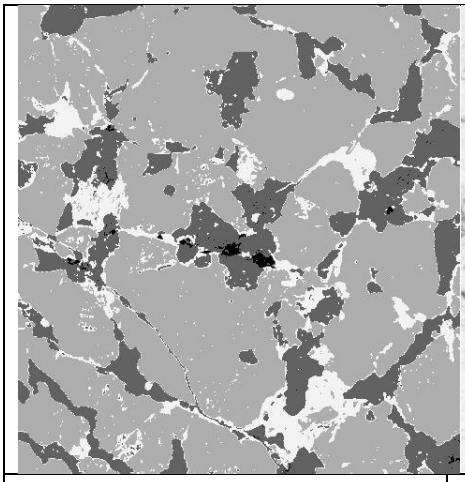
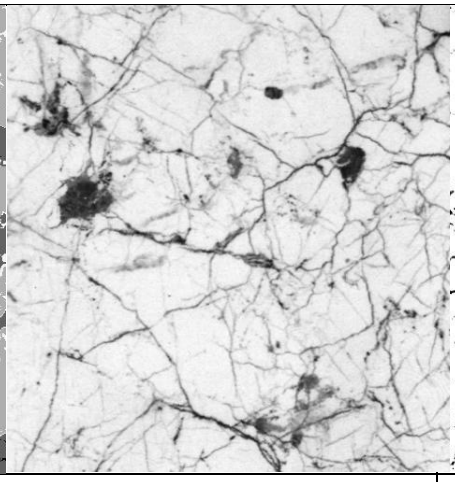
One of the major challenges in the field of geological disposal of spent nuclear fuel is to show confidence in the long-term safety of the repository system. For this, the conditions in the bedrock should remain stable and favorable to the long-term behavior of engineered barrier system and be easily re-established should any disturbance occur, as for example, the intrusion of dilute water during or after glacial periods. In our presentation, using the age of the findings of uranium minerals associated to the rock matrix structure we can state with confidence that 1) oxygen penetrates in the bedrock to a maximum of a few tens of meters, 2) dilute/fresh water is buffered also with a few tens of meters and even within a few meters, 3) the structure of the rock matrix contributes to transport retardation by offering on one hand large reactive surfaces, and on the other hand by making the transport travel times larger (See Figure below).



Petrographic map:
Chemical staining; light grey = K-feldspar, white = plagioclase, dark grey = quartz and black biotite



Porosity map
C-14-PMMA autoradiography

Uranium map
α-tracks on CR-39 polycarbonate film

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