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Potential and existing uranium resources of the Middle East and North Africa

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This study integrated evidences from structural frameworks, geologic environments and geochemical-metallogenic indicators for uranium deposits to predict some uranium-bearing provinces in the studied countries (Egypt, Iran, Iraq, Jordan, Saudi Arabia, Sudan, Syria, Turkey, UAE, Oman, Qatar, Kuwait and Yemen, Algeria, Libya, Morocco and Tunisia). The study found that the Pan-African granites are one of the most suitable environments to host vein type uranium deposits. The uranium mineralizations are hosted in these granites within some favorable structures such as faults and fractures. The uranium minerals are mainly secondary (primarily uranophane) and occasionally some pitchblende and uraninites are present. They are associated with sulphide as pyrite, chalcopyrite, galena, sphalerite and molybdenite. The gangue minerals are mainly iron, manganese oxides and fluorite. The most associated alteration features with this gangue are hematitization, silicification with black silica veins, carbonatization and the presence of fluorite. Volcanic rocks represented another potential source for uranium in many of the studied countries. The volcanics range in age from 74 to 302 MY and some of them host uranium or uranium/thorium mineralization. The presence of intra-cratonic basins is also observed within many basement rock exposures in the study area. Often these basins are filled with late-Proterozoic molasses-type sediments such as the Hammamat series in Egypt, and can form important uranium traps according to their geochemical and geological characteristics. This feature is well known in many of the studied countries especially in Algeria, Egypt and Saudi Arabia.

The present study also documented evidence of the presence of intra-cratonic basins filled with Paleozoic sequences; the lower horizons of these sequences have potential for hosting uranium resources. This was noted in Libya (Morzok basin) and in Egypt (Wadi El Kharite basin). The Unconformity uranium deposits could exist in some countries such as Algeria and Egypt. Good potential was found in Paleozoic rock sequences in many of the studied countries.

In addition, surfacial uranium deposits were reported in Jordan nearby some uranium-bearing phosphate deposits. Phosphorite belts in North Africa and the Middle East can form additional non-conventional uranium resources in several geographic regions. Black shales nearby the phosphorites can contribute to the uranium resources in many of these countries if studied thoroughly. Other potentials and related evidence for uranium deposits in the MENA region are also summarized in this work with detailed with maps, data, coordinates, and analyses.