

### 18.3 Optimal Use of Oil Shale in Jordan Considering the Uranium Substance

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The major oil shale deposits in the Middle East are located in Jordan. Some of these deposits explored in central Jordan are mainly on the surface with average thickness of 1.5 m with overburden of about 0.5 m. It is said now that they are rich in uranium. The carbonate rocks that carry the uranium and kerogen are fine-grained & brittle and hence easy to mine with minimum hazard from radon. Due to scarcity of water, the tendency should be directed to use suitable technologies that may be convenient to Jordanian oil shale deposits whether for in-situ conversion and/or ex-situ retorting. In the same time, coordination is needed to use these oil shale rocks for both extracting uranium and then continue with extracting shale oil and gas while adding value in the proper use of the spent shale in chemical, medical and other construction industries. In Jordan, we are witnessing a debate on energy security and the optimal use of our resources. A strategic plan is sought to tackle this issue. With the introduction of nuclear energy that depends on the oil shale deposits that contain uranium mineral, the question of oil shale became a three fold issue. The prime objective is to extract uranium and the second objective is to produce shale oil to produce oil while the third significant purpose is to properly use the spent shale. The residue (spent shale) contains about 10% carbon that can be used to treat calcium carbonate and transform it by heat into calcium oxide (lime) and carbon dioxide. Lime is then used as construction material or in the cement industry as well as for other uses. All or most of the produced carbon dioxide could be further used in another stage of soda ash production. By this we honor the regulations of environmental restrictions. As a *green* industry, it is feasible as well as practical to control and use carbon dioxide whether it is the product of direct burning of oil shale or from the retorting process of shale oil. After extracting uranium, the focus on the production of oil from the oil shale will form a misleading indicator on the oil shale industry if the benefits from utilizing the spent shale were not taken into consideration. It is concluded that spent shale is an added value in the oil shale industry that employs surface retorting. Three major industries are enhanced and developed such as the production of soda ash, ammonium sulfate and potassium sulfate. The spent shale could also be used in cement and building industry and construction products. By adapting this model, carbon dioxide is no longer a problem for the environment. Most of the produced quantities could be used the industrial processes as will be fully presented in the paper.