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Advances in oil shale technologies for potential application in U.S. oil shale resources

Peter Crawford¹, James Killen², Emily Knaus¹

¹*INTEK Inc, Arlington, VA, United States*, ²*U.S. Department of Energy, Washington, D.C., United States*

The United States has the largest and most concentrated deposits of oil shale in the world - in excess of 6 trillion barrels, 600 to 800 billion barrels of which may be economic to recover. However, these resources have not been tapped due in part to the lack of a demonstrated commercial technology. To help illuminate the technology issue, in 2007, and again in 2008, the U.S Department of Energy, Office of Naval Petroleum & Oil Shale Reserves, identified and profiled oil shale technologies that are being pursued in the private sector. The Report also identifies where further research, development, and demonstration are needed. DOE's most recent Report, dated August 2008, and titled "Secure Fuels from Domestic Resources: The Continuing Evolution of America's Oil Shale and Tar Sands Industries," profiles the in-situ and ex-situ technologies of 29 U.S. companies presently engaged in oil shale research and development. Some of the technological advances that are being pursued include reduced water use, improved energy efficiency, lower emissions (including lower CO₂), reduced surface impact, more effective management of spent shale disposal, and more effective groundwater protection. The vast scope of these undertakings, and the large sums of money required to fund them, suggests there is considerable confidence in the private sector that economic and environmentally acceptable oil shale technology is possible in the near to intermediate term. This paper will provide a description of the technology being developed along with development status. Notable examples include in-situ heating technology (direct current, downhole heaters, heated gas injection, etc.), hybrid technology (e.g., in-capsule), and fluidized bed and rotating kiln technology for surface retorting. The paper will also address the specific attributes of the technology options relative to development challenges.