URANIUM POTENTIAL IN THE TEXAS GULF COASTAL PLAIN

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The potential for large new uranium deposits in the Tertiary rocks of the Texas gulf coastal plain is greatest in the deeper subsurface in an area southeast of the known deposits in Karnes, Live Oak, and Duval Counties, extending to the vicinity of the present coast. This area, favorable because of the thick Catahoula Tuff (Miocene) section and the geologic history of paleo-aridity, has not been extensively explored below depths of about 100 m and may yield several new large deposits.

This assessment of the uranium potential is based on the assumption that any new deposits will be geologically and geochemically similar to those known in the area. Other types are not considered. Various evidence, both geologic and geochemical, indicates that the Catahoula Tuff is the ultimate source of uranium for these deposits. The Whitsett Formation (upper Eocene), the Catahoula Tuff, and the Oakville Sandstone (Miocene) are the principal uranium host rocks in the south Texas coastal plain. The outcrop area of these formations and related rocks from Gonzales and DeWitt Counties southwestward to the Rio Grande river has been thoroughly explored on the surface and to a depth of about 100 m and probably will not produce any large deposits not already known to the industry.

The part of the coastal plain northeast of Gonzales and DeWitt Counties is less promising because the Catahoula is much thinner and may contain less volcanic ash in this area. Furthermore, paleoclimates, like the present climate, may have been less arid to the northeast, creating conditions geochemically less favorable for the formation and preservation of large uranium deposits. Some small deposits are known from this area and others will probably be found.

FRONTIER URANIUM EXPLORATION IN THE SOUTH CENTRAL UNITED STATES

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Selected areas of the South Central United States outside the known uranium trends of south Texas have a largely untested potential for the occurrence of significant uranium mineralization. These areas, underlain by Tertiary and older sediments, include parts of Texas, Arkansas, Louisiana, Mississippi and Alabama. The commonly accepted criteria employed in uranium exploration are applicable to these "frontier" areas but special consideration must also be given to the atypical geologic aspects of such areas as they may apply to relatively unique types of uranium mineralization or to the development of special exploration criteria for common types of roll-front and fault-related uranium mineralization.

The procedures involved in evaluating "frontier" areas should be based on comprehensive evaluations involving: 1) location and analysis of potential source rocks (e.g. intrusive igneous rocks, bentonitic sediments, unique complexes, etc.); 2) definition of regional variations in the potential host sediments (e.g. marginal marine to nonmarine environments of deposition); 3) review of all available radiometric data in Tertiary or associated rocks; 4) local ground-water sampling (using a specific suite of major and minor elements selected on the basis of the regional ground-water geochemistry; 5) widely-spaced reconnaissance (or stratigraphic) drilling, coring and borehole geophysical logging to define favorable sedimentary facies and to establish the specific lithologic character of the sediments; and 6) detailed petrographic evaluation of all available samples to define the environment of deposition and diagenetic history of "favorable" sediments.

If two or more of the above procedures produce favorable results, suggesting that conditions for the formation of uranium mineralization are present in the area under consideration, an extensive drilling program is justified. Drilling should test the target formations evaluated during the initial exploration stage. Depths up to 3000 feet should be anticipated if up-dip information is favorable. Selected areas are discussed that have: 1) favorable source and host rocks; 2) favorable age; 3) favorable regional and local structure; and 4) radiometric characteristics favorable for uranium mineralization of potentially economic grade and reserves in the areas.

URANIUM IN SITU LEACHING IN THE TERTIARY DEPOSITS OF SOUTH TEXAS

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The exploitation ot Texas Uranium deposits of the Eocene, Miocene and Pliocene series by in situ leaching methods is in progress at six locations in Webb, Duval and George West counties. The mineralogy, geochemistry, physical qualities of the host sandstones, and local groundwater conditions vary with each deposit but are compatible with the dissolution chemistry of alkaline type leaching agents.

A classification chart is presented showing the relationship between geologic formation, permeability, calcite, quartz, clays, pyrite, organic carbon and leaching processes.

LIGNITE EXPLORATION IN THE GULF COAST

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In order to establish a meaningful exploration program, a three-prong approach should be utilized. The first stage is the targeting of the areas of exploration. This stage includes
review, review of water-well information, review of oil well data, and meetings with local geologic surveys. The second stage is the actual drilling. At this preliminary stage, the goal of drilling is to define the areas of lignite which would tend to be most likely commercial. In order to minimize costs, drilling should be done on roughly 1 - 1½ mile centers. The third and final stage is the data compilation. At this point the geologist must complete his final seam correlations in order to map the subsurface to establish the preliminary reserves. Various techniques are employed in this type of program, which includes use of computers, as well as various drafting and reproduction processes.