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## **AN ASSESSMENT OF HYDROCARBON AND GEOTHERMAL RESOURCES ON FEDERAL LANDS IN WESTERN WASHINGTON STATE**

An Eocene depositional system has created some elements of an effective hydrocarbon system. A wedge of sediments was deposited west of an ancestral Cascade Range, including coal-bearing sequences found in the Puget Lowland. To the west, the terrestrial deposits pass into marginal marine and shallow marine deposits. Syn-depositional normal faulting is present within these basins, and strike-slip faulting is particularly evident in the Bellingham basin. Eocene volcanism appears to effect patterns of sedimentary deposition. Subsidence and sedimentation during the Miocene buried potential source and reservoir intervals. A low geothermal gradient typifies the center of the Puget Lowland, and thus coals are generally of bituminous rank. Minor subsidence and sedimentation during the Pliocene was followed by extensive glaciation during Pleistocene time. At present the northern Puget Lowland experiences significant active faulting.

The petroleum system in the Puget Lowland is gas prone. Eocene coals and carbonaceous claystones are considered to be gas-source intervals. Eocene fluvial sandstones overlain by intra-formation claystones form potential reservoir-seal couplets!. Syn-depositional faulting and Miocene faulting created potential trapping geometries. Miocene and later burial led to maturation of the gas-prone source interval in areas of deeper burial. Sub-basins within the Puget Lowland are considered to have medium to high potential for commercial gas accumulations. The southern Washington Cascades is considered to have medium to high gas potential. This region is underlain by the "Southern Cascade Conductor", a geophysically defined feature which is interpreted to indicate presence of a sedimentary sequence buried beneath the volcanic cover.

The Eocene coals in the Puget Lowland are considered to be potential targets for CBM production. High CBM potential is also identified beneath the volcanic deposits on the western side of the Cascades. An area of medium potential is identified beneath the Southern Cascades.

Each Quaternary composite volcano is considered to be located within a region of high geothermal resource potential. Two additional areas of high potential are identified in regions where thermal springs are identified in the central and southern Cascades.