11:45 AM Hulen, Jeffrey B.

OIL-BEARING, CARLIN-TYPE GOLD DEPOSITS IN THE SOUTHERN ALLIGATOR RIDGE DISTRICT, NEVADA -- EVIDENCE FOR GOLD MINERALIZATION AND OIL-RESERVOIR EVOLUTION IN A MODERATE-TEMPERATURE GEOTHERMAL SYSTEM

HULEN, Jeffrey B., and WAVREK, David, Earth Sciences and Resources Institute, Department of Civil and Environmental Enginering, University of Utah, 1515 East Mineral Square, Salt Lake City, UT 84112

Carlin-type, disseminated gold deposits in the southern Alligator Ridge (SAR) district contain considerable quantities of oil. The deposits are hosted by fractured and altered Paleozoic siltstones and limestones near the crest of a gentle anticline and sealed above by shales and hydrothermal clays. Oil in an around the deposits occurs as fluid inclusions in hydrothermal vein calcite and quartz, and as fracture coatings in unoxidized host rocks. Petrographic analysis and pressure-corrected homogenization temperatures suggest that the oil inclusions and coexisting dilute aqueous (<3.5 wt% NaCl equiv.) inclusions were trapped in the temperature range 60-160°C, with most between 100 and 120°C. There are no secondary minerals in the deposits indicating, unambiguously, paleotemperatures higher than this range. Temperature-dependent biomarker transformations preserved in fluid inclusions likewise suggest that the oils were probably never heated above about 120°C. These are unusually low temperatures for Carlin-type deposits, but identical to those prevailing in nearby, geologically similar, producing oil fields which coincide with and appear to have formed in actively convecting, amagmatic geothermal systems. We suggest that in the SAR, one or more such moderate-temperature systems may have (1) caused the generation of oil from otherwise (regionally) submature hydrocarbon source rocks; (2) transported oil to entrapment sites in thermal fluids at times enriched in gold and affiliated metals; and (3) formed an oil reservoir, at some point during the filling of which gold was also locally deposited. The role of hydrocarbons in actually transporting gold or focusing mineralization, if any, remains to be determined.