

### Rhenium-Osmium Geochronology of Phosphoria Oils, Big Horn Basin, Wyoming

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The Permian Phosphoria Formation (eastern Idaho/western Wyoming) is estimated to have generated petroleum between the Late Triassic and Early Cretaceous. These Phosphoria-sourced oils now reside in Laramide structures throughout Wyoming and parts of Colorado and Utah. We applied rhenium-osmium (Re-Os) geochronometry to Phosphoria-sourced oils in the Big Horn Basin, Wyoming, to determine whether the radiogenic age reflects the timing of petroleum generation or the age of the source rock. Preliminary results show that the majority of the oils are enriched in Re (1 - 300 ppb) and Os (100 - 4400 ppt), and yield an isochron age of  $260 \pm 37$  Ma. This Permian Re-Os age matches that of the source rock, but there is considerable scatter about the isochron (mean square of weighted deviates, MSWD = 814). For isotopic data to yield a linear array, all samples must have formed at the same time, possess the same initial  $^{187}\text{Os}/^{188}\text{Os}$ , and not be affected by any post-formation geochemical alteration. The scatter in the Phosphoria oil Re-Os data reflects variations in the initial  $^{187}\text{Os}/^{188}\text{Os}$  of the oil, which may relate to the  $^{187}\text{Os}/^{188}\text{Os}$  of the source rock at the time of deposition. The data also suggest that oil, in some cases, can record the age of the source rock and not the timing of generation. In contrast, Re-Os data for samples of Phosphoria oils from Torchlight field, Big Horn Basin, yield a Miocene age ( $9.30 \pm 0.67$  Ma, MSWD = 0.65). This young age may reflect the timing of alteration by thermochemical sulfate reduction, which has been proposed to affect oils from the Torchlight and nearby fields. Although these preliminary results are promising, research is continuing to reach a full understanding of the Re-Os isotope geochronometry, and how it relates to petroleum.