

4.2 **Misting 101: How to maximize shaft retorting yields**

Larry Southwick

L. M. Southwick & Associates, Cincinnati OH, United States

The classic early developers of shaft oil shale retorts recognized that to maximize thermal efficiency in their processes, they had to recover as much heat as possible from the product oil before it left the top of the retort. Thus the cooler the top gas, the more heat recovered.

However, if the gas is cooled too much it condenses and the shaft of descending solids is a perfect collector for that condensed oil, recycling the oil back down the shaft, eventually losing the heavier fractions and leading to decreased oil yields. Further testing also discovered that in the conditions existing in the Gas Combustion retort, the condensation would be in the form of a mist. Work on the mechanism of mist collection by the particles of shale revealed a rather simple solution to avoid this oil lost. Their description of the misting phenomena is in the early US Bureau of Mines reports, and the issues were studied further and reported in the Six Company and Seventeen Company ventures, and of course an alternative solution was implemented in the Modified Paraho retort. Later shaft retorts (and some other types) have not been designed to mitigate misting leading to process disruptions. The early studies of the misting phenomena will be presented, how they led to various developments, and what current retort developers should bear in mind in setting up their processes. How the misting phenomena also led to an increased interest in other oil shale processes, such as Tosco and fluid beds, and explained some failed processes (Union B), will be explained. Parallels in other mineral processing operations will also be discussed.