

Integration of large scale retorting operations with laboratory testing and analyses

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Commercial oil shale development is very expensive, but there have been cases where extensive development testing has been done on a large scale without sufficient, preliminary, small-scale laboratory and bench scale testing. In addition, when large-scale operations are being done, laboratory analyses and testing can be closely integrated with pilot plant and semi-commercial operations to reduce their extent and duration and to provide needed chemical information.

Tosco Corporation conducted retorting testing from the smallest laboratory scale up to pilot plant and 1,000 ton per day operations. Parallel laboratory feed testing, using the Total (Tosco) Material Balance Fischer Assay (TMBA), was done to compare product yields and properties obtained on large-scale operations with yields and product properties obtained on a 100-gram scale. Since all the products from TMBA retorting were contained and measured, it was possible to obtain balances for organic and inorganic carbon, nitrogen, sulfur and enthalpy and compare them with balances obtained from larger scale operations. An organic carbon balance was particularly useful in following the fate of the kerogen. TMBA testing and product analyses provided a useful baseline for comparisons.

Retorting processes will be discussed where heat is variously supplied by externally heated solids, internal combustion, heated gases and by a variety of in situ means. Yields and chemical and physical properties of products will be compared. The use of laboratory testing and analyses for process guidance will be reviewed.