

Chemistry and mineralogy of Mae Sot Basin oil shale, Thailand

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The Department of Mineral Fuels, Government of Thailand selected ninety oil shale samples from potentially oil-rich horizons of interest in ten boreholes in the Mae Sot Basin (Thailand) for characterization by the Colorado School of Mines and UMATAC Industrial Processes, ATP Systems. The samples were analyzed for Fischer Assay, Rock-Eval Pyrolysis and bulk mineralogy. Twelve composite samples of core from the same group of boreholes were run through the bench scale ATP Process retort at UMATAC, and analyzed for oil yield as well as pre- and post-retort mineralogy. Programmed pyrolysis and Fischer Assay data by Weatherford Laboratories provide the following results:

<i>Parameter</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Minimum</i>	<i>Maximum</i>
Total organic carbon (TOC wt%)	7.80	4.52	2.50	27.74
S ₁ (mg-HC/g-rock)	1.66	1.71	0.16	9.44
S ₂ (mg-HC/g-rock)	77.93	51.82	16.90	337.83
S ₃ (mg-HC/g-rock)	1.50	0.787	0.780	7.53
T _{max} (°C)	430	11.6	401	446
Hydrogen Index (mg-HC/g-TOC)	956	132	558	1216
Oxygen Index (mg-CO ₂ /g-TOC)	24.00	20.61	6.50	192.70
Fischer Assay Oil Yield (wt%)	6.71	4.92	0.76	27.31
Water Yield (wt%)	3.61	0.78	1.99	6.66
Oil Density (g/cm ³)	0.878	0.022	0.845	0.935

The organic matter is immature Type I (lacustrine) kerogen. Mineralogy of the samples indicates the oil shale consists of argillaceous mudstone and calcareous to Fe-dolomitic marlstone, with variable quartz, feldspar and analcime content. Clay in the composite samples consists of illite, illite-smectite, and kaolinite with minor chlorite. ATP retort results indicate lean to rich oil shale (up to 351 liters/ton), and waxy crude with densities ranging from 0.861-0.921. The low moisture content indicates no pre-drying would be required, and the coke content (4.21-7.39 wt%) is sufficient to make an ATP retort self-sufficient in heat content. Ash from the retort could be mixed up to ~28% in cement clinker feedstock.