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Process integration for the retorting of oil shale fines

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A process model for pyrolysis and combustion of oil shale fines using a solid heat carrier technology is linked with related models for oil shale drying, oil condensation and fractionation, power generation, cooling utility, and water treatment to create a comprehensive, plant-wide process simulation model. Particle size fractions are tracked to include the simulation of particle segregation, entrainment, and attrition. Secondary pyrolysis reactions for vapor phase cracking and heavy oil coking are included to predict oil yield and oil quality. The steady-state model is used to evaluate process integration concepts, technology alternatives, and operating variables on oil yield, net power generation, heat utilization, emissions, water consumption, and economics.