

EMISSIONS FROM HEAVY-DUTY DIESEL ENGINE WITH EXHAUST GAS RECIRCULATION USING OIL SANDS DERIVED FUELS

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ABSTRACT

The oil sands deposits in Alberta contain approximately 1.6 trillion barrels of bitumen, a naturally occurring viscous mixture of hydrocarbons. Approximately 20 percent of these bitumen reserves are recoverable with current technology. In 2002, the Canadian oil sands industry produced approximately 800,000 barrels of bitumen and bitumen-derived crude oil per day, and production is expected to increase to almost 2 million barrels per day by 2011. It is estimated that up to 75 percent of the oil sands production in 2011 will be exported to the U.S. market.

The presentation will discuss the unique characteristics and properties of oil sands derived crude, which reflect the bitumen source and the upgrading processes that the bitumen undergoes, as well as the emissions behavior of diesel fuels containing oil sands components.

In a recent study, the exhaust emissions from a single-cylinder version of a heavy-duty diesel engine with exhaust gas recirculation (EGR) were measured using 12 diesel fuels derived from oil sands and conventional sources. Exhaust emissions were measured using the AVL eight-mode steady-state test procedure. Particulate matter (PM) emissions for all test fuels were accurately modeled by a single regression equation with two predictors: fuel total aromatics and sulfur content. Similarly, NO_x emissions were found to depend on fuel total aromatics and density. In summary, the PM and NO_x emissions were significantly affected by key compositional fuel properties, but the crude oil source did not play a role.