On-site Analysis of Environmental Air and Water Samples at a SAGD Oil Production Facility (Statoil) in Northern Alberta using MIMS

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A portable ion trap (Griffin 400) was modified to include a He flushed membrane interface. The membrane introduction mass spectrometer (MIMS) was plumbed to enable the analysis of both aqueous and gaseous analytes. Lead acid batteries provided over 10 hours of daily field portability for real-time, on-site analysis of environmental samples in Northern Alberta's oil sands. Data were primarily collected at Statoil's Leismer SAGD (Steam Assisted Gravity Drainage) site in June 2010 and Sept 2010 prior to oil production, and June 2011 just after the site's 1 millionth barrel of oil was produced. For comparative purposes, data were collected at water bodies and air sampling locations adjacent to various surface mining facilities operating near Fort McMurray, Alberta. Both single point (from grab samples) and timeseries data sets were produced. Further, samples of bitumen, steam condensate, and other SAGD reagents were collected from the Leismer production facility for lab analysis. Gaseous samples were infused with deuterated toluene (toluene-D8) via a thermally regulated permeation tube. The toluene-d8 signal acts as an internal standard enabling the operator to monitor instrumental artifacts that may affect signal intensity. MIMS data were correlated with meteorological and positional data and used to produce data analysis products using a Google Earth interface.