

## Assessment of CO<sub>2</sub> Sequestration Potential through Enhanced Oil Recovery in the North Slope of Alaska Oil Fields

Umekwe, Maduabuchi <sup>\*1</sup>

(1) PETE, UAF Fairbanks, Fairbanks, AK.

A US-DOE study in 2005 identified 21 major oil fields containing above 95% of oil in the North Slope of Alaska. This study investigates the storage of CO<sub>2</sub> into these 21 fields while improving oil recovery.

These fields meet the criteria for application of miscible and immiscible CO<sub>2</sub> enhanced oil recovery methods and contain about 40 billion barrels of oil after primary and secondary recovery (DOE, 2005). Volumetric calculations from this study illustrate that 3 billion metric tons of CO<sub>2</sub> could be sequestered upon a complete recovery of the oil in all 21 fields. A ranking produced from this study, mainly controlled by field size and fracture gradient, identifies Prudhoe, Kuparuk and West Sak as possessing the largest storage capacities. This storage capacity includes a 20% safety factor to ensure that the formations are not over-pressurized to create or extend fractures and result in gas leakage during the storage process.

Simulation studies were carried out via CO<sub>2</sub>-Prophet to find the amount of oil technically recoverable and CO<sub>2</sub> gas storage possible during this process. Fields were categorized as miscible, partially miscible and immiscible based on the miscibility of CO<sub>2</sub> with their crude. 7 sample pools were selected across these categories for simulation study. Water alternating gas (WAG) injection ratio and minimum miscibility pressure (MMP) were among the main inputs in these simulations. Ranking these fields showed most recovery and storage potential in miscible pools like Alpine and Tarn, then partially miscible pools like Prudhoe and Aurora and lastly immiscible pools like West Sak and Orion. The study concludes that 5 billion metric tons of CO<sub>2</sub> can be stored while recovering 14.2 billion barrels of the remaining oil in the fields.