

Abstract Submitted
for the DFD10 Meeting of
The American Physical Society

Transition from Selective Withdrawal to Light Layer Entrainment in an Oil-Water System JOEL HARTENBERGER, TIMOTHY O'HERN, STEPHEN WEBB, Sandia National Laboratories, DARRYL JAMES, Texas Tech University — Selective withdrawal refers to the selective removal of fluid of one density without entraining an adjacent fluid layer of a different density. Most prior literature has examined removal of the lower density fluid and the transition to entraining the higher density fluid. In the present experiments, a higher density liquid is removed through a tube that extends just below its interface with a lower density fluid. The critical depth for a given flow rate at which the liquid-liquid interface transitions to entrain the lighter fluid was measured. Experiments were performed for a range of different light layer silicone oils and heavy layer water or brine, covering a range of density and viscosity ratios. Applications include density-stratified reservoirs and brine removal from oil storage caverns. Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

Timothy O'Hern
Sandia National Laboratories

Date submitted: 30 Jul 2010

Electronic form version 1.4