

**ROLE OF BACK DIFFUSION AND BIOGEOCHEMICAL REACTIONS
IN SUSTAINING AN MTBE/TBA PLUME IN ALLUVIAL MEDIA**

Ehsan Rasa

Kate Scow

Nicholas R. de Sienes*

Douglas Mackay

University of California, Davis
PES Bldg, One Shields Avenue
Davis, CA 95616

Voice: 530-574-8193

Fax: 530-752-1552

erasa@ucdavis.edu

Steven Chapman

University of Guelph, School of Engineering
Guelph, Ontario, Canada

Barbara Bekins

United States Geological Survey
Menlo Park, CA

An MTBE/TBA plume originating from a gasoline spill in late 1994 at Vandenberg Air Force Base (VAFB) persisted until 2010 (for over 15 years) within 200 feet of the original spill source. The plume persisted despite excavation of the tanks and piping within months after the spill (early 1995), and removal of additional contaminated sediments in the source area in excavations in 2007 and 2008, i.e. 13 and 14 years after the spill. We estimated the probable history of MTBE concentrations along the plume centerline at its source using a wide variety of available information, including published details about the original spill, excavations and monitoring by VAFB consultants, and our own research data. Based on the results of site characterization and tracer tests indicating a thin aquifer with silt layers above and below it and an MTBE/TBA plume many times wider than the aquifer thickness, we conducted 2-dimensional reactive transport simulations of MTBE along the plume centerline for 20 years following the spill. Our analysis suggests that MTBE diffused from the thin anaerobic aquifer into the adjacent anaerobic silts and transformed to TBA in both aquifer and silt layers. At a later time TBA was the dominant solute, diffusing back out of the silts into the aquifer and sustaining plume concentrations much longer than would have been the case in the absence of such diffusive.

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