Fate and Transport of Chemicals from

the Micron-scale to the Kilometer Scale

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Researchers in the NRDP Center have conducted research that addressed local and national challenges, including the Exxon Valdez oil spill, the Deepwater Horizon spill, natural gas extraction from shale, and Hurricane Sandy. In most cases, their approach relied on understanding processes at the small scale, modeling them using mechanistic mathematical models, and upscaling the results to develop turn-key solutions. The talk will point out the latest projects on modeling the behavior of oil due to turbulence, the movement of waves and their effects on the exchange flux between groundwater and open water, and using multifractals to quantify spatial variability.

Dr. Michel Boufadel is a Professional Engineer in Pennsylvania and New Jersey, and a Professional Hydrologist as accredited by the American Institute of Hydrology. He is also a Fellow of the American Society of Civil Engineers (ASCE). Dr. Boufadel served recently on two National Research Council (National Academies) committees: "An ecosystem services approach to evaluate the impact of the Deepwater Horizon spill on the Gulf of Mexico", and "Evaluation of effective daily recovery capacity" of oil spills. He also served on the Environmental Protection Agency (EPA) Science Advisory Board on natural gas extraction from shale formations (2011-2012). Dr. Boufadel has more than 90 refereed articles in environmental engineering and science publications, such as NATURE geosciences, Environmental Science and Technology, and Environmental Fluid Mechanics. He is Associate Editor for the Journal of Environmental Engineering, ASCE, and Associate Editor for the American Institute of Mathematical Sciences (AIMS) in Environmental Science.