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Preface

Air sparging is a maturing technology which has gained wide acceptance and application over the past decade for cleanup of contaminated groundwater. Its increasingly common usage in site remediation continues despite the fact that substantial uncertainties remain in our understanding of subsurface air flow behavior and associated contaminant removal. Uncertainties also remain in our understanding of the role of air sparging in promotion of aerobic biodegradation (or its inhibition of anaerobic biodegradation). The potential roles of air sparging in hydraulic containment through sparging-induced reduction of hydraulic conductivity, or in contaminant spreading due to hydraulic mounding, have also been subject to large uncertainties. While the frequency of the application of air sparging attests to the frequency of its success in site cleanup, these uncertainties have also frustrated many practitioners who achieve results contrary to expectations.

In this Special Issue of the journal, I have gathered a variety of papers by leading air sparging researchers and practitioners which, together, summarize the current state of knowledge regarding air sparging, and point the way towards methodologies for resolution of the remaining uncertainties in our technical understanding. The factors governing the effectiveness of air sparging in groundwater remediation are identified and examined in detail through review and evaluation of field studies, laboratory research and mathematical modeling. As seen in these articles, these factors range from the characteristics of the porous medium itself to operational procedures for implementation of air sparging systems. Understanding of these factors is critical to design of effective air sparging systems for site remediation, prediction of system performance, and evaluation of system results.

The resulting collection of articles in this Special Issue provides significant advancement in our understanding of many of these factors governing air sparging effectiveness. Taken as a whole, the articles present a set of practical recommendations for design and evaluation of air sparging systems, as well as areas for additional fruitful research.

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