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Book reviews

UNEP Industry and Environment

United Nations Environment Programme, Paris, France, Quarterly Journal, US$ 60.00, 8.5 × 11 in. Format, 70 pp., Vol. 23, No. 4, ISSN: 0378-9993

To date, I have not published reviews of publications other than books. This review is the first for a periodical.

I have just read my copy of the latest issue of UNEP Industry and Environment, a quarterly periodical I have received for several years. Like all others, the issue focuses on a single topic with articles contributed world-wide. Like all other issues, it is excellent, covering the topic on hand thoroughly, fairly and understandably with contributions from several different countries.

This 70-page issue covers the new topic of "sustainable mobility" and focuses on the energy used and air quality issues of transportation comparing marine, rail and road routing in different countries (and continents). Articles in the issue came from the US, Germany, Sweden, UK, Canada, France (published in French, the only other language of published papers other than English), Botswana, Belgium and Australia. Most articles are relatively short (compared to ones found in The Journal of Hazardous Materials and other periodicals). The sixteen papers take up 50 pages, but the topics are covered well. Each article is well-illustrated with photographs, tables and figures.

Following the main articles are short sections on World News, Industry Updates, UNEP Focus and books and reports. An environmental professional wishing a world-wide perspective on environmental issues would be well-advised to subscribe to UNEP Industry and Environment.

Gary F. Bennett

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Subsurface Contamination Monitoring Using Laser Fluorescence

Jonathan E. Kenny, Jane W. Pepper, Andrew O. Wright, Yu-Min Chen, Steven L. Schwartz, Charles G. Shelton (Authors); Katherine Balshaw-Biddle, Carroll L. Oubre, C. Herb Ward (Eds.), Lewis Publishers, Boca Raton, FL, 2000, US$ 64.95, 160 pp., ISBN: 1-56670-481-2

Funded by a US Department of Defense/Advanced Applied Technology Development Facility Grant, this Rice University-guided project selected 12 projects for study. This book is one of 10 books that resulted from that project.

The project's goal was to evaluate a subsurface by hydrocarbon monitoring scheme described as follows.

A new laser-induced fluorescence (LIF) probe developed by researchers at Tuft's University identifies and semiquantifies classes of hydrocarbon compounds in contaminated subsurface soils. The probe is advanced into the subsurface using cone penetrometer testing (CPT) equipment and identifies hydrocarbon classes by use of a multichannel excitation–emission matrix (EEM). The LIF–EEM instrumentation is capable of assessing common subsurface hydrocarbon contaminants at depths up to 50 ft. The technique allows for the collection of significant amounts of subsurface information, surpassing conventional data collection methods that can be used to rapidly identify areas of concern beneath a site. The technology has significant application for environmental assessment and remediation programs and has potential applications for monitoring various manufacturing processes and industrial wastewater operations.

This monograph describes the development, testing, and performance of the Tuft's LIF–EEM instrumentation and summarizes the applicability of the technology.

Field test results of the LIF–EEM instrumentation provide reasonable grounds for optimism that the system will be capable of providing in situ, semiquantitative hydrocarbon classifications. Promising linear correlations of LIF–EEM data and analytical measurements (total petroleum hydrocarbons, diesel range organics, and naphthalene) have been observed in a limited number of soil types from two test sites. The use of multivariate statistical methods to classify and semiquantify groups of aromatic compounds also appears promising, although test results were limited to the semivolatile compounds that were present in the tested soil samples.

Compared to conventional soil sampling and laboratory analyses, LIF–CPT has proven to be a rapid, cost-effective approach to environmental site characterization and monitoring. It provides real-time data collection for mapping contaminant distribution in the subsurface, which surpasses conventional data collection methods.

The body of the book contains six chapters encompassing about 70 pages that describe the development and testing efforts:

- *LIF (Laser-Induced Fluorescence)–EEM (Excitation–Emission Matrix) Engineering Design*: As the chapter title suggests, this chapter deals with the basics of design of the monitoring instrument selection of wavelength, system components, etc.
- *Summary of Technology Demonstration*: The chapter describes the field work at two test sites (air bases).
- *Data Interpretation and Evaluation*: The chapter describes the comparison of field and laboratory results.
- *Outlook*: The future is projected including development goals to improve instrument stability and laser interest among others.
- *Applicability of the LIF–EEM Technology*: This chapter notes that the instrumentation is useful for all fluorescent organic contaminants and inorganic materials.
- *Comparison with other LIF Systems*: This device was compared to the US DOD Site Characterization and Analysis Penetrometer System and Fugro Geosciences' Rapid Optical Screening Tool.

As is common with the books (reports) in this series, a major fraction of the book is taken up by appendices which contain the relevant details of the research and development. This book has three such appendices entitled as follows:

1. Design Manual for the Laser-Induced Fluorescence Cone Penetrometer Tool.
2. Operation and Calibration Manual for the Laser Excitation–Emission Matrix Cone Penetrometer Tool.
3. Excitation–Emission Matrices Collected in the Laboratory, from Hanscom AFB, and at Otis ANGB.

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Phytoremediation of Hydrocarbon-Contaminated Soil
M.K. Banks, R.S. Govindaraju, A.P. Schwab, P. Kulakow, J. Finn (Authors); Stephanie Fiorenza, Carroll L. Oubre, C. Herb Ward (Eds.), Lewis Publishers, Boca Raton, FL, 2000, US$ 64.95, 164 pp., ISBN: 1-56670-463-4

Phytoremediation is a relatively new remediation technique but interest in its utility has (according to the preface in this text) "exploded" since the principle investigators proposed this technology demonstration (the demonstration was a project funded by the US Department of Defense via US$ 193 million grant to Rice University and directed by Dr. C. Herb Ward).

The goal of this project, under the above-noted DOD-funded Advanced Applied Technology Demonstration Facility Project for Environmental Remediation Technologies, was to study phytoremediation's effectiveness as a solution for a variety of contaminants in groundwater and soil.

Phytoremediation is being actively studied by numerous researchers with Kansas State University-led projects being in the forefront. The authors of the study had focused their past research on the problem of hydrocarbon contamination, especially polynuclear aromatic compounds in surface and near surface soils. This report contains the results of a study at a US Navy terminal of remediation of soils contaminated with aged diesel fuel. The degradation of diesel and polyaromatic compounds was tested in plots containing three different vegetated treatments; two grasses and a legume and a nonvegetated control. Part I of this monograph reports the results of that project. Part II discusses the design and potential cost of a full-scale implementation of the demonstration system. (As an aside, I note that most books published in this 10-book series have detailed cost data.)

The researchers conclude that active soil management is needed to assure water and nutrient availability for phytoremediation optimization. They claim success, clearly showing that remediation works, being greater in vegetated systems than in nonvegetated controls. They report a 50% increase in removal of total petroleum hydrocarbons (TPHs) — 32% in nonvegetated versus 47% in white clover phytoremediation plots. Moreover, they detected no plateau effect; nor did the hydrocarbons leach from the root zone and the plants did not accumulate hydrocarbons (PAHs) in the soils.