Environmental Toxicology and Risk Assessment

Science, Policy, and Standardization– Implications for Environmental Decisions

10th Volume

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Foreword

This publication, *Environmental Toxicology and Risk Assessment: Science, Policy, and Standardization—Implications for Environmental Decisions: Tenth Volume,* contains papers presented at the symposium of the same name held in Toronto, Ontario, Canada, on 10-12 April 2000. The symposium was sponsored by ASTM Committee E47 on Biological Effects and Environmental Fate. The symposium co-chairpersons were Dr. Bruce M. Greenberg, University of Waterloo, Ruth N. Hull, Cantox Environmental, Inc., Morris H. Roberts, Jr., Virginia Institute of Marine Science College of William and Mary, and Robert W. Gensemer, ENSR Corporation.

Overview

The Tenth Symposium on Environmental Toxicology and Risk Assessment was held April 10-12, 2000 in Toronto, Ontario, Canada. This conference was the 27th symposium addressing the area of environmental toxicology that has been sponsored by ASTM Committee E47 on Biological Effects and Environmental Fate. Because of the advances in the field of environmental toxicology over the past decade, we felt it was an appropriate time to look beyond science, and thus chose the theme "Science, Policy, and Standardization—Implications for Environmental Decisions" for the symposium. This Special Technical Publication (STP) contains 26 peer-reviewed papers from the symposium. There are papers from each of the seven platform sessions and the two poster sessions. They cover the major topics of environmental toxicology (e.g., aquatic, sediment, terrestrial, and biomonitoring) and they cover the specialty topics of the symposium (environmental science, policy, and standards). The authors also represent a cross-section of the community of environmental toxicology and risk assessment, including scientists from academia, government, and the private sector.

The symposium theme, "Science, Policy, and Standardization—Implications for Environmental Decisions," was chosen to focus on a key aspect of the mission of committee E47 of ASTM. That mission is to develop standards that can be used by the environmental science community to collect coherent data and apply that data to make scientifically sound decisions. The background for this theme was elegantly established in the Plenary Session by presentations on risk evaluation, human health, generation of policy for large multi-jurisdictional environments, and the impacts of environmental policy on Native communities. This led to lively discussions throughout the symposium on problems of carrying scientific findings forward to sound policy decisions.

The firsr two platform sessions were "Aquatic Toxicology" and "Interface Between Policy, Science and Risk Assessment." Aquatic toxicology is one of the most active areas of environmental science, and is central to committee E47. It brings together many topics, and these were represented by the contributions to that session. There are three chapters from that session reflecting that diversity. The paper by Welsh et al. addresses the ionic composition of water used in toxicity tests and how that impacts on metal toxicity. The chapter by Schirmer et al. examines how modified PAHs impact on EROD levels, extending this important test to a novel class of compounds. The paper by Marwood et al. examines how UV radiation in natural aquatic settings impacts on photosynthesis in phytoplankton. In addition, there was one chapter from the poster session related to the aquatic toxicology session; Heyer et al. on the toxicity of chlorinated compounds to crawfish.

The session on the interface between science and policy dealt with the theme of the symposium. From that session, there were three chapters contributed to this STP. Sigal et al. address the question of using appropriate data in environmental modeling, which must be understood if risk assessment is to have real meaning. This topic is continued with statistical procedures to find real risk drivers (Tchounwou et al.), and a chapter from the poster session on statistical evaluation of terrestrial nontarget organisms (Habig et al.). The subject then shifts to a comparison of fish and human toxicity by Tchounwou et al.

The next platform session was "ASTM Standards and Their Applications." This was central to the symposium, as it dealt with how ASTM standards can be used in science and policy. There were three chapters contributed to this volume from that session. The first, by Smrchek and Zeeman, deals with interagency harmonization of test methods. The other two chapters are on proper selection of plant toxicity test methods (Petrie, and Stephenson et al.).

The next two platform sessions were "Biomonitoring of Sediments and Aquatic Systems" and "Current Issues in Soil Toxicity and Remediation." Biomonitoring is central to the standardization

process, as most standards in E47 begin as biomonitor assays that ultimately become well enough established such that a standard method can be generated. Two chapters were contributed from this session. The paper by El-Alawi et al. describes an extension of the Microtox assay, allowing photobacteria to be used in long term assays. The paper by Neff et al. deals with assessing PAH bioavailability at off-shore oil wells. In addition, two chapters from the poster session on biomonitoring are included. The paper by Diener et al. presents a new, powerful molecular bioindicator (differential display polymerase chain reaction) that is coming into use by environmental biologists. The paper by Lee et al. is a comparison of EROD and fibronectin levels.

The soil toxicity and remediation session recognizes on the one hand how important the evaluation of soil toxicity is becoming, and on the other hand how such contaminated sites can be cleaned for reuse. Chapters were contributed in both areas. Soil toxicity is examined by Boyd and Williams, and by Stephenson et al. Contributions by Wells and Lanno, and Huang et al. are on bioavailability of contaminants in soil and their remediation, respectively.

The last two platform sessions were "Hazards of Sediments and Sediment Derived Materials" and "New Directions in Environmental Assessment and Recovery." Sediment toxicology is an important theme for committee E47 of ASTM. There was one chapter from this session. In it Lampi et al. show how contaminant hazards in sediments can be elevated by structural modification after chemical deposition into the environment.

The goal of the session on new directions in environmental assessment and recovery was to bring many of the concepts of the symposium together. The idea was to consider how one uses environmental assessment data to make decisions on risk and restoration. The paper from the session chair (Landis and McLaughlin) sets the stage by discussing if recovery is even a appropriate concept for environmental science. The paper by Sunahara looks at an emerging problem for reuse of military bases: the toxic hazards of residue explosive substances. Babu et al. presents material on the toxicity of co-contaminants, showing a mechanism for synergistic toxicity of metals and PAHs. Lee et al. assess the success of a remediation project using three biological endpoints. Lastly, Dudal and Deschênes examine how bioavailability of contaminants changes in dynamic systems.

The papers of this volume give an excellent cross section of the topics presented at the symposium. They show the diversity of the field of environmental toxicology and risk assessment, and indicate many of the new directions being taken in the environmental sciences. Many of the chapters presented are likely to become the foci of future ASTM standards. This shows how ASTM symposia and STPs are critical steps in spearheading standards for ecotoxicology.

We gratefully acknowledge the efforts of the session chairs for developing the stimulating and comprehensive platform and poster sessions, and for encouraging the preparation of manuscripts provided in this volume. We are deeply indebted to ASTM staff, who worked tirelessly to bring the symposium and this volume to fruition. They are Dorothy Fitzpatrick and Hannah Sparks in symposium operations, Eileen Gambetta in publications, and the committee E47 staff manager Len Morrissey. We also thank the executive committee of E47 for their strong support and input on the symposium.

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