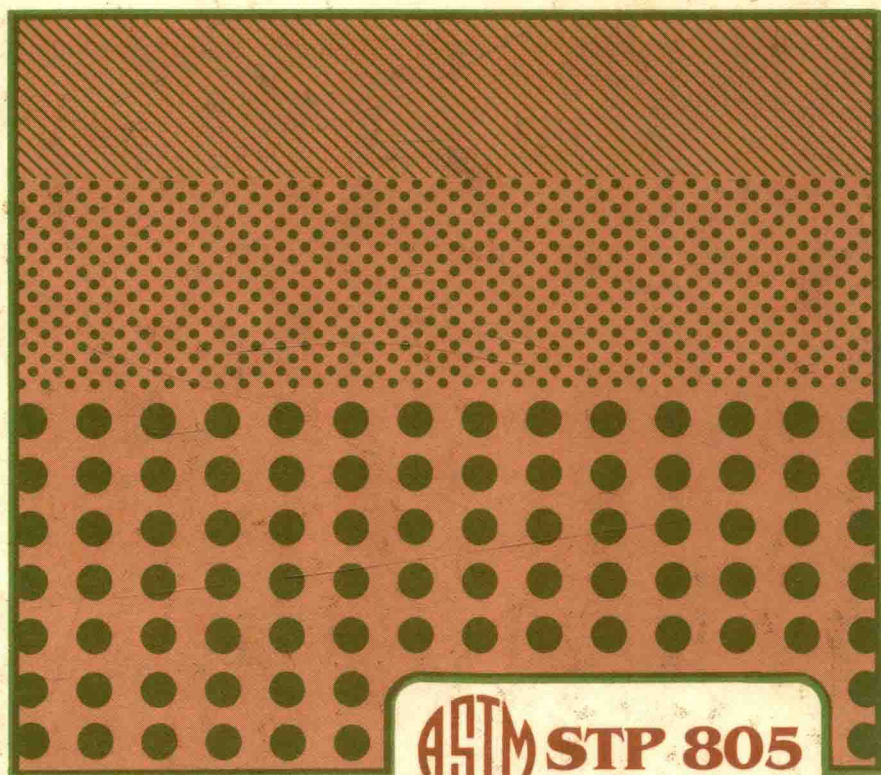


# **Hazardous and Industrial Solid Waste Testing**

**SECOND SYMPOSIUM**



**Conway/Gulledge,**  
*editors*

**ASTM STP 805**

# HAZARDOUS AND INDUSTRIAL SOLID WASTE TESTING: SECOND SYMPOSIUM

A symposium  
sponsored by ASTM  
Committee D-34 on  
Waste Disposal  
Lake Buena Vista, FL, 28-29 Jan. 1982

ASTM SPECIAL TECHNICAL PUBLICATION 805  
R. A. Conway, Union Carbide Corp., and  
W. P. Gullledge, Chemical Manufacturers  
Association, editors

ASTM Publication Code Number (PCN)  
04-805000-16



1916 Race Street, Philadelphia, PA 19103

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Library of Congress Catalog Card Number: 83-70420

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## Foreword

The Second Annual Symposium on Hazardous and Industrial Solid Waste Testing was held in Lake Buena Vista, FL, 28–29 Jan. 1982. It was sponsored by ASTM Committee D-34 on Waste Disposal. Richard A. Conway, of Union Carbide Corp., and William P. Gulledge, of the Chemical Manufacturers Association, served as symposium chairmen and edited this publication.

## Related ASTM Publications

Aquatic Toxicology and Hazard Assessment (Fifth Conference), STP 766 (1982), 04-766000-16

Hazardous Solid Waste Testing: First Conference, STP 760 (1981), 04-760000-16

Aquatic Toxicology and Hazard Assessment (Fourth Conference), STP 737 (1981), 04-737000-16

Ecological Assessments of Effluent Impacts on Communities of Indigenous Aquatic Organisms, STP 730 (1981), 04-730000-16

Aquatic Invertebrate Bioassays, STP 715 (1980), 04-715000-16

Aquatic Toxicology (Third Conference), STP 707 (1980), 04-707000-16

## A Note of Appreciation to Reviewers

The quality of the papers that appear in this publication reflects not only the obvious efforts of the authors but also the unheralded, though essential, work of the reviewers. On behalf of ASTM we acknowledge with appreciation their dedication to high professional standards and their sacrifice of time and effort.

*ASTM Committee on Publications*

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# Introduction

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Within the last several years, the need for state-of-the-art technology related to the disposal of hazardous and industrial solid wastes has greatly expanded. Improved testing methods are required to support waste management technology such as recycling, land disposal, incineration, and waste treatment. To that end the American Society for Testing and Materials (ASTM), through its Committee D-34 on Waste Disposal, is sponsoring a symposium series on testing of hazardous and industrial solid wastes. The First Symposium,<sup>1</sup> held in 1981, dealt largely with laboratory and field extraction tests and the analysis of resulting leachates. The Second Symposium, held in January 1982 and from which the chapters included herein were selected, built on this experience and extended the technology especially toward applicability to field situations.

One regulatory development affecting the waste disposal area and its technical needs is the implementation of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("Superfund"). This Act addresses the correction or mitigation or both of hazards created from past disposal practices. Among the technical needs associated with Superfund are sampling and analysis protocols for groundwater assessment and determination of the performance of liners and cover material. The Resource Conservation and Recovery Act of 1976 (RCRA) largely addresses the proper management of currently generated hazardous wastes. Estimates of the volume of such wastes are approximately 40 to 60 million tons produced in 1980.<sup>2</sup> Disposal methods include landfilling, surface impoundment, underground injection, or incineration.

The five key problems or obstacles to more effective and less costly hazardous waste management have been identified by the Executive Office of the President of the United States<sup>3</sup> as the following:

- Inability to determine hazards posed by wastes and waste sites;

<sup>1</sup> *Hazardous Solid Waste Testing: First Conference, ASTM STP 760*, American Society for Testing and Materials, 1981.

<sup>2</sup> Worthy, W., *Chemical and Engineering News*, 8 March 1982, pp. 10-15.

<sup>3</sup> *Scientific and Technical Needs for Hazardous Waste Management*, Office of Science and Technology Policy, Executive Office of the President, Washington, D.C. 20500, Oct. 1979.

- Inadequate analytical procedures and capabilities;
- High costs and inadequate means for cleaning up existing sites;
- Lack of knowledge on handling current and future waste streams; and
- Lack of (knowledgeable) personnel.

The development of meaningful testing procedures, such as those described in this ASTM Special Technical Publication (STP), addresses several of these issues including the development of adequate leaching tests, screening of organic compounds in solid wastes, and liner testing.

As stated in the Introduction to *Hazardous Solid Waste Testing: First Conference, ASTM STP 760*, the purposes of this symposium series are to:

- Present and discuss new knowledge on testing,
- Stimulate ideas for new technology,
- Provide basis for new or improved ASTM methods,
- Develop a series of STPs on testing of solid wastes, and
- Bring more science into an area dominated by regulations.

Papers in the STP series are selected from the symposium based upon pertinency, originality, and technical quality. All undergo peer review and most are extensively revised between presentation and publication. In this STP, papers were selected in the following categories:

- Sampling considerations,
- Batch extraction,
- Column leaching and transport,
- Analytical,
- Liner testing and closure, and
- Biological tests.

In addition to the authors of the individual papers, any success of this publication reflects the contributions of many people.

The Symposium Committee worked diligently in soliciting abstract submittals, in selecting promising presentations, and in chairing sessions. The committee was composed of the following people:

L. R. Barsotti  
R. A. Conway  
W. P. Gullledge  
D. Lorenzen  
M. Miller  
Scot A. Miller  
C. L. Perket

Kaiser Aluminum Chemical Corp.  
Union Carbide Corp.  
Chemical Manufacturers Association  
State of Pennsylvania  
American Electric Power Service Corp.  
Miller and Associates  
Environmental Engineering and Management Services

J. K. Petros  
 Alan R. Rohlik  
 K. S. Roos

Union Carbide Corp.  
 Standard Oil Co. (Ohio)  
 Rockwell International

The continuing support of this symposium series by the officers of ASTM Committee D-34 on Waste Disposal also was vital, since time from a more than full committee meeting schedule needed to be allocated for this endeavor. Those officers not serving on the symposium committee were:

Eugene Aleshin  
 John S. Beale  
 Larry P. Jackson  
 B. Charles Malloy  
 William C. Webster

Environmental Associates, Inc.  
 Energy and Environmental Analysis Inc.  
 Laramie Energy Technology Center  
 Engineering Science  
 American Resources Corp.

Critical to maintaining the technical quality of this STP was the diligent work of the reviewers of the technical papers. Three reviewers were obtained for each paper to help ensure that the work reported was accurate, reproducible, and meaningful.

Considerable staff support was required for the completion of this effort. The help of the Symposium Committee, the D-34 officers, the paper reviewers, and the ASTM staff is most appreciated. We particularly wish to acknowledge the assistance of Delores Quesenberry (Union Carbide Corp.), who handled the correspondence between the Symposium Committee and the authors. We trust that the papers in this STP, which the contributors labored hard to develop, will aid the efforts of industry and government toward the proper disposal of hazardous and industrial solid wastes.

Future symposia need to address issues other than land disposal. A recent study by the University of Texas<sup>4</sup> identified these categories of hazardous waste disposal:

- Secure landfill,
- Deep well injection,
- Chemical/physical/biological treatment,
- Incineration,
- Waste exchange, and
- Resource recovery.

There are many testing aspects associated with each of these waste disposal options. Research gaps exist in assessing pollutant migration, waste modifi-

<sup>4</sup> "Preliminary Report on Siting of Hazardous Waste Disposal Facilities," L. B. Johnson School of Public Affairs of the University of Texas at Austin, 1982.

cation, thermal treatment, and uncontrolled sites/remedial action. Future symposia<sup>5</sup> should address these issues.

*Richard A. Conway*

Union Carbide Corp., South Charleston, WV  
25303; symposium cochairman and co-  
editor.

*William P. Gullledge*

Chemical Manufacturers Association, Wash-  
ington, D.C. 20037; symposium cochairman  
and co-editor.

<sup>5</sup> *Proceedings of the Seventh Research Symposium on Land Disposal and Hazardous Solid Wastes*, D. W. Shultz, Ed., U.S. Environmental Protection Agency, Cincinnati, OH, 1982.

## **Sampling Considerations**





## Evaluation of Technical Limitations to Determining Organic Contamination in Subsurface Soils

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**REFERENCE:** Baty, C. J. and Perket, C. L., "Evaluation of Technical Limitations to Determining Organic Contamination in Subsurface Soils," *Hazardous and Industrial Solid Waste Testing: Second Symposium, ASTM STP 805*, R. A. Conway and W. P. Gullledge, Eds., American Society for Testing and Materials, 1983, pp. 7-23.

**ABSTRACT:** The major technical impediments to quantitative determination of organic contamination in subsurface soils are the following: lack of an established procedure, heterogeneous specimens with unconfirmed representativeness, and difficulty in assessing method accuracy. These technical limitations have been discussed with respect to a specific case study at the site of a former wood-preserving plant.

Subsurface soil specimens were obtained from the former wastewater drainage trench and lagoons, Soxhlet extracted with methylene chloride, and analyzed by gas chromatography (GC) and high-pressure liquid chromatography (HPLC) for phenolic compounds and polynuclear aromatic hydrocarbons (PNAs), respectively. Interlaboratory and intralaboratory precision was evaluated and was shown to be poor. Accuracy was not determined.

Excavation and soil test borings were compared for utility and sensitivity in subsurface sampling. Data obtained from soil test borings alone did not adequately depict the subsurface patterns of contamination evidenced by the excavation.

**KEY WORDS:** organic compounds, environmental, priority pollutants, polynuclear aromatic hydrocarbons, phenolic compounds, hazardous wastes

With the implementation of the Resource Conservation and Recovery Act of 1976 (RCRA) and the passage of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA/Superfund), the existence and potential threat of old or abandoned disposal sites is generally acknowledged. As a result of this legislation and the corresponding public awareness of potential environmental threat, consultants are increasingly being asked to evaluate the extent of contamination of such suspected sites. Where once the phrase "extent of contamination" meant a groundwater investigation, today it is more likely to include or, in some cases, be limited to a soil investigation. The rationale to this approach is reasonable:

<sup>1</sup> Environmental chemist and professional engineer, respectively, Environmental Engineering and Management, Ltd., Minneapolis, MN 55435.