Hazardous and Industrial Solid Waste Testing

Fourth Symposium

Petros/Lacy/Conway editors

ASTM STP 886

HAZARDOUS AND INDUSTRIAL SOLID WASTE TESTING: FOURTH SYMPOSIUM

A symposium
sponsored by
ASTM Committee D-34
on Waste Disposal
Arlington, VA, 2-4 May 1984

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Foreword

The fourth symposium on Hazardous and Industrial Solid Waste Testing was held on 2–4 May 1984 in Arlington, VA. This symposium was the fourth in a series of annual symposia on hazardous waste sponsored by ASTM Committee D-34 on Waste Disposal.

Chairing the symposium were James K. Petros, Jr., Union Carbide Corp., and William J. Lacy, U.S. Environmental Protection Agency, both of whom also served as editors of this publication. Richard A. Conway, Union Carbide Corp., also served as an editor.

Related ASTM Publications

Hazardous and Industrial Waste Management and Testing: Third Symposium, STP 851 (1984), 04-851000-16

Hazardous and Industrial Solid Waste Testing: Second Symposium, STP 805 (1983), 04-805000-16

Hazardous Solid Waste Testing: First Conference, STP 760 (1982), 04-760000-16

Permeability and Groundwater Contaminant Transport, STP 746 (1981), 04-746000-38

Aquatic Toxicology and Hazard Assessment: Sixth Symposium, STP 802 (1983), 04-802000-16

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

ASTM Editorial Staff

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Kathleen A. Greene
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RISK ASSESSMENT/BIOLOGICAL TEST METHODS

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Introduction

One of the major national problems facing the United States and other nations as well is the need for safe handling and disposal of hazardous solid waste. The Resource Conservation and Recovery Act (RCRA) mandates that the U.S. Environmental Protection Agency (EPA) promulgate and enforce regulations relating to the proper management of hazardous wastes. Neither the EPA nor any other organization can be expected to accomplish this major task without significant external input. Toward that end, Committee D-34 on Waste Disposal has sponsored a series of symposia. These symposia have brought together recognized experts from all sectors—federal, state, and municipal governments, industry, commerce, private laboratories, consultants, legislators, academicians, and knowledgeable citizens—for the express purpose of sharing technical knowledge in the field of hazardous waste testing.

ASTM has worked diligently for years toward learning more about the problems of waste disposal and developing test methods to solve these problems in a scientifically sound, economical manner with a minimum risk to the public health. Committee D-34 has within its ranks a considerable array of talent with which to accomplish this monumental task.

The first ASTM symposium on Testing of Hazardous Solid Wastes was held in Fort Lauderdale, Florida, on 14-15 Jan. 1981, under the chairmanship of Richard A. Conway of Union Carbide Corp. and B. Charles Malloy of Jones, Malloy, and Associates.

As stated in the resulting publication,[1] the purposes of the symposium were to:

- Present and discuss new knowledge on testing.
- Stimulate new technology by building on reported work.
- Provide bases for new and improved ASTM methods.
- Bring more science into an area dominated by regulations.
- Develop a series of special technical publications (STP) on testing of solid wastes.

Papers for the first symposium were selected in five general areas:

- Laboratory extraction and leaching procedures.
- Large-scale leaching tests versus laboratory tests.

[1] *Hazardous Solid Waste Testing: First Conference. ASTM STP 760.* American Society for Testing and Materials, Philadelphia, 1982.

- Analysis of residues, extracts, solids, and groundwaters.
- Evaluation of land disposal sites and materials.
- Risk assessment approaches.

The 300 scientists and engineers who attended thoroughly discussed the presentation made in these areas. The resulting STP[1] addresses the suitability of the land disposal option for various types of residues.

The second ASTM Committee D-34 symposium of this series was held at Lake Buena Vista, Florida, 28–29 Jan. 1982, under the cochairmanship of Richard Conway and William P. Gulledge of the Chemical Manufacturers Association. In the resulting STP,[2] papers were selected in the following categories:

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

The third symposium, held in Philadelphia 7–10 March 1983 and cochaired by Larry P. Jackson of the University of Wyoming Research Center and Carlo Merli of the University of Rome, was a departure from the previous two in that it had many presentations from 13 countries and it addressed the overall problem of waste management as well as solid waste testing. This international conference was a follow-up to an international conference in Rome in 1981 led by B. C. Malloy, L. P. Jackson, C. Merli, and W. J. Lacy.

The principle objective of the third symposium was to accelerate technology transfer that could lead to future standards. Papers were selected in four areas:

- Sampling and analysis of wastes and waste disposal sites.
- Amelioration of wastes in the disposal environment.
- Waste as a resource.
- National perspectives in waste management.

These papers[3] became the basis for relating waste behavior in the disposal environment. This topic was expanded into the broader activity of risk assessment, which is also of interest to other ASTM committees. Risk assessment and risk management of hazardous waste have been the subjects of a series of recent books and articles, highlighting the shift to this area of technical concern.

[2] *Hazardous and Industrial Solid Waste Testing: Second Symposium, ASTM STP 805*, American Society for Testing and Materials, Philadelphia, 1983.

[3] *Hazardous and Industrial Waste Management and Testing: Third Symposium, ASTM STP 851*, American Society for Testing and Materials, Philadelphia, 1984.

The fourth ASTM D-34 symposium on Hazardous and Industrial Solid Waste Testing, the basis for the present STP, was held in Arlington, Virginia, on 2-4 May 1984. The chairpersons were James K. Petros, Union Carbide Corp. and William J. Lacy, U.S. EPA.

The keynote speakers were Norman H. Nosenchuck, director of the Solid Waste Department, New York State Department of Environmental Conservation, and Norbert B. Schomaker, director of Solid and Hazardous Waste Research, U.S. EPA.

The subjects discussed at this symposium and contained in this STP cover the following categories:

- Thermal treatment.
- Hazard degrees, health effects, and risk assessment.
- Waste characterization (chemical, physical, biological).
- Extraction of toxicants (batch and continuous).
- Evaluation of extracts and leachates.
- Landfill/landfarm simulation.
- Sampling of residues and sites (soil, groundwater, air).

In addition, a special session on risk assessment including panel discussions was held under the leadership of William Gulledge of the Chemical Manufacturers Association. Also held in conjunction with the standards development meetings of ASTM Committee D-34 was a Workshop on Ocean Disposal, chaired by Rosalie T. Matthews of Matthews Consulting and Construction, Inc.

The organizing committee for this symposium worked diligently in soliciting abstract submittals, in selecting promising presentations, and in chairing sessions. The committee was composed of the following people:

D. R. Bowlus
D. Buskirk
J. P. Chu
R. A. Conway
D. Friedman
C. Glover
W. P. Gulledge
K. Jackson
L. P. Jackson
W. J. Lacy
D. J. Lorenzen
B. C. Malloy
C. L. Perket
J. K. Petros
A. R. Rohlik
N. B. Schomaker
W. C. Webster

As in any endeavor such as this, the technical quality of this publication has largely resulted from the dedicated and diligent efforts of the scientific reviewers of the technical papers. Considerable support staff efforts also were needed to assure the success of this symposium. The editors gratefully acknowledge the valuable assistance of this key group, Kathy Greene and Don Viall of ASTM, and Betty Maisonneuve of the U.S. EPA. We hope that the technical papers in this STP will be as valuable an aid to industry; federal,

state, and local governments; and the scientific and engineering community in general as were the previous ones.

Future symposia in this series should address other issues, including the following:

- The relationship between laboratory characterizations and field findings.
- Stabilization, soil attenuation/migration.
- Improved liner and landfill closure site testing.
- More accurate testing of physical/chemical parameters.
- Deep well injection and resource recovery.
- Legal issues related to assessment and testing.
- Quality assurance.

Symposia addressing these issues were held in 1985 in Colorado Springs, Colorado, and Alexandria, Egypt, and in 1986 in New Orleans.

William J. Lacy

U.S. Environmental Protection Agency, Washington, DC 20460; symposium cochairman and coeditor.

James K. Petros, Jr.

Union Carbide Corp., South Charleston, WV 25303; symposium cochairman and coeditor.

Richard A. Conway

Union Carbide Corp., South Charleston, WV 25303; coeditor.

Analysis and Characterization of Wastes

John H. Martin, Jr.,[1] *and Raymond C. Loehr*[2]

Determination of the Oil Content of Soils

REFERENCE: Martin, J. H., Jr., and Loehr, R. C., **"Determination of the Oil Content of Soils,"** *Hazardous and Industrial Solid Waste Testing: Fourth Symposium, ASTM STP 886*, J. K. Petros, Jr., W. J. Lacy, and R. A. Conway, Eds., American Society for Testing and Materials, Philadelphia, 1986, pp. 7-14.

ABSTRACT: The precision and accuracy of acidification followed by Soxhlet extraction with trichlorotrifluoroethane to estimate the oil and grease content of oil-contaminated soils was determined. The amounts of oil and grease were determined gravimetrically after solvent extraction. Stock oil-soil mixtures prepared with vegetable oil, No. 2 fuel oil, No. 6 fuel oil, motor oil, and an oily waste were analyzed. The coefficient of variation for all oil-soil mixtures analyzed never exceeded 4%. The percentage of recovery varied from 68% for No. 2 fuel oil to 102% for motor oil. The results indicate that this method is precise and results in reasonable recoveries when used to measure the oils tested.

KEY WORDS: oil and grease, soil, Soxhlet extraction, trichlorotrifluoroethane, precision, accuracy, hazardous wastes

Land treatment has been used for the treatment and disposal of oily wastes by petroleum refineries for many decades. About 100 petroleum industry land treatment facilities exist in the United States, with additional facilities at refineries in Canada and Europe [*1*].

Land treatment is a managed technology that involves the controlled application of a waste into the upper soil zone, the zone of incorporation. The successful performance of land treatment depends on an understanding of the site and waste characteristics that affect the transformation, degradation, and immobilization of the wastes that are applied to the site. Petroleum industry wastes contain a large oil and grease fraction. Therefore, an ability to measure the oil and grease content of both the wastes and the soil in the zone of incorporation is important for determining appropriate waste application

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[2] Professor of civil engineering, University of Texas, Austin, TX 78712; formerly professor of agricultural engineering and environmental engineering, Cornell University, Ithaca, NY 14853.