Beryllium: Sampling and Analysis

Dr. Kevin Ashley, editor

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Each paper published in this volume was evaluated by two peer reviewers and at least one editor. The authors addressed all of the reviewers’ comments to the satisfaction of both the technical editor(s) and the ASTM International Committee on Publications.

The quality of the papers in this publication reflects not only the obvious efforts of the authors and the technical editor(s), but also the work of the peer reviewers. In keeping with long-standing publication practices, ASTM International maintains the anonymity of the peer reviewers. The ASTM International Committee on Publications acknowledges with appreciation their dedication and contribution of time and effort on behalf of ASTM International.
Foreword

This publication, *Beryllium: Sampling and Analysis*, contains papers presented at the Symposium on Beryllium Sampling and Analysis, which was held in Reno, NV (USA) on 21–22 April, 2005. The symposium was sponsored by ASTM International Committee D22 on Air Quality and its Subcommittee D22.04 on Sampling and Analysis of Workplace Atmospheres, in cooperation with the Sampling and Analysis Subcommittee of the Beryllium Health and Safety Committee. Dr. Kevin Ashley, Centers for Disease Control and Prevention / National Institute for Occupational Safety and Health, presided as symposium chairman and served as editor of this compilation. Co-chairs of the symposium were Kathryn L. Creek, Los Alamos National Laboratory; David Hamel, Occupational Safety and Health Administration; Michael J. Brisson, Washington Savannah River Company; and Dr. Amy Ekechukwu, Savannah River National Laboratory.

*Kevin Ashley, Ph.D.*
CDC/NIOSH, Cincinnati, OH
*Symposium Chairman and Editor*
# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forward</td>
<td>iii</td>
</tr>
<tr>
<td>Overview</td>
<td>vii</td>
</tr>
<tr>
<td>Acknowledgments</td>
<td>ix</td>
</tr>
</tbody>
</table>

**Beryllium Disease – Exposure Monitoring and Standardization Issues**

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opportunities for Standardization of Beryllium Sampling and Analysis—</td>
<td>M. J. Brisson, A. A. Ekechukwu, K. Ashley, and S. D. Jahn</td>
<td>3</td>
</tr>
</tbody>
</table>

**Beryllium Exposure Measurement and Reference Materials – National and International Perspectives**

<table>
<thead>
<tr>
<th>Title</th>
<th>Authors</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Determination of Beryllium Compounds by NIOSH 7303—</td>
<td>S. Amer, D. Smieja, J. Loughrin, and L. Reichmann</td>
<td>62</td>
</tr>
<tr>
<td>Sampling and Analysis of Beryllium at JET: Policy Cost and Impact—</td>
<td>D. Campling and B. Patel</td>
<td>68</td>
</tr>
</tbody>
</table>
ON-SITE MONITORING FOR BERYLLIUM – SAMPLING AND ANALYTICAL ASPECTS

Use of Electrically Enhanced Aerosol Plasma Spectroscopy for Real-Time Characterization of Beryllium Particles—M.-D. CHENG,
R. W. SMITHWICK, III, AND R. HINTON 81

Development of a New Fluorescence Method for the Detection of Beryllium on Surfaces—
E. M. MINOGUE, D. S. EHLER, A. K. BURRELL, T. M. McCLESKEY,
AND T. P. TAYLOR 92

Interlaboratory Evaluation of a Portable Fluorescence Method for the Measurement of Trace Beryllium in the Workplace—K. ASHLEY, T. M. McCLESKEY,
M. J. BRISSON, G. GOODYEAR, J. CRONIN, AND A. AGRAWAL 102
Overview

This compilation represents the work of numerous authors at the Symposium on Beryllium Sampling and Analysis, April 21–22, 2005, Reno, Nevada. The symposium was sponsored by ASTM International Committee D22 on Air Quality and its Subcommittee D22.04 on Workplace Atmospheres, in cooperation with the Sampling and Analysis Subcommittee of the Beryllium Health and Safety Committee. Eighteen papers were presented at the symposium, and nine presentations that were accepted for publication appear in this volume.

Occupational exposure to beryllium can cause a lung disease that may ultimately be fatal, and new exposure limits for this element in air and on surfaces have been established in efforts to reduce exposure risks to potentially affected workers. Advances in sampling and analytical methods for beryllium are needed in order to meet the challenges relating to exposure assessment and risk reduction. This symposium provided a forum for technical exchanges on current research and status regarding beryllium sampling and analysis issues. While the primary emphasis was on current research in the areas of beryllium sample collection, sample preparation, and measurement, participants were able to identify areas where pertinent standards can be developed concerning beryllium sampling and analytical procedures.

The symposium was intended to address topics related to: 1. Sampling of beryllium in workplace atmospheres; 2. Surface beryllium sampling; 3. Sample preparation procedures for beryllium in various matrices; 4. Analytical methods for measuring beryllium; 5. Beryllium reference materials; 6. beryllium proficiency testing; 7. On-site beryllium monitoring; and 8. Opportunities for standardization of beryllium sampling and analysis methods. The targeted audience included technical professionals such as industrial hygienists, chemists, health physicists, safety engineers, epidemiologists, and others having interest in beryllium exposure and analysis issues.

The papers contained in this publication represent the commitment of the ASTM D22.04 subcommittee to providing timely and comprehensive information on advances in workplace exposure monitoring. Sections of the two-day symposium focused on the following themes: 1. Beryllium disease – Exposure monitoring and standardization issues; 2. Beryllium exposure measurement and reference materials – National and international perspectives; and 3. On-site monitoring for beryllium – Sampling and analytical aspects. Papers discussing beryllium sampling techniques, analytical measurement technologies, beryllium reference materials, standardization, and occupational hygiene can be found in this compilation.

Beryllium disease – Exposure monitoring and standardization issues

The intent of this section was to present an overview of beryllium disease and efforts to reduce worker exposures through improved monitoring methods and the development of standard methodologies. Some of the papers presented discussed the industrial uses of beryllium and the history of
beryllium disease. Other papers dealt with occupational exposure monitoring and standardization of sampling and analytical methods. These areas continue to comprise the activities of many beryllium researchers. Two of the presented papers from this section of the symposium are published herein.

**Beryllium exposure measurement and reference materials – National and international perspectives**

This portion of the symposium covered global efforts and progress in beryllium occupational monitoring, as well as the development and characterization of beryllium reference materials. Applications of sampling and analytical methods to industrial hygiene chemistry and practice were highlighted, and needs for reference materials containing beryllium oxide were identified. Four of the papers that were given dealing with these issues are published in this section.

**On-site monitoring for beryllium – Sampling and analytical aspects**

The ability to carry out on-site beryllium analysis has been a desire of many for years, and this part of the symposium covered recent developments in this area. New portable analytical methods for determining trace beryllium in samples from air and surfaces have been developed and evaluated, and advances in this research arena are continuing. These include both real-time qualitative and semi-quantitative methods, as well as near real-time quantitative techniques for ultra-trace beryllium analysis. Three papers that were presented in this part of the symposium are published here.

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Symposium Chairman and Editor
Acknowledgments

The editor gratefully acknowledges the voluntary contributions of the numerous colleagues who served as peer reviewers of the manuscripts that were submitted for consideration for publication. Their efforts made the symposium and this compilation possible. Special thanks are extended to the following symposium co-chairs, who helped arrange the presentations and kindly served as session monitors:

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