Proceedings from SWANA's 4th Annual Landfill Symposium

Denver, Colorado
June 28-30, 1999
<table>
<thead>
<tr>
<th>Session 2 – Rocky Mountain Update</th>
</tr>
</thead>
<tbody>
<tr>
<td>Comparative Assessment: Predicted and Actual Leachate Generation, Basin F Landfill, Rocky Mountain Arsenal – Commerce City, Colorado</td>
</tr>
<tr>
<td>Norman T. Ng-A-Qui, Gannett Fleming, Inc; Greg Hargreaves, U.S. Environmental Protection Agency; Laura O. Williams, U.S. Environmental Protection Agency; Carol Bicher, Gannett Fleming, Inc</td>
</tr>
<tr>
<td>Field Test of Potential RCRA-Equivalent Covers at the Rocky Mountain Arsenal, Colorado</td>
</tr>
<tr>
<td>D. George Chadwick, George Chadwick Consulting; Mark D. Ankeny, Daniel B. Stephens &amp; Associates, Inc.; Louis M. Greer, Carl V. Mackey and Mark E. McClain, Morrison Knudsen Corporation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 3 – Groundwater Issues: Problems and Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydraulic Containment of Landfill Gas Driven VOCs in Groundwater Using a State of the Art Computerized Control System at the Los Reales Landfill</td>
</tr>
<tr>
<td>Mark Groseclose, Steven Sagstad and Jim Romer, EMCON; David Barraza and Ray Murray, City of Tucson</td>
</tr>
<tr>
<td>A Retrospective Evaluation of Natural Attenuation at a Closed Landfill</td>
</tr>
<tr>
<td>Timothy J. Cox, Rocky Mountain Consultants, Inc</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 4 – Solid Waste Innovations: Landfill Bioreactors and Leachate Recirculation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effect of Leachate Recirculation on the Enhancement of Biological Degradation of Solid Waste: Case Study</td>
</tr>
<tr>
<td>Mostafa A. Warith, Ryerson Polytechnic University; Paul A. Smoklin, Golder Associates Limited; Jim G. Caldwell, J.L. Richard &amp; Associates</td>
</tr>
<tr>
<td>Rapid Landfill Stabilization and Improvements in Leachate Quality by Leachate Recirculation</td>
</tr>
<tr>
<td>Kenneth W. Kilmer, EA Engineering, Science, and Technology, Inc.; John H. Tustin, Worcester County Department of Public Works</td>
</tr>
<tr>
<td>Proposed Design Guidelines for Effective Leachate Recirculation at Landfill Bioreactors</td>
</tr>
<tr>
<td>John A. Banks, and Robert B. Gardner, SCS Engineers</td>
</tr>
<tr>
<td>Stabilization of MSW in Landfill Bioreactors: A Comparative Study of Leachate Recycle and Clean Water Addition</td>
</tr>
<tr>
<td>Don Richard, University of North Dakota; Robert A. Zimmerman, City of Moorhead; Bruce P. Grubb, City of Fargo</td>
</tr>
<tr>
<td>Operational Characteristics and Enhanced Bioreduction of Municipal Waste Landfill Mass by a Controlled Aerobic Process</td>
</tr>
<tr>
<td>William H. Johnson, ARCADIS Geraghty &amp; Miller; John Baker, Waste Management</td>
</tr>
</tbody>
</table>
### Session 5 – Leachate Management, Closure and 30 Years of Care

**Run-off/Run-on Management: Observations of Storm Water Management at Landfills**  
Theodore S. Reeves, DSM Environmental Services, Inc. ........................................ 145

**Design of Innovative Leachate Collection System Components**  
Larry E. Ruiz and Karl A. Schmit, SCS Engineers;  
Patricia V. Berry, County of Hillsborough .......................................................... 155

**Closed Landfill Remediation: Slope Stabilization & Leachate Control**  
Romeo F. Palombella, CURAC Inc. ................................................................. 163

**Field Investigation of Compacted Clay Liner over a Tire Shred Layer in MSW Landfills**  
Albert M. Johnson, California Environmental Protection Agency;  
Dana N. Humphrey, University of Maine .......................................................... 183

**Cost Effective Landfill Closure, A Case Study: City of Boston, “The Menino Project”**  
John E. Kissida and Richard J. Spieler, Camp Dresser & McKee, Inc. ......................... 197

**Post-Closure Care of Four Chesterfield County, Virginia Landfills**  
Paul A. Mandeville, Tom Conrad and Bob Dick, SCS Engineers;  
Ray McGowan, Chesterfield County .................................................................. 201

### Session 6 – Landfill Design: Cover and Liners

**Permitting of an Alternative Final Cover in Oklahoma**  
E. Sabi Motan, Earth Tech E&I; Mark A. Adams, Law Engineering and Environmental Services, Inc.; Jeff Shepherd, Waste Management of Oklahoma ........................................ 211

**My Landfill Primary Liner Doesn’t Leak, It’s Something Else**  
Eric J. Tuppan, EMCON .................................................................................. 219

**Evaluation of Engineered Alternative Final Cover for Potrero Hills Landfill, Calif.**  
Larry Burch, Potrero Hills Landfill, Inc. ................................................................. 235

**Design and Construction of an Evapotranspirative Cover at the Oil Landfill**  
Suji Somasundaram, Advanced Earth Sciences, Inc.;  
Jack A. Caldwell, Geosyntec Consultants; Abid R. Loan,  
Foster Wheeler Environmental Corporation; Les J. LaFountain, New Cure Inc. .................. 251

**Soil Insulation for Barrier Layer Protection in Landfill Covers**  
Gregory M. Smith, Roy F. Weston, Inc ................................................................. 263

**Landfill Final Cover Stormwater Drainage**  
Mark A. Taylor, EcoLogic Associates, P.C .......................................................... 269

### Session 7 – Leachate: Volume Prediction & Treatment

**Leachate Generation: Actual Versus Predicted**  
Karl A. Schmit, Larry E. Ruiz and Robert B. Gardner, SCS Engineers ......................... 283
Deborah A. Lange, Carnegie Mellon University; Bradley F. Cellier, Paul C. Rizzo Associates, Inc.; Theodore Dunchak, Browning-Ferris Industries of Ohio, Inc ........................................ 293

Leachate Management for the New Millennium
Jeffrey M. Harris, Browning-Ferris Industries; Dennis Purschwitz, PBSJ; Debra R. Reinhart, University of Central Florida ................................................................. 315

State-of-the-Art Landfill Leachate Treatment Systems in the UK and Ireland
Howard D. Robinson, Enviros Aspinwall ................................................................. 323

Session 8 – Slippery Slopes and Other Design Challenges

New Innovations in Quarry Landfill Development Technology
Douglas J. Hermann and Steven A. Elver, STS Consultants, Ltd.;
William A. Dennison, City of Bristol ................................................................. 339

Performance Based Specifications for Landfill Construction Over Existing Fly Ash Basins at a Former Rayon Manufacturing Facility
George H. Barstar and Michael J. Byler, Gannett Fleming, Inc ........................................ 357

Long-Term Performance Tests of Geomembranes and their Relationship to Geomembrane Warranty Issues
Robert E. Mackey, S2L, Incorporated; Y. Grace Hsuan, Drexel University ......................... 373

Landfill Cover Permeability Measurements Using Automated Air-Entry Permeameters
Page L. Pegram, Mark D. Ankeny, James A. Kelsey and Mark E. Miller,
Daniel B. Stephens & Associates, Inc ................................................................. 389

A New Application for Woven Polypropylene Geotextiles in Seismic Landfill Design
Jon R. Luellen, URS Greiner Woodward Clyde; Thomas L. Baker, AMOCO Fabrics and Fibers Company; Stephen N. Valero, Synthetic Industries ........................................ 393

Speaker Contact Listing

4th Annual Landfill Symposium Speakers ................................................................. 405