



February 25-28, 2024

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Your #1 event for solid waste management research and content.

(and it only comes around once every two years)...

“The Global Waste Management Symposium is the premier event for technical presentations in the solid waste industry. The information exchange and networking opportunities are outstanding!”

– Brad Peake, QED Environmental Systems

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- Three days of world-class content and breakthrough research
- Innovative oral and poster presentations
- Education sessions with topics from sustainable materials management and geosynthetics to PFAS and thermal conversion
- Networking with your peers and colleagues from around the world
- Golfing at a world-renowned course that's as beautiful as it is challenging



**Environmental Research
& Education Foundation™**
Lighting a path to sustainable waste management practices

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You're invited to GWMS 2024, North America's leading technical conference for the presentation of applied and fundamental research and case studies on waste management.

This is your best opportunity to share ideas and problem-solve with peers, researchers, vendors, and thought leaders in the global waste community.

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- Learn from industry leaders who use science and innovation to improve solid waste management
- Meet with leading suppliers showcasing their latest solutions to help you implement what you learn
- Forge new relationships with fellow attendees as well as supporting organizations
- Play golf at a world-renowned Clive Clark designed Celebrity Course at the Indian Wells Golf Resort

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A HUGE thanks to our esteemed GWMS Organizing Committees, including:

Technical Committee

- **Chris Bareither**, PhD, PE, *Colorado State University*
- **Morton Barlaz**, PhD, PE, *North Carolina State University*
- **Craig Benson**, PhD, PE, NAE, *University of Wisconsin-Madison*
- **Nicole Berge**, PhD, *University of South Carolina*
- **Bryan Staley**, PhD, PE, *Environmental Research & Education Foundation*

Business Committee

- **Joe Benco**, PE, *Republic Services*
- **Steve Menoff**, PE, *Civil & Environmental Consultants, Inc.*
- **Greg Cekander**, *Waste Management*
- **Kurt Shaner**, PE, *Waste Connections*





Who's attending?

GWMS serves the needs of landfill owners and operators, as well as the engineer, consultant, and vendor communities. Participants include:

- Facility Owners and Operators
- Local/State/Federal Agencies
- Researchers
- Scientific Foundations
- Waste Services Companies
- Vendors/Suppliers
- Trade Organizations
- Solid Waste Generators
- Students

We hope you'll be among the esteemed solid waste management attendees at what promises to be another informative and engaging event.

Your GWMS registration includes:

- All oral and poster presentations
- All networking events, including the Welcome Reception, continental breakfasts, coffee breaks, lunches and cocktail receptions
- Access to all tabletop exhibits

Visit wastesymposium.com and use registration code AB1 to save!

Conference Agenda

Sunday, February 25

| | |
|-----------------|-------------------|
| 1:00pm – 6:00pm | Registration |
| 5:00pm – 7:00pm | Welcome Reception |

Monday, February 26

| | |
|-------------------|-------------------|
| 7:00am | Registration |
| 7:30am – 8:45am | Breakfast |
| 8:45am – 10:00am | Welcome & Keynote |
| 10:00am – 10:30am | Break |

10:30am – 12:00pm Session One

| TRACK A | TRACK B | TRACK C |
|--|---|---|
| Organics Diversion | Understanding Elevated Temperatures in Landfills | Waste Characterization |
| <i>Household Landfill Diversion and the Impact on Methane Emissions</i> Jackson Somers , University of Connecticut | <i>Numerical Simulation of Self-ignition and Smoldering Combustion to Understand Initiation and Propagation in MSW Landfills</i> Alborz Fathinezhad , WSP | <i>Factors Influencing Municipal Solid Waste Generation and Management in the OECD</i> Sagarika Srivastava , Stony Brook University |
| <i>Measuring Organics Diversion Using Waste Composition Studies and Other Techniques</i> Wilbert Yang , Tetra Tech | <i>Development of Methods to Measure Heat Release from Hydration and Carbonation of Ash in Landfills</i> Morton Barlaz , North Carolina State University | <i>Desktop Waste Characterization: An Alternative to Traditional Waste Sorts</i> Sean O'Donnell , Geosyntec Consultants |
| <i>From Drilling to Digesting: An Anaerobic Digestion Feasibility Study</i> Kelli Farmer , SCS Engineers | <i>Evaluation of Heat Generation in Landfills Located in Arid vs Humid Climate</i> Milind Khire , University of North Carolina Charlotte | <i>Solid Waste Generation and its Impacts in the Mt. Everest Region</i> Mohan Dangi , California State University, Fresno |
| <i>LFG Recovery Forecasting Uncertainty and the Effects of Organics Diversion</i> Alex Stege , SCS Engineers | <i>Elevated Temperatures in Municipal Solid Waste Landfills Due to Exothermic Ash-Driven Abiotic Reactions</i> Debra Reinhart , University of Central Florida | <i>Comparison of Technologies for Quantifying Hurricane Debris</i> Navid Jafari , Louisiana State University |
| 12:00pm – 2:00pm | Lunch & Poster Viewing | |



Conference Agenda

Monday, February 26

2:00pm – 3:30pm

Session Two

| TRACK A | | TRACK B | TRACK C |
|---|-------|--|--|
| Landfill Gas Compliance & Data Reporting | | Fate & Transport of PFAS | Sustainability in Waste Management |
| <i>OOO, XXX, AAAA, and Beyond – Looking at the Future of Landfill Air Compliance</i> Melissa Green , Weaver Consultants Group | | <i>PFAS - Where Does It Come From - Where Does It Go?</i> Ivan Cooper , Civil & Environmental Consultants, Inc. | <i>What Sustainability Really Means to Business</i> Bill Moore , Moore & Associates |
| <i>12 Years of GHG Reporting – What Does the Data Show</i> Jonathan Lumang , Weaver Consultants Group | | <i>The Fate of Per- and Polyfluoroalkyl Substances (PFAS) during Waste Management as a Function of PFAS Characteristics</i> Debra Reinhart , University of Central Florida | <i>Creating a Sustainable Approach to Waste Management</i> Vita Quinn , SCS Engineers |
| <i>An Update on the WAG: Case Studies on Recent Innovations in Landfill Gas Data Analysis</i> Ray Huff , SCS Engineers | | <i>Release of PFAS from Paper-Based Food Packaging and Municipal Solid Waste (MSW) to Gas and Leachate under Simulated Landfill Conditions</i> Morton Barlaz , North Carolina State University | <i>Sustainability and Climate Planning in the Solid Waste Industry</i> Matt Stutz , Weaver Consultants Group |
| | | <i>Impact of Solid Waste Management Trends on PFAS Sequestration in MSW Landfills</i> Arie Kremen , Tetra Tech | <i>Landfill Mining: Mitigating Risk and Bringing Clarity to Scary Unknowns</i> Prentiss Shaw , Tetra Tech |
| 3:30pm – 4:00pm | Break | | |

4:00pm – 5:15pm

Session Three

| TRACK A | | TRACK B | TRACK C |
|--|----------------------------|--|--|
| Environmental Justice | | Landfill Operations I | Uncertainty in Landfill Emissions Measurement |
| <i>Potential Implications of Environmental Justice on Landfills</i> Julie Hall , Weaver Consultants Group | | <i>Seismically Induced Deformation Analysis of a Municipal Solid Waste Landfill</i> Livingstone Dumenu , Geosyntec Consultants | <i>Wind Data and Uncertainty in GHG Emission Quantification</i> David Barron , Sniffer Robotics |
| <i>Not Here, Or There: How Solid Waste Facilities Will Co-exist with New and Emerging State Environmental Justice Laws</i> Tiffany Medley , Tetra Tech | | <i>Design and Construction of a Leachate Side Slope Riser Pipe Vertical Extension through Waste</i> Frank Adams , WSP | <i>A Controlled Release Experiment for Investigating Methane Measurement Performance at Landfills</i> David Risk , Saint Francis Xavier University |
| | | <i>Work and Rationale to Evolve GRI GM13 and GRI GM1</i> Samuel Allen , TRI Environmental Group | <i>Assessing Diurnal Variations in Methane Emissions from Landfills</i> Madjid Delkash , Delkash Engineering |
| 5:15pm – 6:45pm | Reception & Poster Viewing | | |

Conference Agenda

Tuesday, February 27

7:00am – 8:15am Breakfast

8:30am – 10:00am

Session Four

| TRACK A | TRACK B | TRACK C |
|--|---|---|
| Managing Unconventional Landfill Gas Issues | Emerging Contaminants in Solid Waste | Black Goo (Panel) <i>Morton Barlaz, North Carolina State University, Moderator and Panelist</i> |
| <i>Municipal Solid Waste Landfill Gas Well Liquid Hydraulics and Effects on Vertical Liquid Extraction</i> David Penoyer , Republic Services | <i>Understanding Emerging Contaminants and Related State-Led Coalition Activities; Maximizing Others' Efforts to Benefit Your Waste Management Organization</i> Shalene Thomas , Battelle | <i>Fouling of Leachate Collection Infrastructure by Non-Traditional Clogging Agents (aka Black Goo, Flubber, and Taffy)</i> Craig Benson , University of Wisconsin - Madison Steven Carl , Progressive Environmental Jiannan (Nick) Chen , University of Central Florida Brittney Crawford , Region of Waterloo Seth Ramaley , WM |
| <i>Targeted Analysis of Odorous Compounds Related to Municipal Solid Waste Operations Using Gas Chromatography Triple Quadrupole Mass Spectrometry</i> Emmanuel Varona-Torres , Weaver Consultants Group | <i>Geological and Geophysical Evaluation of PCE Plume Migration Potential, Carson City Landfill</i> Joseph McKinney , Universal Engineering Sciences (UES) | |
| <i>Investigation of Organic Silicon Compounds in Landfill Gas and Sludge Gas</i> Qinghui Meng , University of Michigan | <i>Solid Waste Radiation Monitoring Trends and Case Studies</i> Samuel Nicolai , Casella Waste Systems | |
| | <i>Tritium and Radium in Pennsylvania Landfills</i> Suzie Boxman , Environmental Research & Education Foundation | |

10:00am – 10:30am Break

10:30am – 12:00pm

Session Five

| TRACK A | TRACK B | TRACK C |
|--|--|---|
| Coal Ash Management & Beneficial Use | Composting | PFAS Management |
| <i>Life Cycle Impacts of Harvested Coal Ash Used as Cement Replacement in Concrete</i> Craig Benson , University of Wisconsin-Madison | <i>Meeting the Organics Infrastructure Challenge in Orange County, CA</i> Tom Koutroulis , Tetra Tech | <i>Characterization and Quantification of Per- and Polyfluoroalkyl Substances in Landfill Gas from U.S. Landfills</i> Florentino De la Cruz , University of North Florida |
| <i>Long-term Performance of Bentonite-polymer Geosynthetic Clay Liners Permeated with Typical Coal Combustion Leachates</i> Kuo Tian , George Mason University | <i>Which has Fewer Air Pollutants? Aerated Static Pile Composting or Anaerobic Digestion with Short Aerobic Composting</i> Ramin Yazdani , University of California, Davis | <i>Cost-Effective PFAS Removal from Landfill Leachates</i> Martin Bureau , Altra-Senexen |
| <i>Forty Years of EPRI Research on CCP Leaching</i> Bruce Hensel , EPRI | <i>PFAS in Compost</i> Syed Md Iskander , North Dakota State University | <i>Evaluation of PFAS through Leachate Evaporation</i> Travis Smith , Heartland Water Technology |
| <i>Sequestering PFAS in Concrete Made with Modified Coal Fly Ash</i> Sk Sadman Sakib , North Carolina Agricultural and Technical State University | <i>PFAS Legal and Regulatory Risks in the Composting Sector</i> Wes Younger , Trinity Consultants | <i>Cost Effective Leachate Pretreatment to Remove PFAS</i> Jeffrey Murray , HDR |

12:00pm – 1:30pm Lunch & Poster Viewing

Conference Agenda

Tuesday, February 27

1:30pm – 3:00pm

Session Six

| TRACK A | TRACK B | TRACK C |
|---|--|---|
| Landfill Emissions Regulation & Measurement | ETLF Lessons Learned and BMPs (Panel) <i>Debra Reinhart, University of Central Florida</i> <i>Moderator and Panel Chair</i> | PFAS Treatment in Leachate |
| <i>Landfill Emissions Regulations and Offset Opportunities in Canada</i> Jenn Packer , GFL Environmental | <i>Lessons Learned and Best Practices for Preventing and Managing Elevated Temperature Landfills</i> Morton Barlaz , North Carolina State University Michael Beaudoin , Republic Services Craig Benson , University of Wisconsin – Madison Bill Meyer , WM | <i>Taking Fear Out of PFAS with Foam Fractionation</i> Brad Granley , Leachate Management Specialists |
| <i>Large Scale Landfill Emission Measurement Across Canada</i> Rebecca Martino , Saint Francis University | | <i>The Effect of the Clay-GAC Combined Media on the PFAS Treatment System</i> Farrokh Shoaie , Orange County Waste & Recycling (OCWR) |
| <i>Assessing Landfill Methane Emissions by Multiple Measurement Approaches</i> Roger Green , WM | | <i>Landfill Leachate Column Test to Compare Adsorptive Media for PFAS Treatment</i> Purshotam Juriasingani , Tetra Tech |
| <i>Contrasting Field Monitoring and GHGRP Data within the Context of Reducing Landfill Methane Emissions</i> Tarek Abichou , Florida State University | | <i>Electrochemical Destruction of PFOA and PFOS in Landfill Leachate – A Pilot Test</i> Jared Alder , Aclarity |
| 3:00pm – 3:30pm | Break | |

3:30pm – 5:00pm

Session Seven

| TRACK A | TRACK B | TRACK C |
|---|--|--|
| Landfill Operations II | Landfill Gas Processing | Recycling & Circularity |
| <i>Quantified Moisture Contributions from Precipitation, Waste, and Leachate for Active MSW Landfills</i> Max Krause , US EPA | <i>Increasing Renewable Energy Potential of Landfill Gas by Electrocatalytic Conversion of Carbon Dioxide to Methane at Low Temperature</i> Asma Akter Rony , The University of Texas at Arlington | <i>Leveraging Personalized Education and Automated Cart Audits: An Analysis on Recycling Contamination and Resident Engagement</i> Sam Dietrich , Prairie Robotics |
| <i>Installing a Drilled Vertical Riser to Return a Leachate Collection Sump to Compliance</i> Tamara Perkins , Weaver Consultants Group | <i>Process Modeling and Techno-Economic Analysis of Intensified Biogas to Liquid (IBGTL) Process</i> Rarosue Amaraibi , University of South Florida - Tampa | <i>Engaging Consumers in the Circular Plastic Economy</i> Mahdi Takaffoli , 5REDO |
| <i>Geotechnical Assessment of Landfilled Oilfield Waste: Implications for Waste Management Practices</i> Scott Graves , Geosyntec Consultants | <i>Tandem Catalytic Reactor for Single-Step Production of Value-Added Hydrocarbons from Biogas</i> Olusola Johnson , University of South Florida | <i>Utilization of Industrial By-products in Sustainable Construction of Transportation Superstructure</i> Alireza Mohammadinia , WSP |
| <i>Landfill Leak Location Case Study: Utilizing Multiple Leak Location Survey Methods to Locate a Defect in a Landfill Baseline System</i> Christopher Dohner , Civil & Environmental Consultants, Inc. | <i>Ohio Landfills - Gas Desulfurization</i> Kyle Bertke , ET Design - Build | <i>Improved Sampling Methods of PV Modules for Toxicity Testing to Support End-of-Life Decisions</i> Stephanie Shaw , EPRI |
| 5:00pm – 6:30pm | Reception & Poster Viewing | |

Conference Agenda

Wednesday, February 28

7:00am – 8:15am

Breakfast

8:30am – 10:00am

Session Eight

| TRACK A | TRACK B | TRACK C |
|---|---|---|
| Landfill Post Closure | Waste Collection | Case Studies in Leachate Management |
| <i>Performance Based Post Closure and Current Approaches Used in Different States</i> | <i>How to Achieve Maximum Landfill Diversion of Organics: Food Waste Collection vs Single Bin Mixed Waste Collection</i> Luc De Baere , OWS | <i>Lessons Learned on the Use of Analytical Tools For Recovering Treatment Plants From Loss of Capacity</i> Ronald Overholt , US Water Industrial Group |
| <i>Temporary Exposed Geomembrane Cap in Large Areas</i> Rick Buffalini , Civil & Environmental Consultants, Inc. | <i>Measuring Temperature and Odour: A Study in Semi-Underground Waste Containment</i> Tim Corcoran , Molok North America Ltd. | <i>Understand Your Scale Challenge: Precipitate New Solutions with Chemical Modeling</i> Shubhashini Oza , Brown and Caldwell |
| <i>Solar on Landfills: A “One Stone Two Birds” Solution for Landfill Closure and Renewable Energy Generation</i> Ming Zhu , Watershed Geosynthetics | <i>Leveraging Branded Litter Audits to Foster Extended Producer Responsibility</i> Rebecca Yandam , Zoomlion Ghana Limited | <i>Treatment of Landfill Leachate from a Recently Opened Landfill Site in Nepal using a Two-Stage Continuous Aerobic Moving Bed Biofilm Reactor</i> Anjal Bohaju , Kathmandu University |
| <i>Maximizing Solar Potential on Closed Landfill Sites</i> James Walker , Tetra Tech | <i>Condition and Risk Assessment of Critical Infrastructure</i> Jeremy Heyerly , Civil & Environmental Consultants, Inc. | |

10:00am – 10:15am

Break

10:15am – 11:45am

Session Nine

| TRACK A | TRACK B | TRACK C |
|---|---|---|
| PFAS in Biosolids & Special Wastes | Leachate Treatment | PFAS & Landfill Liners |
| <i>Effect of Sample Mass on PFAS Characterization of WWTP Biosolids using EPA Method 537M</i> Terry Johnson , WM | <i>Using Landfill Gas Condensate as a Carbon Source for Landfill Leachate Denitrification</i> Md Ashik Ahmed , North Carolina Agricultural and Technical State University | <i>Migration of Per-polyfluoroalkyl Substances (PFAS) in High-density Polyethylene (HDPE) Geomembrane Liners</i> Kuo Tian , George Mason University |
| <i>Fate of PFAS through Thermal Processes Treating Wastewater Solids</i> Lloyd Winchell , Brown and Caldwell | <i>Leachate Phytomanagement Pilot Test Implementation at a Closed Landfill in Northern Virginia</i> Yovanna Cortes Di Lena , Geosyntec Consultants | <i>Key Parameters of Per- and Polyfluoroalkyl Substance Transport in Landfill Composite Liners</i> Yu Tan , University of Wisconsin Madison |
| <i>Does the Disposal of PFAS-containing Special Wastes Impact Leachate PFAS Concentrations?</i> Vie Villafuerte , North Carolina State University | <i>Effects of Foam and Best Practices for Defoamer Usage</i> Ronald Overholt , US Water Industrial Group | <i>New “Hybrid” Geosynthetic Clay Liners as Barrier Systems for PFAS Waste Containment</i> Michael Donovan , CETCO, Inc. |

12:30pm

Golf

2024 Poster Session Presentations

Anaerobic Digestion of Food Waste Components: Modeling Biogas Production

Opeyemi Adelegan, University of Texas Arlington

Breaking the Lignin Barrier with Termite TAV5 Treatment Technology (T4): Biopower and Biofuel from Agricultural Waste

Hussain Ali, University of Texas at Arlington

Using Data and Mapping to Capture Attention and Tell Your Story

Cecile Carson, Keep California Beautiful/Carson Consulting

Life Cycle Assessments of Residential Curbside Waste Collection Programs

Mert Gokgoz, University of Central Florida

Remediation of Contaminated Dumpsite Soil: An Evaluation of Soil Amendments in Combination with Phytoremediation

Sasha Jones, University of Texas at Arlington

Waste Composition in New York State: 2022 Sampling Results

Sameena Manzur, Stony Brook University

Textile Solid Waste Recycling: A Circular Economy Approach

Maeen Md Khairul Akter, Stony Brook University

Waste Management and Urban Planning: Mixed Outcomes – Global Climate Change and Greenhouse Gas Emissions Considerations vs Improving Service Equity and Efficiency in African Cities. Lessons From Freetown, Sierra Leone, and Kigali, Rwanda

Pius Nishimwe, GOAL Ireland

Trends in Surface Emissions Monitoring

Keshav Parikh, Civil & Environmental Consultants, Inc.

Keynote Speaker

MEET YOUR KEYNOTE SPEAKER!

Dave Call, Senior Vice President of Operations Support, Republic Services

Leveraging sustainability as a platform for growth requires driving innovation and making investments in projects that deliver significant environmental and economic benefits. How? By making commitments to advance circularity, reduce fleet emissions and decarbonize operations.

Advancing Circularity

Plastics circularity has traditionally been limited, with most plastic being downcycled into products with few options for further recycling. As part of our commitment to enabling greater circularity of plastics, we're developing the Republic Services Polymer Center, the nation's first vertically integrated plastics recycling facility.

Reducing Fleet Emissions

Republic Services' fleet of 17,000 vehicles is a meaningful part of our carbon footprint, which is why we've made the industry's largest commitment to fleet electrification. In early 2023, we rolled out the first fully integrated, zero-emissions collection truck, designed and built by our longtime supplier Oshkosh Corp.

Supporting Decarbonization

Improving landfill biogas collection efficiency and beneficially reusing biogas are two important ways that Republic Services is decarbonizing our operations. With 65 landfill gas-to-energy projects at our facilities across the country, we're utilizing a naturally occurring byproduct of landfills to generate renewable energy for local communities. With more than 200 active landfills, we saw opportunity to scale up renewable energy production to support our customers' decarbonization goals.

Hear Dave's perspective on these timely topics and more.





Special Events

Golf Outing

Join your peers for an enjoyable afternoon of golf on the Clive Clark designed Celebrity Course at Indian Wells Golf Resort. The golf outing includes greens fees for the Players Course, as well as lunch and an awards ceremony. New for GWMS 2024 is the golf pairing feature that allows golfers to invite each other to play together. Golf handicap required.

Timeless Hospitality

The iconic Hyatt Regency Indian Wells Resort & Spa in Palm Springs, California is the official hotel for the Global Waste Management Symposium.

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