EREF’s Regional Summit on
Sustainable Solid Waste Practices & Research

*Leachate and Gas Management*
*Regulatory & Operational Perspectives*

November 13-14, 2014
Doubletree Suites by Hilton
Austin, Texas

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Focus Areas

- LANDFILLS
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- WASTE MINIMIZATION
- COMBUSTION/WASTE-TO-ENERGY
- EQUIPMENT/SAFETY
- CONVERSION TECHNOLOGIES
- LIFE CYCLE INVENTORY/ANALYSIS

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AGENDA
EREF’s Regional Summit on Sustainable Solid Waste Practices & Research
Leachate and Gas Management – Regulatory & Operational Perspectives

THURSDAY, NOVEMBER 13 (8:00 am – 5:00 pm)

BREAKFAST/EXHIBITS (7:00 – 8:00 am) – Bluebonnet Rooms A & B, Longhorn Room

All presentations will take place in the Bluebonnet Rooms A & B

Welcome/Introduction
Dr. Bryan Staley, EREF

Landfill Gas Management – An Owner’s Perspective
David Penoyer, Republic Services and Bill Meyer, Waste Management

Current and Future Trends in Landfill Gas Utilization
Mike Michels, Cornerstone Environmental Group

BREAK/NETWORKING/EXHIBITS (10:00 – 10:30 am) – Longhorn Room

Fugitive Emissions: Why We Should Care
Dr. Paul Imhoff, University of Delaware and Roger Green, Waste Management

Correlating Landfill Gas Modeling to Practice and Policy
Alex Stege, SCS Engineers

Understanding, Identifying And Managing Odor Issues
Dr. Pam Dalton, Monell Chemical Senses Center

LUNCH/NETWORKING (12:00 – 1:30 pm) – Bluebonnet Rooms A & B, Longhorn Room

PANEL DISCUSSION: REGULATORY ASPECTS AFFECTING LANDFILL GAS MANAGEMENT

Key Management Issues
Amy Banister, Waste Management

Summary of Primary Regulatory/Legislative Activity
Anne Germain, National Waste & Recycling Association

Current/Future Trends Related To Gas Management
Pat Sullivan, SCS Engineers

Municipal Solid Waste Air Permitting
Joe Shine and Kevin Whitenight, Texas Commission on Environmental Quality

Discussion

BREAK/NETWORKING/EXHIBITS (3:00 – 3:30 pm) – Longhorn Room
PANEL DISCUSSION: REGULATORY ASPECTS AFFECTING LEACHATE MANAGEMENT

Key Management Issues
Roger Green, Waste Management

Summary of Regulatory/Legislative Activity
Anne Germain, National Waste & Recycling Association

Regulatory Effects on Leachate Disposal Strategies
Pieter Scheer, Smith+Gardner

Working with Publicly Owned Treatment Works
Jeff Theerman, Brown & Caldwell

Discussion

RECEPTION (5:00 – 7:00 pm) - 219 WEST RESTAURANT & BAR
612 W. 6TH ST., AUSTIN, TX 78701

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FRIDAY, NOVEMBER 14 (9:00 am – 12:30 pm)

Breakfast this morning is on your own

Leachate Management – An Owner’s Perspective
Gary Hater, Waste Management

Correlating Leachate, Landfill Gas and Waste Stability
Dr. Chris Bareither, Colorado State University

How Leachate and Gas Management Affect Landfill Closure Strategies
Jeremy Morris, Geosyntec

BREAK/NETWORKING/EXHIBITS (10:30 – 11:00 am) – Longhorn Room

Operational Aspects of Leachate Generation and Management
Kevin Torrens, Brown & Caldwell

Inhibition of Disinfection by Leachate at Publicly Owned Treatment Works
Dr. John Novak, Virginia Tech

How Does Gas/Oil Exploration & Production Waste Affect Leachate Management
Eric Chiado and Ivan Cooper, Civil & Environmental Consultants

Meeting Adjourn (12:30 pm)
As the nature of landfills change - through increases in waste densities, changes in the nation’s waste stream, aggressive efforts by landfill owners to attract industrial/special waste customers - new and additional pressures are placed on those responsible for managing landfill gas. Design and O&M paradigms are changing, systems are getting larger and more complicated, perched liquids are impacting more and more sites, system efficiency and performance are gauged and pushed forward by a focus on metrics, and new technologies are on the drawing board and being tested more frequently. These challenges and others that are discussed in this presentation paint the picture of a significant opportunity for the LFG industry to take an important step forward.

Trends in landfill gas utilization in the last 5 years includes such market drivers as the push toward “zero waste,” federal tax credits, renewable portfolio standards, renewable fuel standards, natural gas pricing, gasoline and diesel pricing, and low carbon fuel standards. Renewable Fuel Standards (RFS2) are expected to allow more development of biogas-to-electricity for use in electric vehicle cars and landfill gas-to-BioCNG fueling. The likely effects of the growing movement towards banning food waste in landfills indicates increased biogas-to-energy via digesters and lower landfill gas generation in the short-term. The California low carbon fuel standard, high price of gasoline and diesel, poor air quality, and other market drivers will bring more renewable natural gas from landfills located outside California into California’s natural gas pipelines.

Predictions of landfill gas-to-energy and other emerging biogas trends that should be considered will be discussed, including historic landfill gas usage in the U.S. as tallied by the Environmental Protection Agency’s Landfill Methane Outreach Program and electric power production, as well as high-BTU and medium-BTU projects, and others.

Controlling fugitive landfill gas emissions is important for meeting regulatory requirements (non-methane organic compounds), minimizing odors for surrounding residents, and maximizing the collection of methane for energy production, where such facilities are installed. In order to understand and improve control of fugitive emissions, accurate measurement and/or prediction of emissions over the life of a landfill is needed. Over the last two decades, there have been significant advances in technologies for measuring fugitive emissions, which now span meter-scale flux chambers to whole-landfill measurements involving controlled release of gas tracers and gas measurements of the downwind plume. With these measurements, it is now possible to evaluate the adequacy of existing regulatory approaches for estimating fugitive emissions. For whole-landfill emissions, data are available for a number of landfills in the US and Denmark that allow a preliminary assessment of standard regulatory approaches for estimating emissions. In this presentation, we will review regulatory requirements on fugitive emissions, new field measurements for assessing the adequacy of those requirements, and results from intensive application of these field methods, where field-measured emissions are compared with model-predicted emissions that follow standard regulatory approaches.
Landfill gas (LFG) models are required for estimating emissions of methane and other LFG constituents for environmental compliance (“regulatory models”) and for forecasting fuel availability for LFG-to-energy projects (“non-regulatory models”). Both types of models have important effects on policy and practice in the LFG industry. Regulatory models not only are used for determining individual landfills’ emissions and regulatory compliance status, but also for the EPA to evaluate the potential impacts of new regulations. Non-regulatory models often are used to guide multi-million dollar investments in new or expanded LFG utilization capacity. Although they apply similar model structures, which are typically based on LandGEM (EPA, 2005) or the Intergovernmental Panel on Climate Change spreadsheet (IPCC, 2006), LFG models prepared for regulatory vs. non-regulatory applications often use very different methods and assumptions, including:

- For regulatory models, “conservative” is a high estimate; for non-regulatory models “conservative” is a low estimate.
- Regulatory models must use a prescribed process for assigning model inputs (waste disposal rates, waste decay rates, methane production rates, and collection efficiency).
- Non-regulatory models allow for adjustment of model input parameters based on professional judgment and an evaluation of the reliability and “representativeness” of available data.
- Regulatory models consider a limited number of site-specific factors affecting LFG generation and recovery.
- Non-regulatory models can (attempt to) account for multiple site-specific factors.
- Regulatory models focus on estimating unknown and unmeasured values for LFG generation and emissions, and assume that emissions equals theoretically modeled generation minus recovery and 10% oxidation.
- Non-regulatory models focus on LFG recovery, which enables them to be calibrated to account for empirical data.

These important differences between regulatory and non-regulatory modeling can yield very different results for the same landfills. If performed by an experienced professional, non-regulatory modeling enjoys significant advantages in achieving forecast accuracy due to its greater flexibility to account for site-specific conditions and empirical data. However, even the best modelers may not be good forecasters of changing future conditions (due to disposal declines, organics diversion programs, different collection system expansion schedules, etc.), so that “model forecasting accuracy” is difficult to define.

Complaints about malodors comprise one of the chief issues confronting landfill operators, particularly for those facilities in close proximity to residential communities. Understanding and identifying the nature of landfill odor sources and potential alternative sources are key to managing odor issues. However, the frequency of malodor complaints coupled with reports of health symptoms is often inconsistent with known levels of emissions, leading to frustration on the part of landfill operators and the community alike. This talk will provide an overview of the multiple factors—including expectations, suggestion and physiological reactions—that influence individual and community responses to odors from landfill management. Recognizing the interaction between the sensory, physiological and the psychological responses to odors is of significant importance when trying to address community complaints. However, the successful application of these findings to practice requires a better understanding of the relationship between actual community exposures and response thresholds for each level of effects. This approach often necessitates an increased focus on measuring the association between the dynamic profile (i.e. intensity, frequency and duration) for key odorants in landfill emission sources (landfill gas, leachate and solid waste) and the perception and response of exposed community residents.
The panel will address legislative activity and current/future trends related to landfill gas management. Specific topics identified for discussion include the recent US EPA Landfill NSPS/ANPRM rulemaking initiatives and how gas management plays into state landfill permitting processes. The potential impact of the EPA proposed Clean Power Plan Rule on LFG beneficial use projects, as well as EPA’s pending release of its revised “Accounting Framework for Biogenic CO2 Emissions from Stationary Sources”, will be summarized. Stakeholder perspectives on the key topics and next steps will be discussed. The panel will also field questions provided by the audience.

The panel will discuss critical management issues associated with leachate management and how current and future regulatory actions may influence treatment strategies. Operational considerations related to direct discharge of treated leachate versus disposal of leachate via publicly owned treatment works (POTWs) will be discussed. Perspectives on how POTWs evaluate whether or not to accept leachate will be shared. Local policy impacts on management discussions will also be summarized. The panel will also field questions provided by the audience.
Leachate Management – An Owner's Perspective  
Gary Hater, Waste Management

Historically leachate has been hauled to a local municipality or pretreated for BOD and ammonia reduction and hauled or discharged to a municipality. Today these two options are still preferred but are being excluded or enhanced because of changes in regulations, modernization at the municipality and cost of fuel for transportation. Regulations for discharge to the environment are changing from an ammonia discharge limit to a TKN limit (organic nitrogen and ammonia). A discharge limit of 3 ppm TKN is now common on renewed or new discharge permits. For landfill owners the organic nitrogen often has greater than 20 ppm organic nitrogen much of which is RDON (refractory dissolved organic nitrogen). A significant percentage of this organic nitrogen will not biodegrade. Many municipalities are changing from chlorination for disinfection of final effluent to ultraviolet light disinfection. Raw and pretreated leachate has paper, cardboard and wood breakdown byproducts called humic and fulvic acids these adsorb or quench UV light. This has led to a 3% rule for owners for discharge to municipalities. Salt or chlorides are now also regulated in many areas. Landfill leachate is often as salty as seawater. Some facilities have also taken salt cake or aluminum dross from the Aluminum industry and these facilities can have very high total dissolved solids values. The result of these changes in the industry is now in some cases leading us to advanced treatment. This typically includes large-scale evaporation, reverse osmosis, and membrane bioreactors.

Correlating Leachate, Landfill Gas and Waste Stability  
Dr. Chris Bareither, Colorado State University

Waste stability can be viewed as a state of near complete decomposition of organic waste constituents such that human health, environmental, and financial risks associated with undecomposed waste are reduced. Short-term and long-term risks associated with landfilled waste arise from gaseous emissions, organic or inorganic contaminants in leachate that have potential to be released to the environment, and settlement of the waste mass to the extent that settlement results in damage to the final cover and/or gas collection and control system. Assessing waste stability from a landfill perspective commonly is completed based on gas generation; however, leachate chemistry, waste composition, and waste settlement can be effective measures to supplement and enhance waste stability analyses. An overview of coupled physical, chemical, and biological behavior from relevant case study examples are used to document inter-relationships between solid waste, leachate, and gas metrics. These case studies provide a basis to develop multi-phase and multi-parameter assessments for waste stability in solid waste landfills.

How Leachate and Gas Management Affect Landfill Closure Strategies  
Jeremy Morris, Geosyntec

Geosyntec worked with a multi-disciplinary team on an EREF funded project to develop the Evaluation of Post-Closure Care (EPCC) Methodology, which has been available since 2006. The methodology provides a technically defensible, performance-based approach for evaluating the site-specific elements of post-closure care (PCC) at municipal solid waste landfills regulated under RCRA Subtitle D. A modular approach for evaluating the functional stability of a landfill facility is adopted in which the four primary PCC elements required under Subtitle D (i.e., leachate management, gas management, groundwater monitoring, and final cover maintenance) are sequentially addressed. Following a step-down procedure, the EPCC methodology can be used to demonstrate how and when operation and maintenance of leachate and gas control systems can be optimized and what associated monitoring of control systems and potentially affected media (groundwater, surface water, air, vadose zone) is appropriate. The ultimate goal is responsible cessation of active leachate and gas management, with residual treatment of de minimis emissions provided by natural analog systems (e.g., wetlands, biocovers) that are fully passive or require only low levels of unspecialized maintenance. This presentation will briefly review application of the EPCC methodology to assess leachate and gas management after landfill closure, illustrated using examples of step-down modifications to control systems that can be taken. Based on experience and lessons learned from evaluation of already-closed landfills, design decisions at operational landfills that can maximize future flexibility will also be highlighted.
Operational Aspects of Leachate Generation and Management
Kevin Torrens, Brown & Caldwell

Leachate management has become a significant operational cost for landfill owners (estimated at up to 30 percent of operational costs). The presentation will discuss considerations for minimizing leachate management costs, including identification of disposal options, effective disposal permit negotiations (where applicable), leachate minimization and on-site management treatment technology selection (as needed), and operations optimization. Additionally, there are several key drivers that impact this process which are related to leachate characteristics (e.g. impact on UV disinfection at Publicly Owned Treatment Work’s (POTW), refractory Dissolved Organic Nitrogen (rDON), gas well liquids) which will be discussed. Successful approaches for developing and maintaining effective relationships with POTW’s will be introduced.

Inhibition of Disinfection by Leachate at Publicly Owned Treatment Works
Dr. John Novak, Virginia Tech

Two characteristics of leachate create problems when leachate is disposed to municipal sewer systems. These are: leachate blocks UV light and interferes with UV disinfection and leachate contains organic nitrogen that can result in violation of nitrogen limits at publicly owned treatment works. Extensive characterization of leachate and investigations into leachate treatment methods has led to insights into the applicable treatment technologies. In addition, other technologies are currently under investigation. Much of the UV blocking substances are the result of humic acids in leachate. Humic acids are difficult to degrade, however, it appears that for older leachates, the humic acid content is relatively low. Humic acids can be removed by microfiltration and we are investigating the removal by anaerobic membrane bioreactors. Organic nitrogen is very low in molecular weight material and resists biodegradation and most physical-chemical removal methods. Some removal of both humic acids and organic nitrogen can be achieved by ion exchange. However, this method is most effective for leachates that require partial removal or seasonal treatment.

How Does Gas/Oil Exploration & Production Waste Affect Leachate Management
Eric Chiado and Ivan Cooper, Civil & Environmental Consultants

In the past decade American industry has used unconventional production methods, which include horizontal drilling and hydraulic fracturing, to extract enormous volumes of gas and oil from tight shale formations. A result of unconventional production is the generation of large quantities of solid, semi-solid and liquid wastes, collectively referred to as Exploration & Production (E&P) waste. Much of this waste is disposed in municipal solid waste landfills, and in certain regions of the country E&P waste can comprise a substantial portion of a landfill’s overall wastes stream. E&P wastes typically possess high concentrations of total dissolved solids, chlorides, and sulfates, and low to moderate concentrations of several toxic heavy metals. Further, E&P wastes can contain naturally occurring radioactive material (NORM) and Technologically Enhanced NORM (TENORM). An evaluation of leachate quality from several landfills that accept various quantities of E&P waste is provided herein. A “before” and “after” quality comparison is used to evaluate potential changes in leachate chemistry, and identify whether or not these changes represent an emerging issue.

These constituents have the potential to impact leachate quality detrimentally to the point where alternatives need to be considered. Specifically, the elevated concentrations of TDS may change the applicability of existing treatment or require additional processes. For example, an SBR process may not function well under an elevated TDS scenario, and may require a reverse osmosis or other technology in addition to, or replacement of, existing treatment technologies. Stabilization to prevent leachate impact from these wastes may be an alternate approach. Other scenarios may require pretreatment of some or all of the E&P wastes prior to placement in a landfill. The potential impacts these changes may have on existing on-site treatment systems or ability to discharge to Publically Owned Treatment Works are discussed, and technologies that can be used to manage and improve leachate quality are presented.
AMY VAN KOLKEN BANISTER has a Bachelor’s Degree in Geology from Hope College in Holland, Michigan. She has more than twenty years of experience in air quality consulting, project management, regulation development and planning, as well as corporate environmental program implementation. She is currently responsible for directing air program activities at Waste Management, which includes developing corporate policies and standards and training programs for application at Waste Management North American facilities. Ms. Banister is also responsible for corporate climate change reporting and participates in regulatory advocacy for air issues pertaining to Waste Management and the solid waste industry.

DR. CHRISTOPHER BAREITHER earned his BS in Geological Engineering in 2004 from the University of Idaho, and earned his MS and PhD in Geological Engineering from University of Wisconsin-Madison (UW) in 2006 and 2010. He worked as an Instructor and Research Associate at UW-Madison until 2012, whereupon he started at Colorado State University as an Assistant Professor in the Department of Civil and Environmental Engineering. Christopher’s research focuses on physical, chemical, and biological behavior of geomaterials, scale effects in field- and laboratory-scale testing, and sustainable solutions to geoengineering problems. In addition, he is faculty advisor to the CSU chapter of Engineers Without Borders that is actively engaged in engineering challenges for developing communities, and is a licensed Professional Engineer in the state of Colorado.

ERIC CHIADO is a Principal with Civil & Environmental Consultants, Inc., located in Export, Pennsylvania. He is a West Virginia University graduate with Bachelor and Master of Science in Civil Engineering degrees. Eric has spent the last 25 years on the consulting side of the waste management industry, and possesses extensive engineering and management experience associated with the design, permitting, and construction of municipal and industrial waste disposal facilities. Mr. Chiado currently leads CEC’s solid waste group where he is responsible for technical development of the staff and capabilities. He is an active member of the Solid Waste Association of North America. Today’s presentation is based on CEC’s experiences with shale gas/oil Exploration and Production waste and its potential impact on landfill leachate and associated management.

IVAN COOPER is the National Water and Wastewater Practice Leader for Civil and Environmental Consultants, Inc. He has detailed experience for solid waste to energy projects, leachate treatment, water and wastewater reuse. He has designed over 100 wastewater treatments plants and oversees projects, wastewater permitting, and treatability. He is a graduate of Union College and has a Master’s Degree in Civil Engineering from Northwestern University. He is a PE in 13 states, and is a Board Certified Environmental Engineer from the American Academy of Environmental Engineers with a Wastewater Treatment Specialty.

DR. PAMELA DALTON received her Ph.D. from New York University in Experimental Psychology and her MPH from Drexel University. Dr. Dalton is a senior scientist at the Monell Chemical Senses Center in Philadelphia, a nonprofit, multidisciplinary, basic research institute devoted to the study of smell, taste and chemical irritation. Her research program explores the interactions among physiological and psychological factors in the human response to odor. The research she conducts investigates the role of social and non-social odors in both eliciting and reducing stress, the effects of occupational and residential pollutant exposures on chemosensory function and chemical communication of emotional states. She has been a consultant to many groups in the chemical, household products, fragrance, agricultural and waste management industries, as well as government and community organizations involved in odor issues.
ANNE GERMAIN has been the Director of Waste & Recycling Technology for the National Waste & Recycling Association since September 2013. Prior to that, she was the Chief of Engineering and Technology for the Delaware Solid Waste Authority. She graduated from Virginia Tech with a B.S. in Civil Engineering and received her Master’s, also in Civil Engineering, from the University of Delaware. In addition, she is a Past President of the Solid Waste Association of North America. She has written over 20 papers and has presented nationally and internationally on solid waste and recycling matters.

ROGER GREEN is a Director in Waste Management’s corporate Environmental Management Group. His responsibilities have included the development and evaluation of processes for waste treatment and remediation. He provides technical support to the company’s bioremediation, landfill and wastewater treatment facilities projects. He is involved in the company’s work on greenhouse gas emission quantification and modeling and biologically active landfill cover systems. Mr. Green has been employed by Waste Management since 1993. He earned a Bachelor of Science in Biochemistry and Biology and Master of Science in Environmental Science from the University of Cincinnati.

GARY HATER is currently employed as the Senior Director of Engineering Sciences/WWT at Waste Management, Inc. Gary has a bachelor’s degree in Biology from Thomas More College and a master’s degree in Biology from University of Cincinnati. He holds in excess of ten patents related to landfills, bioremediation and landfill bioreactors. The research program has supported more than sixty graduate students at four universities and has led to dozens of publications. He was installed in the Environmental Industry Association (EIA) Hall of Fame in 2013. He has been with Waste Management for over 25 years.

DR. PAUL IMHOFF is a Professor in the Department of Civil and Environmental Engineering at the University of Delaware, Newark, DE, USA. Dr. Imhoff received his degrees in Civil and Environmental Engineering at the University of Cincinnati (BS), University of Wisconsin (MS), and Princeton University (MA, PhD). Dr. Imhoff’s teaching and research interests focus on the movement of fluids and mass transfer processes in porous media, with a particular emphasis on model development and application. In the last 10 years he has employed field, laboratory, and computer modeling techniques to understand and describe the movement of gas and liquid in landfills and to advance technologies for improved capture of landfill gas and measurement of whole-landfill methane emissions.

WILLIAM MEYER is Corporate Director of Gas Operations for Waste Management, Inc. His current duties include creation and implementation of Landfill Gas Best Practices and Corporate oversight of GCCS Design and Operations. He holds a Bachelors of Science degree from Northern Arizona University as well as a Masters of Business degree from Our Lady of the Lake University. During his thirty plus years of involvement with the landfill gas industry, William has participated in all aspects of the management of landfill gas; wellfield operations, GCCS design / construction, power plant design / operations, and environmental compliance. In addition, his career experience has included a variety of capacities associated with landfill gas; wellfield technician, construction superintendent, project manager, and lead trainer.

MICHAEL MICHELS is a co-founder of Cornerstone Environmental Group, an engineering consulting and field service firm dedicated to providing services to the solid waste industry and commercial, industrial, and agricultural clients throughout the nation. His 35 years of experience has focused primarily on the development of landfills and implementation of landfill gas-to-energy systems, including vehicle fuel production, pipeline injection, greenhouses, electrical generation, and other beneficial uses. He serves on the Board of Directors for Cornerstone and for BioCNG, LLC, an affiliated company with a patent-pending process to convert biogas into vehicle fuel.
JEREMY MORRIS has over 18 years of professional and academic experience in the field of solid waste management, with particular expertise in issues relating to waste disposal by landfill. Educated at Imperial College, London, England and the University of the Witwatersrand, Johannesburg, South Africa, his Ph.D. research work involved investigating methods for enhancing waste degradation and landfill gas generation at water deficit landfills, and field measurement and modeling of fugitive greenhouse gas emissions through landfill covers. Since joining Geosyntec in 2001, he has provided technical design and project management services during permitting and construction of new landfills and lateral or vertical landfill expansions at numerous sites around the country and internationally. His technical specialties include landfill closure and post-closure care, waste characterization and landfill processes, and leachate characterization and treatment.

DR. JOHN NOVAK is the Nick Prillaman Professor Emeritus of Civil and Environmental Engineering at Virginia Tech where he has been a faculty member for the past 33 years. In addition to receiving multiple prestigious awards, he is the author of over 350 papers in journals and conference proceedings and has served as the major advisor to over 200 graduate students. Dr. Novak also served 6 years as a member of the Research Council of the Water Environment Research Foundation, the last three as Chair. His BS and MS degrees are from the University of Missouri-Columbia and his PhD is from the University of Washington.

DAVID PENOYER has 18 years of experience in the landfill gas industry, both as a consulting engineer, and in his current position as the corporate manager of landfill gas operations for Republic Services. His experience includes numerous landfill gas design, permitting, construction, and operations and maintenance projects. Since joining Republic in 2010, he has been responsible for managing Republic’s landfill gas program, including capital budget oversight, construction contracting, establishing guidelines and benchmarks by which systems are evaluated, and providing technical direction for design, construction, and operations, maintenance, and monitoring of landfill gas collection and control systems at over 200 landfills across the U.S. Mr. Penoyer has a Bachelor of Science degree in Environmental Engineering from the University of Florida and is a registered Professional Engineer.

PIETER SCHEER is a Vice President and Senior Engineer with the firm Smith Gardner, Inc. (S+G) of Raleigh, North Carolina. S+G provides consulting engineering services primarily in the solid waste industry to public, private, and industrial clients in the eastern U.S. Mr. Scheer has 22 years of design and project management experience working on the siting, design, permitting, and construction of municipal and industrial landfill containment cells and closures. Mr. Scheer is a licensed Professional Engineer in North Carolina, South Carolina, and Virginia and holds both Bachelors and Masters Degrees in Civil Engineering with a focus on Geotechnical Engineering from N.C. State University.

JOSEPH SHINE is a Team Leader in the Rule Registrations Section of the Air Permits Division at the Texas Commission on Environmental Quality. Joe has an undergraduate degree from Texas A&M University and a graduate degree from the University of Southern California. He has been with the agency since 2010 and is responsible for the technical review of permits by rule and standard permits.

G. ALEXANDER STEGE has 27 years of professional experience in environmental research and consulting, including 24 years at SCS Engineers. Over the past 19 years, Mr. Stege has supported the U.S. EPA’s LMOP, World Bank, International Finance Corporation, landfill owners, municipalities, and LFG project developers in preparing LFG models and evaluating the feasibility of LFG utilization projects. As SCS Engineer’s National Partner (company leader) in LFG recovery modeling, he was responsible for the development of SCS’s empirical LFG model calibration method and database of over 1,000 years of historical flow data from over 200 modeled landfills. He has prepared many hundreds of LFG recovery projections, and project assessment, due diligence, or feasibility reports for landfills in the U.S. and throughout the world. Alex Stege has a B.S. in Geology from Tufts University in Massachusetts and a Master’s degree in Geography from UCLA.
PATRICK SULLIVAN has a degree from Harvard University and over 25 years of experience in solid waste consulting. He is a Senior Vice President and Managing Director for SCS Engineers’ consulting and engineering practice in the Southwestern U.S. He is SCS’s National Partner for Air Quality and Greenhouse Gas (GHG) services. Mr. Sullivan acts as the Principal-in-Charge for Air quality, GHG, Landfill Gas (LFG), and odor projects for solid waste facilities, including over 200 landfills. He has published over 25 technical papers in industry publications and presented at over 35 conferences, including the SWANA, EREF, and NWRA events.

JEFF THEERMAN is a Vice President and a Senior Performance consultant for Brown and Caldwell. As BC’s national leader for Performance Consulting practice, he focuses on bring best business practices to public and private sector clients. In addition to business performance, Jeff has assisted private sector clients in their working relationships with publically owned wastewater utilities. For nine years Jeff was on the Board of the National Association of Clean Water Agency’s (NACWA), serving as its president in 2010. He holds Bachelors and Masters Degrees in Civil Engineering and is a registered professional engineer in Missouri.

KEVIN TORRENS has over 30 years of experience in industrial wastewater, leachate treatment, O&M, and hazardous waste site remediation groundwater treatment projects. He holds a Masters Degree from Vanderbilt University in Environmental and Water Resources. Kevin has had significant experience treating complex wastewaters such as those from landfill leachate, pharmaceuticals and chemicals industries and is the National Practice Leader for leachate management at Brown and Caldwell. He is actively engaged in research and evaluation of innovative treatment processes that have the promise of reducing leachate management costs and addressing emerging issues such as impacts of leachate on POTW operations.

KEVIN WHITENIGHT is a Technical Specialist in the Rule Registrations Section of the Air Permits Division at the Texas Commission on Environmental Quality. Kevin has been at the agency for over 20 years and is considered an expert in multiple areas of air permitting.