
ERIC R. PETERSON, PE

Education

M.S. - Environmental Engineering, Duke University, 1985
B.S.E. - Civil Engineering, Duke University, 1980

Professional Licenses

Registered Professional Engineer - VA, DE, MD, NJ, PA and NC

Professional Affiliations

Solid Waste Association of North America

Professional Experience

Mr. Peterson joined SCS in 1985 and works primarily on landfill gas (LFG) control and recovery projects. He is the director of the Medford, New Jersey office and is a leader in the company's far-reaching Landfill Gas practice. Mr. Peterson directs LFG investigations and energy utilization studies; provides due diligence for energy and carbon emission reduction investors, designs LFG systems for energy recovery and control of emissions, odors, and migration, and provides training and consulting for system operations and optimization. He also is involved in bioreactor and leachate recirculation system engineering and operations consulting.

His projects involve permitting, design, construction engineering, system start-up, and troubleshooting. He has designed over 150 LFG systems including LFG recovery systems; emissions and odor control systems; and systems to protect buildings located adjacent to and on landfills. As an expert in landfill emissions, air regulations, and associated permitting and compliance requirements, he has conducted training air compliance seminars to both private waste firms and regulatory agencies. Examples of his project experience include:

Burlington County, NJ – Project manager for LFG management services since 2006, including system operations, engineering consulting, regulatory compliance (Title V and NSPS) and construction assistance. Past consulting services also have addressed LFG system modifications in conjunction with large scale leachate recirculation practices, conveying LFG to fuel an onsite 7.2 MW power plant (startup in September 2007), blower station modifications, food waste disposal/management alternatives analysis, and integration of gas system design with expansion of the landfill through new cell construction.

Delaware Solid Waste Authority (DSWA) Southern and Central Landfills: LFG Control & Recovery. Project Manager and director for various LFG permitting, design, and construction projects including work both for the Authority and onsite energy developer (Ameresco). Permitting activities have included pre-construction permits for flares, permit modifications to add sulfur treatment (including BACT analysis), application to add a new engine generator, and various Title V and NSPS compliance activities. SCS also has designed and constructed LFG system wellfield expansions for odor control and energy recovery purposes. For the Central Landfill, design work has had to consider ongoing leachate recirculation efforts via a system of

reinjection trenches.

DSWA Cherry Island Landfill: Air Permitting and LFG Engineering. Project Manager and Director for various LFG collection system design and construction tasks. Air permitting tasks have included hydrogen sulfide generation and dispersion modeling; Title V permit review; assessment of air permit implications of proposed self generation project involving and onsite 1-MW engine generator (specifically NSR and PSD applicability). This effort was part of a comprehensive (technical, economic, and environmental analysis) evaluation of generating power to offset onsite power consumption that exceeded a million dollars per year.

Pollution Control Financing Authority of Camden County, Pennsauken, NJ Groundwater Remediation Design Engineering Services. Project Director for the groundwater remediation system design. Tasks include the preparation and submission of all design documents, the preparation of bid documents, review of all bids submitted by potential contractors, and assist in the selection of the contractor to perform the remediation services. SCS is also tasked with the preparation of an engineering cost estimate for the implementation of the groundwater remediation system.

Cumberland County Improvement Authority, Millville, NJ LFG Engineering Services. Project Manager for comprehensive landfill gas management services. Prepared permit drawings for the overall system at final grade and construction drawings and specifications for six phases of system installation. Engineering services during construction and air permitting (Title V and Flare permit) were also provided. SCS also assessed the feasibility of energy recovery and assisted the Authority in preparing an RFP and reviewing proposals from third party developers. Ongoing services with the Authority include Title V monitoring and reporting, gas system operations and maintenance, construction quality assurance, and consulting services for LFG management and regulatory compliance. He also participated in a landfill operations audit to develop comparative metrics of landfill performance to industry data.

Cumberland County Improvement Authority, Millville, NJ Consulting Engineer for Solid Waste System Revenue Bond. Client manager for preparing independent engineering report in support of the issuance of \$22,780,000 in Solid Waste System Revenue Bonds, Series 2009.

City of Greensboro, NC, Landfill Gas Dehydration. Project director for engineering, procurement, and construction of a gas dehydration and compression skid to treat LFG sent via pipeline to Cone Mills. The dehydration skid was added to an existing project to remove moisture, improve gas flow and pressure conditions, and assist in compliance with air regulations recently applicable to the landfill.

City of Winston-Salem, NC, Landfill Gas to Energy Consulting. Provided landfill gas to energy consulting services to the City regarding the valuation of LFG to be sold on a Btu basis to onsite energy developer. Services included preparation of a project pro forma reflecting City capital and operational costs versus revenues from gas sales to justify gas pricing terms in contract negotiations.

Michelin North America, Landfill Gas to Energy Evaluation at Three Manufacturing Facilities. Conducted pre-feasibility assessments of utilizing LFG from nearby landfills to displace boiler

fuel at three tire manufacturing plants located in Alabama and Oklahoma. The assessments included evaluation of energy needs; capital and operational cost estimates for LFG collection, compression, and transmission and boiler modifications; and potential benefits of fuel savings and carbon offsets.

Vogel Disposal, Mars, PA, High Btu Gas Processing Technology Evaluation. Conducted an evaluation of two landfill gas processing technologies to produce pipeline quality gas for a proposed project between the landfill owner and the local gas distribution company. The two technologies included the Kryosol solvent based system and the DuPont Air Liquide membrane based system. The evaluation included both technical and economic aspects along with process flexibility and experience record.

BMW/Palmetto, SC, LFG Utilization Project. As a consultant to Ameresco, an energy developer, assisted in the permitting and design of a 9-mile pipeline to transmit LFG from Waste Management's Palmetto Landfill to the BMW automobile manufacturing plant to fuel four existing gas turbines to generate electricity onsite.

Taylor, PA, Alliance (formerly Empire) Sanitary Landfill. Project manager for the design and permitting of an LFG collection and flare system. The system was initially installed for odor control and subsequently expanded by SCS (design/build) for high-Btu gas production. Other tasks included preparing an LFG feasibility study, calculating facility emissions for state air regulation requirements, and Title V and RACT permitting.

Raleigh, NC, Wilders Grove LFG Recovery System Design. Project Manager and lead engineer for the design of a landfill gas collection and pipeline project using LFG as a boiler fuel. The DOE recognized the project in 1994 with a national award under the Utility Technology Category for Energy Innovation.

Monmouth County, NJ, LFG Collection/Flare Systems. Project Manager for three system design/build projects. Phase I system included the meeting of New Jersey regulations requiring zero methane detection within on-site structures. The Phase II projects abated landfill odors by extracting LFG from an existing leachate collection system and, subsequently, from an expanded extraction well system in the active landfill. The collection systems are now being used to fuel a 10-MW power plant. In 2007, Mr. Peterson served as the engineer of record for the site/civil design work associated with the installation of a 1 MW power plant contracted through SCS Energy.

City of Richmond, VA, Engineering Services. Project Director of a multi-year contract involving five inactive landfills including evaluation and remediation of existing LFG migration control systems.

Frederick County, VA. Project Director for comprehensive LFG engineering services including design and construction of a leachate recirculation system, design of a LFG collection and flaring system; design and construction oversight of a methane migration cut-off trench; design and operations consulting for LFG-fire infrared heaters to heat onsite maintenance and storage buildings; Title V permitting; and ongoing consulting.

Prince George's County, MD, Brown Station Road Landfill. Project Director for LFG projects including CQA for the installation of an 11 million dollar facility involving a 4 MW power plant, new gas compressors and associated building, utility, and control systems; air compliance consulting for Title V and NSPS including monitoring, recordkeeping and reporting; LFG migration control engineering; and assistance with green power marketing.

Anne Arundel County, MD, Millersville LFG System Design. Project Manager for design in conjunction with landfill rehabilitation involving waste relocation and landfill capping. The project also included an evaluation of onsite LFG utilization feasibility. Additional projects managed for the County have included NSPS Tier 1 and 2 reporting, NSPS design plan preparation, Title V air permitting, and pilot-scale leachate recirculation system design and permitting. More recently directed an LFG system design project involving modifications to the existing header piping and blower/flare station.

Baltimore County, MD, LFG Management. Project Manager at five municipal solid waste landfills, one active and four closed. LFG monitoring data and migration controls were evaluated regarding protection of adjacent commercial and residential properties. Served as reviewing principal for design of an air injection system to control off-site migration and managed the design of a comprehensive LFG collection/flare system for emissions and migration control at the Eastern Landfill.

Howard County, MD, LFG Collection & Flaring Systems. Project Manager for LFG collection system design and construction monitoring for the Alpha Ridge and New Cut landfills in conjunction with landfill closure/rehabilitation projects. Other LFG- related services included Title V air permitting, a health risk assessment, LFG utilization feasibility studies, and presentations at public meetings.

Fairfax County, VA:

- **I-95 LFG Collection System Design.** Project Manager for the design to fuel two 3.2 MW power plants and a multiple flare system to combust excess gas. The project included a fully automated condensate collection and pre-treatment system and coordination of system design with closure plans involving a membrane cap.
- **I-66 & I-95 LFG Migration & Odor Control Systems.** Investigations, designs, construction oversight, and operations consulting for six separate systems. The I-95 control systems received the 1997 Excellence Award for LFG Systems from the Solid Waste Association of North America (SWANA).

Pine Grove Landfill, PA, LFG Odor Control System. Project Director for design, build, and operating services in conjunction with SCS Field Service to install an emergency candle flare system collecting LFG from vertical wells, horizontal collectors, surface collectors and leachate facilities. The effort was followed by installation of a permanent control system including two enclosed flares. Air permitting for a landfill expansion and Title V and presentations at public meetings were also performed.

Town of North Hempstead's Port Washington Landfill, NY. Design, permitting, construction

oversight, start-up operation, and trouble-shooting of two LFG emissions and odor control systems. The project included one vertical well system, one horizontal collection system (beneath an exposed membrane cap), and two enclosed flares.

Landfill Fire Investigations. Consulting for landfill fire investigations including data collection and interpretation, recommendations for response actions including measures to extinguish the fire and adjust LFG collection operations, and design of system/landfill repairs to address fire damage. Assignments have included the following landfills and/or developments over former landfills:

- Lakeside Market Place, GA
- Mid-shore Landfill, MD
- Anne Arundel County, MD
- Fairfax County, VA
- Harford County, MD
- Fauquier County, VA
- Baltimore County, MD
- Town of Islip, NY

International Experience

Due diligence assessment for **Inter-American Development Bank for Cancun Landfill** to evaluate the technical and economic feasibility of a proposed landfill gas to energy project.

Study for **World Bank** to analyze the under-delivery of certified emission reductions (CERs) from landfill gas CDM projects around the world. The study focused on initial projects via landfill gas recovery modeling and actual monitoring data of system performance to identify reasons for the shortfalls experienced in these projects.

As a contractor to **USEPA**, performed feasibility assessments of five landfills in **Sao Paulo, Brazil**. Assessments included site visits, meetings with potential end-users, gas recovery modeling, pump test observation and interpretation of results, economic evaluation, and preparation of reports. Two of the sites (Bandierantes and Sao Joao) were subsequently developed by others to produce electric power from the recovered LFG.

Due diligence for Natsource in conjunction with their purchase of certified emissions reductions (CERs) for a proposed CDM project in Brazil.

Monterrey, Mexico, World Bank Consultant. Project involved a 7-MW power plant to be fueled by LFG. Tasks included evaluating field pump test results, performing gas modeling, estimating project costs, and assisting in the development of pre-qualification and bidding documents per Bank procurement procedures.

Latin America, World Bank. Project Director for 10 pre-feasibility studies in five countries (Peru, Uruguay, Brazil, Colombia, and Mexico). Studies included technical and economic analysis considering both energy and carbon finance revenues (as per the Clean Development Mechanism of the Kyoto Protocol). Pump tests were conducted at five of the ten sites and

included three extraction wells, nine monitoring probes, and active extraction for 30 days. Mr. Peterson presented the results of the studies in Montevideo and Mexico City.

Mexico, World Bank. Conducted LFG recovery analysis and environmental improvement assessments (including conceptual design) for three carbon finance projects at Mexico landfills (Guadalajara, Monterrey II, and Leon).

Buenos Aires, International Finance Corporation (IFC). Project Director for due diligence for proposed carbon finance project being developed by a Dutch firm to sell CERs to the IFC. Evaluation included site visit, review of proposed gas collection system design, economic pro forma, environmental considerations, and leachate management.

Latin America, MGM International. Project Director for ongoing (2005) evaluation of LFG projects to be developed by MGM under the Clean Development Mechanism (CDM) of the Kyoto Protocol for greenhouse gas emissions reductions. Project locations include Colombia, Peru, Chile, and Brazil.

BFI Ponce Landfill, Puerto Rico. Project Director for the design of a relocated liquid waste solidification facility including structural and ventilation system designs, and air permitting associated with particulate emissions.

Israel:

- **Hagal Landfill.** Landfill gas consulting and design development to address biogas collection from high liquid level areas in the landfill in order to increase gas flow to the existing power plant.
- **Efe'e Landfill.** Prepared general design drawings and report for overall landfill gas collection and flaring system and detailed design drawings and bid documents for construction of the initial phase of the system.
- **Tel Aviv, Hiriya Landfill.** Project Manager for landfill rehabilitation project. Specific efforts included LFG investigation (test wells, monitoring, dynamic pump test and analysis), LFG collection and flare system design, engineering during construction, startup assistance, and consulting services to address interconnection of LFG system with existing onsite anaerobic solid waste treatment process (by Arrow Ecology) and engine generator. Follow-up consulting provided for transmission of LFG to offsite boilers and CDM project implementation.
- **Beer Sheva, Dudaim LFG System Design and Utilization Feasibility.** Managed project involving field-testing, assessment of energy utilization options, conceptual LFG collection system layout and cost estimate, and evaluation of alternatives. Also designed LFG collection and flare system, assisted with construction oversight and performed system startup and evaluated system performance in light of its energy potential. In early 2004, a 2-MW onsite powerplant became operational. Field activities have included field testing,

construction oversight, system startup, and system performance/troubleshooting evaluations. System expansion design completed in 2013.

- **Rosh Pina, Teenim Landfill.** Project Director for LFG system design, construction engineering, and startup services.
- **West Bank, Abu Dis Landfill.** Project Director for LFG field study (including dynamic pump test), assessment of LFG energy recovery and emissions reduction potential, and design of LFG collection and flare system.

Due Diligence Services

Served as Project Director or project manager on financial due diligence services for financiers of landfill gas-to-energy (LFGE) projects, including:

Mizuho Bank, Due Diligence for Financing of Proposed Landfill Gas Processing to Pipeline Quality Project. Conducted due diligence for proposed project at a large active landfill in Georgia. Services provided included assessment of gas recovery projections; inspection of gas collection system and evaluation of necessary improvements and expansions; review of contract documents; permitting assessment; Air Liquide membrane processing plant technology assessment; review of proposed capital and operational costs; and project schedule review.

Confidential Investment Client, Due Diligence for Acquisition of Landfill Gas High Btu Processing Project. Directed the evaluation of an existing High Btu plant for acquisition. Tasks included: landfill gas recovery projections; gas collection system assessment with cost estimate for expansions and improvements; Selexol gas processing plant inspection and condition assessment; verification of processing plant O&M practices, costs and capital improvement requirements; plant performance assessment; and review of permit status and compliance.

Bayerische Landesbank. Nine-mile pipeline project developed by Ameresco to fuel gas turbines at BMW.

Merrill Lynch. Equity investment in acquisition of existing LFG compression and pipeline project fueling a utility power plant.

John Hancock. Five LFG pipeline projects developed by Enerdyne - VA / NC and two high-Btu projects in PA developed by Beacon.

United Capital. Five-mile pipeline project developed by Toro Energy to fuel boilers at the NASA Goddard Space Flight Center.

GMAC. Twenty-one mile pipeline project developed by Enerdyne to fuel burners at Honeywell.

Catamount. Onsite due diligence to assist Catamount in the acquisition of 5 operating LFG to electricity projects in the United Kingdom.

Duke Capital Partners. Environmental and financial due diligence in support of NGP

Power acquisition of ten existing LFGE projects, including both power generation and direct pipeline application.

Brownfields Redevelopment and Site Remediation

Since 1986, Mr. Peterson has performed various engineering tasks related to the development of commercial, residential, and institutional structures on environmentally impaired properties. Such assignments have included extensive interaction between the developer/property owner and the state and local agencies responsible for approval (including environmental, building, and fire control officials). Clients have included Ryland Homes, Pulte Homes, North American Properties, Marriott, Morse Diesel, NYC Dept. of General Services, Safeway, and Target Stores. A selection of such projects is summarized below:

- **Philadelphia Regional Produce Center, PA.** Methane investigation and abatement system design, construction oversight, and monitoring for a 600,000 square foot building employing sub-slab membrane and ventilation (via roof-mounted blowers). Building completion 2010.
- **Marriot Suites, Rosemont, IL.** Subsurface investigation of environmental conditions at a former disposal site and design of a methane control system for a 14-story hotel.
- **Brentwood Condominiums, Harford County, MD.** Design of a LFG control system to protect a residential development next to an operating landfill.
- **Lee Controls, Middlesex, NJ.** Investigation, sampling, and design of a bioremediation system to cleanup contaminated soils from a metal rod manufacturing facility in accordance with ECRA regulations for property transfer.
- **Madison Place, Alexandria, VA.** Design of a subslab methane extraction system for an office building and hotel complex.
- **Ironwood Sports Park, Fairfax County, VA.** Design of methane controls and operations and safety plans for a multi purpose sports facility atop a closed landfill.
- **Lakeside Market Place, Acworth, GA.** Subsurface fire and methane gas investigation and remediation for a shopping center being developed over top a debris landfill. Passive membrane and ventilation system design and mitigation/operations and monitoring plan developed for approval by County Building and Fire Marshall offices.
- **Fairlands Golf Community, Burtonsville, MD.** Rubblefill capping and methane remediation plans developed for a Ryland Homes project involving residential homes and a golf course. Project was approved through the MD Voluntary Cleanup Program (VCP).
- **Greenbelt Metro Station.** Methane investigation and remediation plans for a Pulte Homes development over a former sand and gravel operation with wash ponds that were found to be generating methane in the subsurface.
- **Rikers Islands.** Design on methane control and detection systems for five jail facilities on the Rikers Island complex in New York City.

Other Experience

Prior to joining SCS, Mr. Peterson served as SCA Services' Mid-Atlantic Regional Engineer overseeing New Jersey landfills, including four operating and five closed sites. He provided engineering support for operating and constructing sanitary landfills, including on-site engineering for new cell excavation and capping/lining landfills. One landfill rehabilitation project included installation of slurry wall, rerouting of a stream, and placement of a clay cap to mitigate ground water contamination.

In 1981 and 1982, he worked for the New Jersey Department of Environmental Protection in the Bureau of Enforcement for the Division of Water Resources.

Publications

Peterson, E. R., J. Michelsen, and C. Leatherwood, "Where Credit Is Due How Landfill Owners Can Engage The Greenhouse Gas Market," Public Works Manual (Online Magazine), 2010.

Riat, A., W. Blake Hedges, and E. Peterson, "Recovering Landfill Gas for Energy," Geotimes, Vol. 51, No. 2, February 2006.

McLaughlin, M.W. and E. Peterson, "Methane Mitigation: Monitoring and Mitigation of Methane at Landfill Sites," Waste Management World, January-February 2006, International Solid Waste Association.

Peterson, E.R., R Isenberg, and D. Sternberg, "From Landfill to Leisure: Closure and Rehabilitation of the Hiriya Landfill," Waste Management World, September-October 2004, International Solid Waste Association.

Peterson, E.R., J.G. Roth, "Preparing Your Landfill for Greenhouse Gas Emissions Reduction Trading," Proceedings: SWANA Wastecon, October 2003.

Dillah, D. D., E. R. Peterson and S. G. Lippy, 2001, "Air Injection to Control Off-Site Landfill Gas Migration: Design Parameters, Mathematical Model, and Case Study," Wastecon 2001 Proceedings.

Pierce, J. L., and E.R. Peterson, "Jamacha Landfill Microturbine Power Plant: Case Study," 17th International Solid Waste Conference, Philadelphia, October 2001.

Dick, R.E. and E.R. Peterson "Fundamentals of Bioreactor Landfills and Potential Innovations at Virginia's Solid Waste Disposal Facilities" Presented at the VMI Environment Conference, April 2001.

Peterson, E.R. and G.P. McCarron. "The Impact of New Air Regulations on Landfill Expansions." Proceedings: SWANA Wastecon 97, October 1997.

Vogt, W.G., T.R. Peyser, E.R. Peterson. "Development of an Air Emissions Inventory for Municipal Solid Waste Landfills Under Title V." Proceedings: SWANA 19th Annual Landfill Gas Symposium. March 1996.

Carpenter, K., E.R. Peterson, C.M. Seager. "LFG Issues and Concerns for Landfill End Uses." Proceedings: SWANA 19th Annual Landfill Gas Symposium. March 1996.

McGuigan, M.J., E.R. Peterson, J.M. Smithberger, and W.L. Owen. "Case Study: I-95 Landfill Gas Recovery Project, Fairfax County, VA." Proceedings: First Biomass Conference of the Americas: Energy, Environment, Agriculture, and Industry. Burlington, Vermont. August 1993.

Peterson, E.R., et al. "Electrical Design Issues for Hazardous Locations." Proceedings: SWANA 16th Annual Landfill Gas Symposium. March 1993.

Peterson, E.R., W.G. Vogt, J.R. Vogt. "Emissions Control and Treatment of High Level Hydrogen Sulfide and Landfill Gas." Proceedings: SWANA 15th Annual Landfill Gas Symposium. March 1992.

Peterson, E.R. and R.W. Luce. "Predicting the Potential for Arsenic Contamination from Spent Gold Ore." STP-1162. Proceedings: ASTM. Symposium on the Application of Agricultural Analysis in Environmental Studies. June 1991.

Peterson, E.R., R.B. Gardner, and P.K. Foxwell. "Landfill Gas Issues Affecting the Design and Operation of Waste to Energy Facilities." Proceedings: Second International Conference on Municipal Waste Combustion. April 1991.

Peterson, E.R. "Pending Subtitle 'D' Regulations and Their Effects on Landfill Gas Issues." Proceedings: GRCD/ SWANA 14th Annual Landfill Gas Symposium. March 1991.

Held, W.M. and Peterson, E.R. "Landfill Gas Pipe Selection and Installation." Proceedings: ASCE International Conference on Pipeline Design and Installation. March 1990.

Vogt, W.G., J.L. Briggs, and E.R. Peterson. "Disposal Options for Landfill Gas Condensate." Proceedings: GRCD/ SWANA Seventh Annual Virginia Waste Management Conference. April 1989.

Gardner, R.B., E.R. Peterson, and W.M. Held. "Landfill Gas Migration and Odor Control -- The Hillsborough County and Palm Beach County Experiences." Presented at the Joint Annual Meeting of the Florida and South Florida Sections of ASCE. September 30, 1988.

Peterson, E.R., P.J. Carrico, and J.M. Smithberger. "Subsurface Landfill Gas Migration: A Case History of an Air Injection System for Migration Control." Proceedings: 43rd Annual Purdue Industrial Waste Conference. May 1988.

Pierce, J.J., G. Salfors, and E.R. Peterson. "Parameter Sensitivity of Hydraulic Conductivity Testing Procedure." Geotechnical Testing Journal. GTJODJ, Vol. 10, No. 4. December 1987. pp. 223-228.

Luce, R.W. and E.R. Peterson. "Compatibility of Clay and Synthetic Liners with Strong Acids." Proceedings: Waste Tech '86. Chicago, IL. October 20-22, 1986.

Pierce, J.J., G. Salfors, and E.R. Peterson. "Clay Liner Construction and Quality Control." Journal of Environmental Engineering 112(1). ASC