JOSHUA G. ROTH, PE

Education

M.S. - Civil (Environmental) Engineering, Virginia Tech University, 2005

B.S. - Civil (Environmental) Engineering, University of Pittsburgh, 1994

Professional Registrations/Certifications

Professional Engineer in Virginia and Pennsylvania

40-Hour OSHA Health and Safety Training for Hazardous Materials Site Workers

Professional Affiliations

Member and active participant in the Pennsylvania Waste Industries Association (PWIA) Air Technical Committee

Professional Experience

Mr. Roth is a Project Director with the Landfill Gas (LFG) Group in the SCS Reston, VA office. He has served on a number of LFG engineering projects involving LFG remediation system design, emissions inventories and air permitting, migration and odor control, ambient air sampling and reporting, LFG and CER due diligence projects, GHG emission mitigation and reporting, field sampling and assessments, and general emissions control projects. Examples of specific project experience include:

Berks County, PA, Pioneer Crossing Landfill. In support of G.A.S. Access Energy's development of a 6.4-MW LFGE Project (CAT 3520 engines). Performed permitting services for the completion of a state Air Plan Approval Application for the construction of an LFG utilization project at the landfill as well as a General Permit application for the associated gas treatment system. Developed a detailed LFG mathematical model to project anticipated recovery rates for project size selection. The permitting process involved numerous specific aspects, including but not limited to: PSD requirement evaluation and considerations, ambient air modeling, human health risk assessment, and extensive PADEP BAT technology review. Current activities include evaluation and permitting for an expansion of the plant capacity, involving both NSR and PSD level air permitting activities.

Mountain View Reclamation Landfill, PA. Project Manager and lead engineer for air emissions consulting services for the landfill. Specific tasks have included: regular compliance reporting in accordance with the Title V air operating permit and NSPS/NESHAP regulations, preparation of Air Plan Approval application for an expansion of the landfill capacity (the Northwest Expansion) and also for additional flaring capacity (4,500-cfm enclosed ground flare), and assistance with various other air compliance issues such as PADEP inspection support and response, preparation of alternate scenarios and/or modifications to the GCCS and SSM Plans, etc. The air permitting work involved detailed review of the existing gas projections in relation to actual recovery rates to evaluate existing flaring capacity, development and modification of gas models to incorporate planned leachate recirculation, and response to PADEP requests for additional information for determination of project applicability according to Federal PSD and PADEP NNSR regulations.

Pine Grove Sanitary Landfill, PA. Project Manager and lead design engineer for expansion of the landfill's existing system into new cells Pads 9, 10 and 11 as well as the preparation of a permit application and conceptual design of an LFG collection system for a landfill expansion permit application for the future Pad 12, and the preparation of an NSPS GCCS Design Plan for the landfill. System evaluation and data review services on a routine basis to improve performance of the collection system. NSPS Tier 2 LFG sampling of the LFG collection system and reporting services for the testing, design of LFG odor control extraction wells, reviewed LFG site monitoring data and providing recommendations for addressing odor and migration controls as required, and performing NSPS and Title V compliance services. Various air permitting services including Plan Approval applications for the Pad 12 landfill expansion and a 5,000-cfm enclosed ground flare.

IESI, PA:

- **Scotland, Blue Ridge Landfill.** Project manager and lead design engineer for the design of the Phase I, Phase II, Phase III, Phase IV and Phase V landfill gas collection and control systems for odor control purposes, including the flaring station and preparation of the Air Plan Approval application for the flare. Other services include NSPS and Title V compliance services, such as Title V reporting and compliance, preparation of the Title V renewal application, and NSPS Tier 2 reporting. Also involved with the development of LFGTE project at the facility.

- **Bethlehem Landfill.** Project manager and lead design engineer for air emissions and LFG consulting services for the landfill. Specific tasks include: regular Title V and NSPS compliance reporting, preparation of Air Plan Approval applications for the site's enclosed ground flare and Phase IV expansion of landfill capacity, design of LFG system expansion and flaring station, and preparation of Title V renewal application. Also involved with the development of LFGTE project at the facility.

Pottstown Landfill, PA. Project Manager and lead engineer for a variety of activities at the landfill, including regular NSPS and Title V reporting activities, preparation of a Title V permit application, preparation of Air Plan Approval application for source (flare) modifications, development of a monitoring plan for site testing of source emissions, preparation of various alternate operating scenarios (AOS) and higher operating value (HOV) requests per Title V and NSPS, and other various air compliance and permitting activities.

Dauphin Meadows Landfill, PA. Project Manager and lead engineer for air emissions consulting services for the landfill. Specific tasks include: regular compliance reporting in accordance with the site operating permit, preparation of Air Plan Approval application for a planned LFGTE project at the landfill, conceptual design for a direct-use pipeline for off-site gas transmission, and evaluation of the site's LFG collection system.

Blythe Recycling and Demolition Site (BRADS), PA. Project Manager and lead engineer for air emissions consulting services for the planned BRADS C&D landfill. Specific tasks to date included: development of mathematical LFG model to project LFG and air emissions from the planned landfill, preparation of an Air Plan Approval application for the planned facility, and development of various solid waste permitting forms related to gas control and air emissions from the planned facility.

McKean County Landfill, PA. Project Manager and lead engineer for LFG air emissions consulting services at the landfill. Specific tasks to date have included: preparation of an Air Plan Approval application for installation of an enclosed ground flare at the site, development of mathematical LFG model to project gas recovery rates and evaluate existing control capacity, preparation of an application for renewal of the Title V operating permit, and various other air permitting activities

including preparing several RFDs for use of temporary flaring capacity and removal of other obsolete equipment at the site related to the leachate system.

Elizabeth, PA, Kelly Run Landfill. Project Manager and lead engineer for LFG air emissions consulting services at the landfill. Specific tasks have included preparing an updated Title V operating permit application and performing Tier 2 LFG sampling of the LFG collection system and reporting services for the testing in accordance with the EPA's NSPS regulations, and preparing annual emissions inventory calculations and reporting services for the landfill.

Cumberland County Landfill, PA. Provided general LFG and air emissions consulting services to the landfill, including: Title V and NSPS compliance reporting, support for an EPA Title V inspection, and preparation of an emergency RFD for the installation of a utility flare for odor control.

Easton, PA, Chrin Brothers Sanitary Landfill. Performed NSPS Tier 2 LFG sampling and system evaluation of the LFG collection system. In addition, performed reporting services for the landfill in accordance with the EPA's NSPS regulations.

Augusta County VA, Augusta Regional Landfill. Project Manager for a number of landfill gas and air permitting/compliance tasks for the landfill. To date these tasks have included air permitting assistance with the landfill's recent capacity expansion, GHG inventory and EPA reporting, and assistance with the landfill's EPA NSPS Tier 2 emissions testing and reporting.

Rockingham County Landfill, VA. Project Manager and lead engineer for air emissions consulting services for the landfill. Specific tasks to date have included: design of an expansion of the LFG collection system, evaluation of the existing LFG collection and control system, preparation of an air permit application (VA Form 7) for expansion of the landfill's capacity including evaluation of the source's applicability under State and Federal NSR and PSD regulations, and various CAA compliance services. In addition, involved in the feasibility study and engineering design of an LFGE pipeline project to deliver gas to a new hospital (RMH), along with air permitting services for RMH. Served as the engineering project manager and lead design engineer for the engineering of the 3-mile LFG transmission pipeline to deliver gas from the landfill to RMH. The pipeline was installed as a design/build project with SCS Field Services, and in accordance with the US DOT gas pipeline regulations of 49 CFR Part 192.

Alexandria, VA, Hilltop Construction and Debris Landfill. Site sampling and recommendations for LFG migration and odor control. Provided recommendations to the landfill according to site sampling and investigation for the eventual on-site development of a golf course. Also developed a comprehensive LFG Monitoring Plan for the proposed development of a golf course on the closed portion of the landfill, and conducted site odor testing and air dispersion modeling relating to concerns raised during the permitting process. Current activities involve engineering design of an LFG control system to protect a planned adjacent retail development.

Fauquier County Landfill, VA. Lead design engineer for the development of construction documents for installation of an LFG collection and control system at the landfill. Past services also included assistance in a comprehensive site odor investigation prior to system installation. Other services include evaluation of system operational data, and data related to a past subsurface waste composting situation, as well as recommendations for action regarding the same.

Page County, VA. Project Manager and lead engineer for landfill gas consulting services for the Stanley Landfill and the Battle Creek Landfill. To date, these services have included perimeter subsurface methane monitoring, evaluation of the existing LFG collection and control system, and repairs to existing LFG system components.

Prince William County Landfill, VA. Provided design services for the initial construction and continued expansion of the active LFG collection and control system by vertical extraction wells, and an active migration control extraction trench. Also performed oversight and direction of the installation of permanent and temporary LFG monitoring wells and probes. Also involved in follow-up monitoring of these wells and probes. Additionally, performed design assistance of the initial LFG collection system at the landfill including the development of construction drawings and specifications. In addition, assisted in the development of the site LFG Management Plan with regard to migration and monitoring issues. Also prepared a Feasibility Report for the utilization of landfill gas in infrared heaters and in microturbines at several on-site buildings.

Fort Belvoir, VA, Cullum Woods Landfill. Project Manager and lead design engineer for an LFG migration control project. Tasks performed included a migration investigation, pilot-scale vent trench extraction testing, permit amendment preparation, extensive LFG and air testing to assess migration, design of a full-scale LFG collection system, construction quality control engineering, development of an operation and maintenance manual, and operation and maintenance of the active LFG collection and control system.

Elkton, MD, Cecil County Central Landfill. Project Manager and lead design engineer for an ambient air investigation and remediation system design at the landfill. Specific tasks to date have included conducting point and ambient air testing of the landfill and surrounding areas, developing a report outlining recommendations for remedial action, preparing and submitting air permit application, designing passive LFG remediation system, quality control engineering during construction, and follow-up ambient air testing and reporting services. Other tasks have included completion of a comprehensive odor investigation at the town of North East and the landfill and development of a summary report. Ongoing tasks include performing regular Title V and State Emission compliance and reporting services.

Anne Arundel County, MD, Millersville Landfill. Project manager and lead design engineer for a variety of services related to the existing landfill gas collection and control system. This includes evaluating the operation and performance of the existing LFG collection and control system with respect to ongoing subsurface composting in Cell 567, preparing a comprehensive report outlining action alternatives with respect to same, development of design documents for LFG conveyance system modifications to increase operational flexibility. Recent services include the preparation of design documents for the Phase I LFG System Improvements involving modifying the blower/flare station elements and design of a blower/flare station pavilion shelter.

Other services have included performing design services and CQA for the installation of additional migration control extraction wells in Cell 2. Also performed annual reporting services for operation of the active LFG collection system (Title V and NSPS operational reporting), and emissions inventory and air toxic reports in accordance with the EPA's and MDE's regulations.

U.S. Coast Guard, Baltimore Yard, Maryland. Project manager and lead engineer for a variety of air compliance consulting services for the Yard, including regular Title V and NSPS/NESHAP reporting requirements, MDE air compliance reporting, and services related to air compliance for the Yard's LFGE plant.

Easton, MD, Midshore Regional Solid Waste Facility. Project Manager and lead engineer for ambient air investigation and remediation system design at the facility, which includes both the closed Easton Landfill and the active Midshore Landfill. Specific tasks included conducting point and ambient air testing of the facility, developing a report outlining recommendations for remedial action, and design passive LFG remediation controls.

Montgomery County, MD:

- Oaks Sanitary Landfill. Performed Tier 2 LFG sampling of LFG collection system in conducting an LFG utilization study. Assisted in preparation of annual LFG emission estimates for the MDE annual emission fee calculation.

- Gude Landfill. Project Manager and lead design engineer for the development of design plans and specifications for the enclosed ground flaring station at the landfill and modifications to the LFG collection system.

Howard County, MD:

- New Cut Landfill. Design services of a comprehensive LFG collection and control system, including review of existing site conditions and requirements for LFG migration control at the site for final design of the site's LFG collection system, which included the development of construction drawings and specifications.

- Alpha Ridge Landfill. Provided construction oversight and CQA services for the construction of LFG extraction wells for the LFG collection system at the landfill. Performed NSPS Tier 2 LFG sampling of the newly installed extraction wells and reporting services for the testing in accordance with the EPA's NSPS regulations.

Frederick, MD, Reich's Ford Sanitary Landfill. Lead design engineer for the conceptual design of the LFG collection system expansion into Site B at the landfill. Completed an LFG Operations and Maintenance (O&M) Manual for the LFG collection and flaring system, including evaluation of the designed LFG system under construction and preparing a manual for the County to fully maintain the efficient operation of the system. Also involved in the development of an LFG Utilization Report for the site, including evaluating the existing LFG collection system, development of LFG modeling projections and end-users, and economic analysis. Additional services include NSPS and Title V compliance services.

Harford County, MD, Abingdon Landfill. Performed management services and oversight for the installation of LFG testing and evaluation probes at the landfill. Performing ongoing evaluation of the monitoring and laboratory data for the site for the purposes of estimating the emission of hazardous air pollutants from the landfill and evaluating the potential for LFG to contaminate groundwater at the landfill.

Baltimore County, MD, Eastern Sanitary Landfill. Performed site LFG testing and reporting services for odor assessment and control at the landfill. Also provided design assistance for the LFG collection and control system at the landfill and completion of the air permit application for the construction and operation of the LFG flaring system at the landfill. In addition, performed annual emissions inventory calculations and reporting services for the landfill

Cumberland County Solid Waste Complex, NJ. Permit and design assistance of the Phase I LFG collection and flaring system at the Cumberland County Landfill. Specific tasks included performing LFG flow estimations and calculations, laying out new LFG extraction wells and collection header, designing and assisting with individual components of the collection system including condensate sumps, manhole collection tie-ins, and condensate drainage. In addition, prepared state air permit application for the construction of the LFG flaring system at the landfill, and updated Title V application. Also prepared conceptual design for a combined leachate recirculation system and expansion of the LFG collection system to Cells 5 and 6.

Other services include: the development of an LFG Utilization Report for the site including evaluation of the performance of the existing LFG system, development of LFG modeling projections and potential end-users, and their economic analysis. Ongoing services include NSPS and Title V compliance services, and the Phase II expansion of the LFG collection system.

Joppa, MD, Oak Avenue Rubble Fill. Project Manager and lead design engineer for the design of a comprehensive LFG collection and control system at the landfill, including the development of construction drawings and specifications.

Indian Head, MD, Fran Del Subdivision Development. Site sampling and recommendations for LFG migration control. Provided recommendations to the developer according to site sampling and investigation of a nearby landfill for the ongoing development of a residential area.

Culpeper County, VA. Project Manager and lead engineer for a landfill gas mitigation pilot study for remediation of subsurface migration at the landfill, including the preliminary design of full-scale active LFG controls. Also prepared a revised LFG management plan for the site.

Virginia Beach, VA, Landfill No. 2. Conducted a comprehensive evaluation of the existing LFG collection system elements, and provided analysis and recommendations for improving the performance of the collection system for the development of an LFGTE project at the site.

Great Falls, VA, Crippen Stump Dump Landfill. Site sampling, investigation, evaluation and recommendations for action for an active LFG migration control system. Ongoing site monitoring, system evaluations, and recommendations for action as needed to maintain effective control of LFG migration at the landfill.

King George County Landfill, VA. Performed Tier 2 LFG sampling and reporting services in accordance with the EPA's NSPS regulations.

Palmetto Landfill, SC. Conducted an evaluation of monitoring and testing data for the landfill's existing wellfield and two blower/flare stations in order to develop recommendations for improving the performance of the collection system from an NSPS compliance standpoint. Also provided engineering design support of an off-site landfill gas transmission line for delivery of LFG from the landfill to the nearby BMW Plant.

New York City, NY, RMSC New Kitchen Project. Design and design assistance of LFG abatement measures for on-site structures at the RMSC New Kitchen project in New York City, including subslab extraction system. Performed construction review services for the ongoing completion of this project.

United States Due Diligence on GENCO/ZAPCO Energy Recovery Projects. Conducted environmental due diligence for project financing, including site and equipment inspections, background review of the energy recovery operations, evaluation of the performance of the gas recovery and energy generation operations, and report preparation for multiple LFG utilization projects.

Chile, Colombia and Peru Landfills, GHG Feasibility Assessments and Conceptual Analysis, MGM International. Involved in the development and preparation of LFG feasibility reports for GHG mitigation projects per the Clean Development Mechanism (CDM). Specific tasks included: site reconnaissance and evaluation, evaluation of project certified emissions reductions (CERs), economic projections, conceptual system design, technology evaluation for LFGTE options, and meeting with potential customer(s) for CERs to present the results.

Monterrey, Mexico, Siemeprodeso Landfill. Lead engineer for the feasibility assessment of implementing a landfill gas use project at the landfill. Involved site reconnaissance, conducting an on-site pump test to assess gas recovery feasibility, evaluation of pump test data, and development of modeling for LFG recovery estimates and CER potential.

New Zealand:

- **Redvale Landfill.** Involved in the preparation of Emissions Reductions Verification Reports for the transaction of CERs for the leachate evaporation process and the LFG power plant at the landfill.

- **Bluegums Landfill.** Involved in the conceptual design of the Phase I LFG recovery and control system at the site for odor control purposes. Included development of conceptual plans and a summary design criteria report. He was involved in the development of an LFG Utilization Report for the site including evaluation of the performance of the existing LFG system, development of LFG modeling projections and potential end-users, and their economic analysis. Ongoing and future services include NSPS and Title V compliance services, and the Phase II expansion of the LFG collection system.

- **Awapuni Landfill.** Involved in the design and construction of a pilot scale LFG recovery system to assess the feasibility of an energy utilization project at the site. Ongoing activities include the development of a full scale LFG recovery system at the site, including preparation of construction plans and specifications, development of a design criteria report and permitting issues. Also completed design plans for partial closure of the landfill for areas at final grade.

Mexico, Peru, Colombia, Uruguay and Brazil, GHG Feasibility Assessments and Conceptual Analysis, The World Bank (Various Countries). Involved in the development and preparation of LFG feasibility reports for GHG mitigation projects per the CDM at 10 landfills. Specific tasks included: site reconnaissance and evaluation, meeting with local officials and representatives, evaluation of project CERs, economic projections, conceptual system design, detailed revenue projections with sensitivity analysis, and assistance in the development of the formal Project Design Document (PDD) for the Lima Peru site. At 5 of these landfills, on-site pump tests were conducted to assess gas recovery feasibility, and therefore other tasks included implementation and coordination of these efforts, review and evaluation of pump test data, and incorporation of the data to the LFG and CER projections.

Los Colorados Landfill, Santiago Chile. Lead engineer for a detailed landfill gas investigation and feasibility study for the development of a landfill gas recovery and control project at the landfill in accordance with the guidelines of the Kyoto Protocol Clean Development Mechanism. The study involved site testing and reconnaissance, conceptual system design, economic cost evaluations and revenue projections, significant coordination with local contacts and utilities, and technical support in the development of the project protocol.

Israel:

- **Teenim Landfill, Galilee Region.** Lead design engineer for the development of a landfill gas collection and control system at the landfill. The project involved conceptual system design, followed by Phase I and Phase II designs, as well as site testing, startup technical support and evaluation for construction according to technical specifications.

- **Teenim and Hiriya Landfills.** Specific tasks include: preparation of design for LFG collection and flaring systems, evaluation of system performance and operational data, system expansion, and startup and testing of the systems.

Brazil, GHG Feasibility Studies at three landfills. Involved in the development and preparation of LFG feasibility 'due diligence' reports for GHG mitigation projects per the CDM at landfills located in the Brazilian cities of Salvador, Belem and Manaus. Specific tasks included: site reconnaissance and evaluation, meeting with local officials and landfill representatives, evaluation of potential CERs, and evaluation of the proposed gas capture and control project and schedule.

Other Experience

Prior to joining SCS, Mr. Roth was a Staff Engineer with Law Engineering and Environmental Services (LAW) in Chantilly, VA, with LAW's Facilities Engineering department. His responsibilities included performing indoor air quality evaluations and assessments and reporting services, performing site air sampling and assessments for asbestos-containing materials (ACM) and lead-based paint (LBP), conducting sampling and evaluations of building water systems for lead contaminated drinking water, performing design services for various ACM and LBP abatement and demolition projects.

Publications and Presentations

Roth, J., Vasuki, N.C., Sammons, D., Prestbo, E. "Mercury in Landfill Gas? A Delaware Case Study." MSW Management, November/December 2003. Also presented at the SWANA LFG Symposium in Tampa, Florida March 2003.

Roth, J., Peterson, E. "Preparing Your Landfill for Greenhouse Gas Emissions Reduction Trading".

Roth, J., Peterson, E. "Title V for Landfills: From Permit Application to Inspection/Enforcement." Presented at the PWIA/SWANA Conference in State College, PA, September 2002.

Roth, J., Grajales, F. "LFG-to-Energy Development in Mexico." Presented at the EPA's Landfill Methane Outreach Program (LMOP) Conference in Baltimore, MD, January 2006.

Roth, J., Sullivan, P. "Tailoring Talk – What the EPA's Tailoring Rule for Greenhouse Gases Means to Your Landfill." Waste Age, February 2011. Also presented at the SWANA LFG Symposium in March 2011.