ABDUL R. MULLA-SALEH, PHD, PE, BCEE

Education

PhD - Civil Engineering, University of South Florida, 2006
MS - Environmental Engineering, University of South Florida, 1999
BS - Civil Engineering, University of South Alabama, 1979

Professional Licenses

Professional Engineer - Alabama, Florida, Georgia, and South Carolina

Specialty Certifications

Board Certified Environmental Engineer (BCEE), American Academy of Environmental Engineers
Tau Beta Pi –National Engineering Honor Society
National Society of Collegiate Scholars
The National Scholar Honor Society

Professional Affiliations

Member: American Academy of Environmental Engineers
American Society of Civil Engineers
International Solid Waste Association
Solid Waste Association of North America
Awards Committee Chair for SWANA's Landfill Gas Division | 2002 to 2005
Served as a member of the Technical Advisory Committee for research projects on "Infiltration Rates through Landfill Liners" for the Florida Center for Solid and Hazardous Waste Management

Professional Experience

MSA Engineering LLC (July 2020 –Present). MSA Engineering/Consultant providing engineering consultancy and assistance in civil and environmental projects including site solid waste master plans, landfills, solid waste management, permitting and site development.

CDM Smith (1988 – July 2020). Engineering and construction company that provides solutions in water, energy, transportation, and facilities projects for government and private clients.

Middle East Operations Support (2014 – 2020). Associate Technical/Management involved in infrastructures and solid waste projects in the Kingdom of Saudi Arabia and Qatar. Maintained client relationships, managed project delivery, and assisted in major pursuits. Major clients included The Royal Commission of Saudi Arabia developing Ras Al-Khair Industrial Park and the Ministry of Transport and Communications in Qatar developing Parking Master Plan.

Parking Master Plan Development for Qatar's Ministry of Transport & Commun. (2017 – 2020). Client Manager/Project Manager managed client relationships and delivery of the project, ensuring quality control and quality assurance of developed documents. Attended meetings and developed presentations during workshops and stakeholders' meetings. Developed parking master plan for Qatar's Ministry of Transport and Communications to provide consistency in designing public and

private parking facilities. Collaborated with diverse stakeholders and managed end-to-end aspects of the project including: 1) inventory surveys of parking spaces; 2) utilization and turnover surveys; 3) interview surveys; 4) development of parking design manual for private and public facilities; 5) inelegant paring system; 6) development of parking master plan for 3 horizon years.

Ras Al-Khair Industrial City Development for Royal Commission, Jubail, KSA. (2014 – 2017). Engineering Design/Project Manager coordinated day-to-day activities between the project team and client in all aspects of disciplines requirement, including geotechnical field work and design recommendations, ensuring QA/QC and project delivery across all tasks. Provided updates and regular reporting on project performance and financial status. Managed 5-year project that involved design transportation corridors and infrastructure development for the new Ras Al-Khair Industrial City (RIC) including: 1) Approximately 50 km of major highways to provide adequate access to RIC; 2) Interior roadways design to access plots for future development; 3) Electrical substations design and telecommunication systems; 4) Drainage and storm water management; 5) Solid and industrial waste management; 6) Water system modeling and design of storage tanks for potable water supply; 7) Sea Water Colling supply and return lines for industrial use; 8) Pump stations and associated buildings for all utilities and SCADA systems.

Bimini Bay Solid Waste Master Plan, Bimini Bay, Bahamas (2014). Project Manager developed solid waste master plan for Bimini Bay Islands to accommodate new resorts development, commercial and business districts, and civic and tourists' centers. These developments were planned as part of a 20-year master development plan for the Islands. The plan covered waste collection, recycling, waste minimization, waste treatment, and disposal to address short term needs (2-5 years), as well as long term needs (15-20 years).

City of Jacksonville Trail Ridge Landfill Permitting and Design, Jacksonville, Florida (2013 – 2014). Lead Practitioner served as Lead Practitioner for the expansion of the city of Jacksonville Trail Ridge Landfill (TRL). Provided project technical direction and quality management. As part of the design and operation requirements for the TRL expansion, the project team performed several HELP model runs to simulate and minimize annual leachate generation quantities from the existing and expansion areas of the landfill for the next 20 years. The collected leachate is currently stored in storage tanks and hauled by tanker trucks to a nearby wastewater treatment facility. Operation sequencing, intermediate covered areas, and capped areas were designed and managed to minimize the number of the required leachate storage tanks and truck-trips per week to the wastewater treatment plant.

Solid Waste Management Strategy for the City of Lusail, Qatar (2014). Project Manager and Team Leader provided solid waste management strategy for the city of Lusail in preparation for hosting the 2022 FIFA World Cup. The area included residential housing, mix-use retail stores, commercial centers, hotels, and community facilities, with total anticipated population for the city is about 450,000 at full occupancy in 2030. Aligned with Lusail City development focus on sustainability and Clean Development Mechanism by developing a sustainable solid waste management strategy that included waste minimization, recycling and reuse, transfer station, material recovery facility, and composting facility. The first project phase was completed in February 2014. Following the recommendations of the solid waste management strategy, a search for the property suitable for planning and implementation of the waste management is underway.

Financial and Operational Management Analysis Study, Homestead, Florida (2013). Project Manager led the project team in providing financial analysis based on the growth occurring in the utility service area, reviewing pro forma projections for funding and operating the water and wastewater systems. Identified areas for capital cost recovery charges and provided recommendations to drive excellence in financial operation and management of the city's utility systems. Provided similar services for the

solid waste collection and management system, allowing the city to evaluate existing and proposed revenues and plan for potential rate increases to provide and maintain sustainable operations.

Integrated Solid Waste Management Services, Cayman Islands Government (CIG), Cayman Islands (2013). Technical Advisor served as the technical advisor to the CIG on a new integrated solid waste management facility (IWMF) for the Islands and closure of the existing unlined George Town Landfill (GTLF). This included review and advice the CIG on 3 separate documents about the site master plan for the IWMF, preliminary calculations for the liner and leachate collection systems, storm water management, and waste-to-energy (WTE) facility; In addition to the closure and remediation of the existing GTLF. The review was based on the provided information, CDM Smith experience with similar projects and site conditions, and pertinent United States Environmental Protection Agency (USEPA), Ireland Environmental Protection Agency (IEPA), and State of Florida regulations and guidelines.

Solid Waste Collection Route Optimization and Implementation, Homestead, Florida (2012). Project Manager developed an aggressive schedule and work-plan with input from the city and public communication sub consultant as stakeholders. The main aspects of the project included design and optimization of collection routes using advanced geographic information systems (GIS) based program, massive and innovative public communication program, and classroom and field training of staff. The project was completed within 2 months as required by the city.

Middle East Paper Co. (MEPCO), Jeddah, Kingdom of Saudi Arabia (KSA) – Comparative Waste-to-Energy Financial Model and Evaluation Report (2011). Project Manager and Team Leader assembled technical and financial team within CDM Smith to execute the project, provided guidance and technical support to the Project Team, and ensured quality product was delivered to the client. Project scope of services included developing methodology and evaluation criteria to compare the cost of electricity produced from waste-to-energy (WTE) vs. petroleum oil. A financial analysis modeling tool was developed by CDM Smith to perform the analysis. The model input parameters were based upon recent CDM Smith experiences in the US, the model adjusted certain cost parameters based upon local conditions in KAS. A report was prepared summarizing the performed evaluation and cost comparison of the two electricity generation practices. In conclusion, the break-even point at which the cost of electricity generated from WTE plant is equivalent to the cost of electricity produced from petroleum oil was found to be at $70.00 a barrel. A WTE facility was feasible as long the price of oil was above $70.00 a barrel.

South Broward, Ash Monofill Leachate Collection System Cleaning Demonstration, Fort Lauderdale, Florida (2011). Technical Director, Wheelabrator South Broward was experiencing clogging in the leachate collection system of their ash monofil. Was tasked with assessing the condition of the gravity system and developing a cleaning protocol to determine the effectiveness of different pipe cleaning technologies. Phase I of this project included collecting leachate and precipitate samples to determine the chemical composition of the leachate and the mineralogy and chemical composition of the precipitate; identifying mechanical, chemical, and other technologies used to clean pipe; and providing a recommendation for the best technology/technologies for field demonstration. Phase II of this project included coordinating with the recommended vendors for an initial site visit, developing system retrofits for each of the vendors' operation requirements, and a three-day cleaning demonstration of the technology. Under Phase A of the project, developed and implemented a liquid and solid phase testing plan to identify the cause of precipitate formation in the leachate collection system, mineral composition of precipitate, and present recommendations for alternative remediation methods. In subsequent project phases, continued providing technical assistance and technical reviews for evaluating remediation technologies and recommendations for full-scale operation for leachate collection system remediation and cleanup.

Miami-Dade Department of Solid Waste Management, Miami-Dade County, Florida (2011). Technical Reviewer, Class I Ash Monofill Cell 20- Design & Permitting provided technical guidance and design assistance for a 10-acre Ash Cell, including cell layout, liner and leachate collection systems, and performing technical and quality assurance reviews. The project included design of a 10-acre Class I ash monofill (Cell 20) for the Miami-Dade County Resource Recovery Facility (RRF) operated by Covanta Energy. The project included design elements to collect and convey the leachate generated within the 10-acre cell and from a 26.5-acre closed area. This project involved extensive geotechnical analysis for foundation stability to ensure that the underlying muck layer did not reduce the required factor of safety, adequate post-settlement slopes for the leachate collection pipes to convey the peak leachate flows, and stability of the ash slopes to provide adequate factor of safety against slopes failures.

North County Resource Recovery Facility (NCRRF) Landfill Master Phasing Plan, Palm Beach County, Florida (2010). Provided technical direction and quality reviews for the NCRRF Master Phasing Plan to optimize the life of the landfill. This included determining current and future capacity of the Class I and Class III landfills, modifying the phasing to a "leap-frog" scenario, updating the population projections and waste diversion percentages, and predicting the capacity and phasing for each set of landfill cells. Conducted phase-planning for leachate generation volumes, landfill gas (LFG) generation and recovery for beneficial use, and site utilities to optimize landfill capacity and operations to reach the permitted build-out elevations.

Western Landfill Alternative Site Assessment, Palm Beach County, Florida (2009). Technical Reviewer provided technical guidance and assisted in alternative site assessment analysis, performance criteria, and performed technical and quality assurance reviews. This project involved analyzing three potential alternative sites. For the proposed Western Landfill in Palm Beach County, which included Tier I and Tier II evaluations. Tier I evaluation was conducted to determine if each property was located outside of exclusionary areas, complied with Florida solid waste regulations, and was of sufficient size and configuration to meet client's goals of a 50+ year landfill. Tier II evaluation of each potential alternative site was also conducted to determine development and operating costs; acquisition cost; development conditions, and contingencies; constructability, capacity and operability; proximity/impact to environmentally sensitive areas; and proximity/impact to residential areas for each of the three potential alternative sites. Client used the Tier II evaluation report to select the best potential alternative site for the Western Landfill.

Jefferson Parish Landfill, Jefferson Parish, Louisiana (2009). Technical Director provided technical assistance for the final design and construction bid package for the Phase 4A expansion area of the Jefferson Parish landfill, which included a dewatering system under the liner, a double liner system with leachate collection and leak detection systems, and a leachate control and management system. Assisted the Parish with negotiating an early closure of the landfill with Louisiana Department of Environmental Quality (LDEQ) and disposing of the generated waste in an adjacent private landfill.

Western Landfill Permit Application, Palm Beach County, Florida (2008). Technical Director provided technical guidance and design assistance for a new "Green" landfill property, including site layout, design of the scale-house and weigh stations, landfill cells, and support structures. The project included preparing design and permitting documents for the Solid Waste Authority's Class I Western Landfill site, HELP modeling for simulations and design, and evaluation of the liner and leachate collection systems. The design and layout of the new (green) facility was well received by the client.

Charlotte County Department of Environmental Services, Charlotte County, Florida (2008). Technical Director provided assistance to Charlotte County in preparing a facility response plan (FRP) for a landfill gas-to-energy project for the Zemel Road Landfill, proposal review, and evaluation, and

recommendation for contract award based on technical, financial, and past performance evaluation of the considered firms. Assisted the county in renewal of the operations permit for the Zemel Road Landfill and compliance of groundwater monitoring and reporting activities with Florida Department of Environmental Protection (FDEP) regulations.

West Pasco County Landfill Cell A-4 Expansion, Pasco County, Florida (2007). Project Manager designed and managed a 20-acre ash cell expansion area (Cell A-4) at the West Pasco County Landfill, including design, permitting, and bidding services for construction. This expansion project included a double liner system, leachate collection, and leak detection systems, as well as improvements to the leachate truck loading facility and maintenance building.

Southeast Region Market Leader (2005 – 2007). Developed and implemented strategic marketing plan to grow solid waste business in the Southeast Region, increasing client base and participation in conferences/technical presentations, and provided high-value technical contact with clients.

Solid Waste Authority (SWA) of Palm Beach County Landfill, West Palm Beach, Florida (2006). Technical Director served as a member of the technical review committee and provided technical guidance and design assistance on several landfill projects, including closure of Cells 5 and 6, expansion of Cells 11 and 12, and evaluation of a proposed new Western Landfill site. The design of the proposed landfill expansion incorporated the use of new geosynthetic material to enhance the long-term performance of the liner and leachate collection systems.

Glades Road Landfill-Class I, Phase IIIB, St. Lucie County, Florida (2006). Technical Advisor provided technical assistance for the liner and leachate collection systems. Performed technical reviews on the project at the 30, 60, and 90 percent levels of completion.

MacAlpine Place, Clearwater, Florida (2006). Expert Testimony provided expert opinion and testimony on developed new apartment complex adjacent to an old landfill site to prevent health hazards and provide a safe environment.

Palm City II Landfill — Cell 2 Closure and Gas Collection System Services During Construction, Martin County, Florida (2005). Reviewed final bid documents for the gas system and provided input in resolving field issues during construction.

MacAlpine and Bannockburn Developments, Clearwater, Florida (2005). Project Manager provided design evaluation and incorporated improvements to the existing landfill gas control system for the existing and proposed residential development adjacent to an old landfill site.

Solid Waste Services, Berkeley County, South Carolina (2003 – 2004). Project Director coordinated and managed projects for solid waste services provided by CDM Smith to the Berkeley County Water and Sanitation Authority, including landfill closure, new cells expansion, bioreactor design and permitting, construction and demolition landfill expansion, disaster management plan, new maintenance building expansion, and other related facilities.

West Pasco County Landfill Expansion, Pasco County, Florida (2002). Project Manager led design and permitting of Cells A-3 and SW-2 expansion, which included expanding new ash and municipal solid waste cells, approximately 10 acres each. Provided engineering assistance during construction of the new cells and developed operations plan and permit documents.

Long-Term Planning and New Cells Expansion for Jefferson Parish, Louisiana (2001). Technical Director evaluated several expansion scenarios for a limited landfill footprint to maximize the airspace capacity of the facility.

Whitehouse Waste Oil Pits Site, Jacksonville, Florida (2001). Technical Director served on the technical review committee for the Whitehouse Oil Pits Site, a Superfund cleanup site. Developed design procedures for a surficial gas collection system, approved by the EPA, resulting in considerable savings in the construction cost of the closure.

Design-Build Closure of Bee Ridge Landfill, Sarasota County, Florida (2000). Project Manager this fast-track design-build project included storm water management, cap system design using 40-mil LLDPE geomembrane, and a landfill gas (LFG) extraction system with a combination of vertical and horizontal wells. The total project cost at completion was approximately $7M.

Baling and Recycling Facility Design, Permitting, Bidding, and Construction Services for the Class I Landfill, Phase IIIA, St. Lucie County, Florida 2000). Technical Advisor reviewed final bid documents for the bailing and recycling facility and provided input in resolving field issues during construction.

Landfill Support Structures — Central County Solid Waste Disposal Complex, Sarasota, Florida (1999). Technical Advisor participated in the overall site layout during the initial stages of the project, provided technical assistance, and reviewed the deliverables at 30, 60, and 90 percent completion of the project.

Delaware Solid Waste Authority, DE | (1999) Technical Director provided technical assistance and design reviews for a 30-acre new cell expansion for the Delaware Solid Waste Authority, including leachate recirculation and gas extraction systems for a bioreactor operation.

Transfer Stations, Houston, TX | (1998). Project Manager designed and permitted 3 transfer stations for the City of Houston. The transfer stations were designed for 1,000 tpd capacity with expansion capabilities to 2,000 tpd in the future.

Publications and Presentations

Mulla-Saleh, Abdul, and John Reichling “Leachate Generation Management” Presented at Utility Solid Waste Activities Group –Ash Committee Meeting and Technical Symposium, Washington DC, May 8, 2013.

Abdul Mulla-Saleh, Ravi Kadambala, and Julio Bera “Solid Waste Collection Zones Optimization and Implementation” Presented at WSANA FL 2013 Summer Conference, Sarasota, FL, July 28-30, 2013.

Mayer, Nathan, Mulla-Saleh, Abdul, Manuel Hernandez, Carl, Steven, and Calistri, Ralph. “Biogeochemical Clogging of Landfill Leachate Collection Systems: Why is it Occurring, How Can it Be Cleaned, and what can be done to Prevent It?” First of two parts, Published Article in Waste Advantage Magazine, July 2013.

Mayer, Nathan, Mulla-Saleh, Abdul, Manuel Hernandez, Carl, Steven, and Calistri, Ralph. “Biogeochemical Clogging of Landfill Leachate Collection Systems: Why is it Occurring, How Can it Be Cleaned, and What Can be Done to Prevent It?” Second of two parts, Published Article in Waste Advantage Magazine, August 2013.

Abdul Mulla-Saleh, Ravi Kadambala, and Julio Bera “Solid Waste Collection Route Optimization and Implementation Plan, Published Article in Waste Advantage Magazine, December 2013.

Mulla-Saleh, Abdul R. "Implementation of Zero Waste Program For The City of Chicago as Part of Integrated Solid Waste Management" Presented at XII Annual International Solid Waste Symposium, Armenia, Colombia, September 27, 2012.

Mayer, Nathan, Mulla-Saleh, Abdul, Manuel Hernandez, Carl, Steven, and Calistri, Ralph. "Biogeochemical Clogging of Landfill Leachate Collection Systems: Why is it Occurring, How Can it Be Cleaned, and What Can be Done to Prevent It?" Presented at WASTECON 2012, Washington, DC.

Mulla-Saleh, Abdul R, Manuel Hernandez, and Jack Mesojedec. "Elevated Temperatures (as high as 176 Degrees F) Detected in Landfill Gas Wellheads!" Presented at SWANA 31st Annual Landfill Gas Symposium, Houston, Texas, March 10-13, 2008.

Mulla-Saleh, Abdul R. "Dynamic of Clogging in Landfill Leachate Collection Systems – Case Histories." WASTECON2007, Reno, Nevada, 2007.

Mulla-Saleh, Abdul R. "Clogging of Landfill Leachate Collection Systems." SWANA Florida Chapter, Naples, Florida, July 16, 2007.

Mulla-Saleh, Abdul R. "Assessment of Biogeochemical Deposits in Landfill Leachate Drainage Systems, Phase II."Ph.D. Dissertation, University of South Florida, October 2006.

Mulla-Saleh, Abdul R. "The Dynamics of Clogging." Municipal Solid Waste (MSW) Management Magazine, July/August Issue, 2006.

Levine, Audrey, Valerie Harwood, and Abdul Mulla-Saleh. "Assessment of Biogeochemical Deposits in Landfill Leachate Drainage Systems, Phase I." Presented at "Bill" Hinkley Center for Solid and Hazardous Waste Management, University of South Florida, February 2005.

Mulla-Saleh, Abdul R. "Landfill Closure Design-Build: A Trend of the Future – Bee Ridge Landfill Experience, Sarasota County, Florida." Presented at the Solid Waste Association of North America's WASTCON 2000, Cincinnati, Ohio, 2000.

Mulla-Saleh, Abdul R. "Landfill Gas Generation and Recovery – Looking Into the Future." Presented at the Solid Waste Association of North America's 23rd Annual Landfill Gas Symposium, San Diego, California, March 2000.

Mulla-Saleh, Abdul R. "Innovative Computer Models Add Efficiency to Design." Presented at the 18th International Madison Waste Conference, Department of Engineering Professional Development, University of Wisconsin-Madison, September 20-21, 1995.

Mulla-Saleh, Abdul R. "Evaluation of Leakage Rates in Geomembrane Double Liner Systems." Presented at the Air &Waste Management Association 87th Annual Meeting and Exhibition, Cincinnati, Ohio, June 1994.

Mulla-Saleh, Abdul R. "Financial Planning and Management of Recycling Programs and Facilities." In The McGraw-Hill Recycling Handbook, McGraw-Hill, Inc., 1993.

Mulla-Saleh, Abdul R. "Leakage Mechanism through Double Liner Systems." Presented at the Solid Waste Association of North America 30th Annual International Solid Waste Exposition, Tampa, Florida, August 1992