

RYAN M. LEFERS
ENVIRONMENTAL AND AGRICULTURAL ENGINEER,
P.E., M.S.

Ryan.lefers@kaust.edu.sa

SKILLS AND EXPERTISE

- Water systems and sustainability
- Soil-based onsite wastewater treatment and groundwater recharge
- Storm water permitting and management/surface water protection
- Groundwater protection and remediation
- Soil and water sampling and characterization
- Wastewater irrigation/application
- Contaminated site remediation (soil, water, air)
- GPS-based precision surveying and data processing
- Equipment management and maintenance
- Odor and hydrogen sulfide reduction in air
- Soil and water nutrient management and transfer
- Surface and groundwater modeling
- Project management
- Proposal and grant writing
- Project budgeting
- Team management and scheduling

EXPERIENCE

- 2006-2013: Environmental Engineering Consulting, Wenck Associates, Inc., Maple Plain, Minnesota
- 2004-2006: Agricultural Engineering Research, South Dakota State University, Brookings, South Dakota
- 2003-2003: Civil Engineering, Willadson Lund Engineering, Sioux Falls, South Dakota
- 2002-2003: Volunteer Teacher and Consultant, Resource Exchange International, Tashkent, Uzbekistan
- 2001-2001: Wildlife Technician, Game, Fish and Parks South Dakota, Chamberlain, South Dakota

EDUCATION

- Pursuing PhD, Environmental Science and Engineering, King Abdullah University of Science and Technology, Thuwal, Saudi Arabia, 2013-present.
- M.S., Agricultural and Biosystems Engineering, South Dakota State University, Brookings, SD, 2006 (4.0 GPA).

- B.S., Agricultural and Biosystems Engineering, South Dakota State University, Brookings, SD, 2004 (3.907 GPA).
- University of Minnesota Onsite Sewage Systems Certification

REGISTRATIONS

- Professional Engineer (P.E.)-States of Minnesota and South Dakota, USA
- Subsurface Sewage Treatment System Certification (Minnesota)

HONORS

- ASABE “New Face of Engineering” February 2009
- US Dep. of St. Critical Language Scholar April 2006
- Featured in ASABE Discover Magazine April 2006
- Winner AWMA student research paper July 2005
- SD Environ. Professionals Scholarship March 2005
- Featured on SDSU TV commercial Dec. 2004
- US NSEP Boren Scholar Aug. 2003

SELECT PUBLICATIONS

- “Design Specification for a Vertical Bed Biofilter”
 - **Abstract:**

Biofilters have been demonstrated to be an effective technology in reducing odor and gas emissions from these facilities. Large horizontal biofilter media beds sometimes prevent application of this technology to building layouts. A vertical biofilter bed may be an effective alternative. The objective of this research was to determine optimum vertical bed biofilter construction configuration to achieve uniform airflow that would compensate for media settling. Media thickness was determined to be a factor in achieving uniform airflow. For biofilters of 12 inches and 24 inches thick, a 9.6 degree wall construction produced the least airflow variation at the end of one year as compared to a wall slope of 0 degrees and 4.8 degrees. Improved media moisture distribution was achieved when the water soaker hose was placed on top of the media versus being suspended vertically through the media. The value of this research leads to a more efficient vertical biofilter design configuration.
- “Biofilters Used to Reduce Emissions from Livestock Housing – A Literature Review”
 - **Abstract:**

This paper reviews the literature on the development of biofilters for use on confined livestock facilities. More specifically the paper addresses the history, current and accepted design parameters, and status of research. Biofilters offer one potential solution to reduce nuisance odors and pollutants emitted from confined livestock housing. Typical biofilters used in agriculture consist of an organic media mixture of wood chips and compost. Barn exhaust air is blown through this media, allowing the microorganisms contained within the media to break down the gaseous compounds. Biofilters have been used in agriculture in Europe since the 1970’s and in the United States since the 1990’s. Much advancement has been made in terms of biofilter

design since their introduction to agriculture. Design parameters have been established to minimize cost and maximize effectiveness. Some of these design parameters include bed thickness, media type, empty bed contact time, moisture control, and media bed orientation. These design parameters also influence factors such as pressure drop, microbial ecology, air channeling, foot print size, and gas/odor removal efficiency. Overall, properly designed biofilters used in agriculture have been shown to reduce hydrogen sulfide emissions by up to 95% and ammonia emissions by up to 65%. Biofilters are an effective air pollution control option for agriculture.

- “A Design and Analysis for a Vertical Bed Biofilter and Biofilter Moisture Control System,” (Master’s Thesis, copy available upon request.)

- **Abstract:**

Biofilters are an effective technology in reducing odor and pollutant gas emissions from animal agriculture. Large horizontal biofilter media beds sometimes prevent application of this technology. Vertical bed biofilter are an alternative. Also, moisture content in a biofilter affects its pollutant removal efficiency. The research objectives were to develop a design for a vertical biofilter to achieve uniform airflow after media settling and test a biofilter moisture control system.

By sloping one wall of a vertical biofilter, uniform airflow can be achieved after media settling. A 9.6 degree wall construction produced the least airflow variation after media settling among the 0, 4.8, and 9.6 degree side wall slopes tested. Using a Watermark Electronic Module irrigation control system on a laboratory scale biofilter, moisture was kept above the desired minimum 40% moisture.

ACTIVITIES

- American Society of Agricultural and Biosystems Engineers-
Sep 2000-present
- National Groundwater Association Aug 2006-present
- Common Ground Intercultural Volunteer Sep 2006-present
- Study Abroad in Cairo, Egypt Aug 2003-Jan 2004
- University Resident Assistant Sep 2001-May 2003
- Engineers Without Borders at South Dakota State University,
VP International Projects May 2004-May 2005
- Volunteers in Action (Egypt) Sep 2003-Jan 2004

LANGUAGES

- English-native speaker
- Arabic-intermediate language certification

HOBBIES

- Fishing, Reading, Gardening, and Traveling

*References, transcripts, and copies of publications available upon request