Press Release

EREF Awards Three Research Grants for Solid Waste Research,
Next Proposal Deadline is January 8, 2015

Raleigh, NC (October 28, 2014) – The Board of Directors of the Environmental Research and Education Foundation (EREF) is pleased to announce the award of three research grants for solid waste research.

EREF is the only private, grant making institution with a national and international scope whose sole mission is to support solid waste research and education initiatives. EREF’s research grants program is led by its Research Council, a body of volunteers consisting of technical experts in industry, academia and consulting. The work of the Council is guided by a long range strategic plan with the goal to achieve greater sustainability, good environmental stewardship, higher process efficiency and increased knowledge. Council recommended projects are then reviewed by EREF’s Board’s Projects Committee for a final review and funding allocation. Non-research oriented projects are reviewed and recommended to the Projects Committee by technical staff.

Simultaneous Concentration and Treatment of Landfill Leachate by Hybrid Osmotically Driven Membrane Processes

Investigators: Humboldt State University
Award Amount: $120,040

Municipal landfill leachate has been one of the major environmental problems because of its high content of organics, inorganics, and heavy metals [1]. Therefore, before discharge to the environment, landfill leachate must be treated and different technologies can be employed. Common treatment technologies include biological and physio-chemical process; however, with the continuous tightening of discharge limits and standards and the ageing of landfill sites with more and more stabilized leachates, conventional treatments are often not sufficient to reach the level of treatment needed. The proposed research will examine emerging membrane-based technologies with the potential to improve treatment efficiency and minimize concentrate disposal issues. A novel integrated membrane system that utilizes a forward osmosis (FO) membrane and a membrane distillation (MD) membrane in a reconcentration process will be investigated and optimized for developing a highly efficient landfill leachate treatment and concentration system. In satisfying the stated objectives, the following objectives of EREF’s TRP will be addressed:

1. Development of a system that aims to minimize cost, yet is operationally reliable and environmentally compliant
2. Compare the system to existing and innovative treatment technologies
3. Evaluate the system’s capability of improving the use of evaporative systems for leachate management.

Transitioning from Active to Passive Care at Municipal Landfills: Full-Scale Site Evaluations using the EPCC Methodology

Investigators: Geosyntec Consultants
Award Amount: $40,403

The Subtitle D regulations governing municipal solid waste (MSW) landfills reference a 30-year post-closure care (PCC) period, but also mandate that PCC be continued until it is demonstrated that ending care does not
propose a threat to human health or the environment (HHE). The performance-based Evaluation of Post-Closure Care (EPCC) methodology provides a modular approach for sequentially evaluating the four primary post-closure care (PCC) elements (i.e., leachate management, landfill gas management, groundwater monitoring, and cover maintenance) in terms of ‘functional stability,’ which describes a closed landfill that does not present an unacceptable threat to HHE in the absence of active care. Functional stability implies residual leachate and gas emissions can be managed using passive measures such as windmills, wetlands, biofilters, or methane oxidation caps (biocovers). After functional stability is demonstrated, a mechanism for confirmation monitoring is suggested, ultimately allowing transfer of responsibility from a regulated PCC program to a custodial care program.

The EPCC methodology is almost eight years old and much has been learned since publication in 2006, not least in terms of simplifying and adapting its application to address different technical and regulatory objectives. The overall objective of the proposed project is to illustrate how updated EPCC methodology components can be applied to progressively demonstrate step-down reductions in PCC, starting with fully active controls and ending with fully passive measures representing a de minimis level of care that meets sustainability objectives, can be provided under a non-regulatory custodial care program of land management, and facilitates beneficial reuse of the site. This will be achieved by performing a series of retroactive data evaluations at a case study landfill that has completed nearly 20 years of PCC and achieved fully passive residual controls. Specific objectives include:

- Updating the ‘EPCC tool box’ to provide additional guidance on methodology application, including what data are required and how to evaluate the data;
- Illustrating the simplicity and flexibility afforded by methodology application at different stages of the post-closure lifecycle (i.e., early, middle, and end of PCC);
- Quantification of the environmental implications of decisions made at each stage; and
- Demonstrating that desired outcomes from the methodology are relevant and achievable

**Approaches to Mitigation of Landfill Leachate-Induced UV Transmittance Impacts**

**Investigators:** Montclair State University

**Award Amount:** $175,652

Landfill leachate management has become an increasingly important component in integrated and sustainable solid waste management as a result of gradually tightened regulations and significant associated expenses. Discharge of leachate to publicly owned treatment works (POTWs) is a common and preferred leachate management practice in the United States, due to the lowest treatment cost and the least management complexity as compared to other strategies. However, leachate can significantly interfere with UV disinfection performance at POTWs due to introduction of strongly UV-quenching substances in the leachate. Since a regulatory trend is pushing POTWs from traditional chlorination to alternative UV disinfection, there is an immediate and urgent need to mitigate the UV transmittance impacts of leachate at POTWs. Unfortunately, the knowledge on the origin and nature of UV-quenching DOMs in landfill leachate is extremely limited, and the technologies for mitigation of UV absorbance are not well tested, optimized, and developed.

The long-range goal of this research is to develop successful leachate management strategies for mitigation of UV transmittance impacts. The primary objective of this proposal is to identify the origin and nature of UV-quenching substances in landfill leachate, and develop technically and economically viable on-site treatment technologies to address the UV transmittance issue at POTWs. Preliminary laboratory studies, in conjunction with literature data, show that leachate UV absorbance can be significantly reduced after an effective removal of dissolved organic matters (DOMs), thereby suggesting that the UV transmittance problem is principally caused by UV-quenching DOMs. Therefore, the central hypothesis is that the leachate UV transmittance issue can be well addressed by development and application of appropriate on-site leachate treatment technologies targeting at UV-quenching DOMs. This primary objective can be achieved by pursuing the four specific objectives:
1. To identify the origin and nature of UV-quenching DOMs in landfill leachate;
2. To preliminarily screen physical/chemical on-site treatment technologies for UV-quenching DOMs;
3. To further evaluate the performance of selected on-site treatment technologies combined with subsequent secondary treatment and advanced technologies at POTWs;
4. To comprehensively review and compare the tested technologies, and make recommendations to the solid waste industry for improved sustainability

Researchers are invited to submit proposals on solid waste management issues contained in EREF’s Strategic Research Plan or on educational projects. The next proposal deadline is January 8, 2015. Visit www.erefdn.org/grants for more information.

EREF is a 501(c)3 class charity that funds and directs scientific research and educational initiatives for waste management practices to benefit industry participants and the communities they serve. For more complete information on EREF funded research, its scholarship program and how to donate to this great cause, visit www.erefdn.org.

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