QUARTERLY PROGRESS REPORT

March 1st to May 31st

PROJECT TITLE: Assessing Options for On-site Leachate and Groundwater Management Strategies at Florida Landfills

PRINCIPAL INVESTIGATOR(S): Timothy G. Townsend

AFFILIATION: Professor, University of Florida Department of Environmental Engineering

COMPLETION DATE: November 30th, 2014 **PHONE NUMBER:** (352) 392-0846

PROJECT WEB SITE: http://pages.ees.ufl.edu/townsend/research/hc13/

Work accomplished during this reporting period:

Leachate Database

Roya Darioosh added entries to the leachate database. A large part of this came from the FDEP, using the leachate data in WACS. This added some new landfills to the database as well as many different data points for each landfill. Other sources of data came from Jones Edmunds, landfill operators, and Oculus. Roya will continue to search for more data in order to try to have complete data for all landfills between the years of 2000 to 2010. In addition to that we are trying to get a better sense of the backgrounds of all the lined landfills in Florida in order to understand what type of data is in the database.

On May 3, 2014, Dr. Meeroff prepared a USB drive with data sets for the research team of Jim Wally and Roya Darioosh. The directory included the following: copies of Hinkley Center reports (Analysis of Florida MSW Landfill Leachate Quality, Interactive Decision Support Tool for Leachate Management); copies of permits from the BIC landfill; copy of an engineering report, "Analysis of BIC Landfill Biosolids Disposal Impact Assessment Report;" spreadsheets of class 1 leachate information including contacts, latitude and longitude location data, leachate water quality, flow rates, leachate management strategies, waste generation rates, etc.; water quality reports from Lake County, WM Pompano Beach, Martin County, and SWA; map with location of waste facilities in Florida; BMP guide with alternative analysis for leachate management and treatment options; leachate generation rate study conducted by Richard Tedder; and leachate questionnaire. This information was provided to the research team and discussed on May 27, 2014 at the technical advisory group meeting in Palm Beach, FL.

Leachate Treatment Tool

Cost and performance literature reviews were performed for various relevant treatment technologies using the previous Hinkley Center leachate treatment report as a guide to relevant technologies. A review of the state of practice is also underway which will update the leachate database on current management strategies.

Design options for sub-liner vadose zone air venting

A two-dimensional vadose zone conceptual model was developed for air venting simulation. The subsurface, composed of 250 cells, was created using SEEP/W and then air flow was added using AIR/W. Sandy soil with a hydraulic conductivity (K) of 8.64 m/days was chosen for the material and the air pipes

could be installed between 20 m along the longitudinal direction and each pipe is assigned either for the negative pressure (suction) or the positive pressure (blower). In this study, three sets of simulations (pipes connected to blower, pipes connected to suction, and alternating in order) were compared in terms of the air flux with the same pressure (100 kPa) applied.

Simulation results

Three sets of simulation were carried out with AIR/W. For the first try, with all pipes connected to the blower was well predicted in Figure 1. The pressure gradient seemed to be well developed in subsurface, however, most of air flux was found to vent outwards.

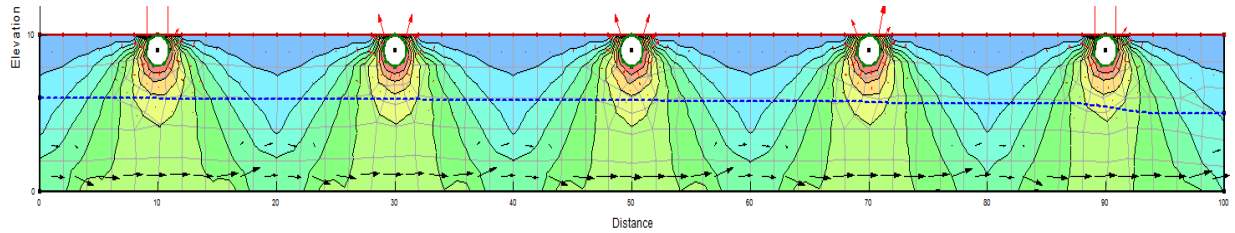

Figure 1. Vadose zone air venting simulation for the case #1: all pipes for blower

The second (all pipes for suction) case, was also simulated using same procedure except for the applied pressure, at this time, negative pressure (-100 kPa) was applied instead of positive pressure.

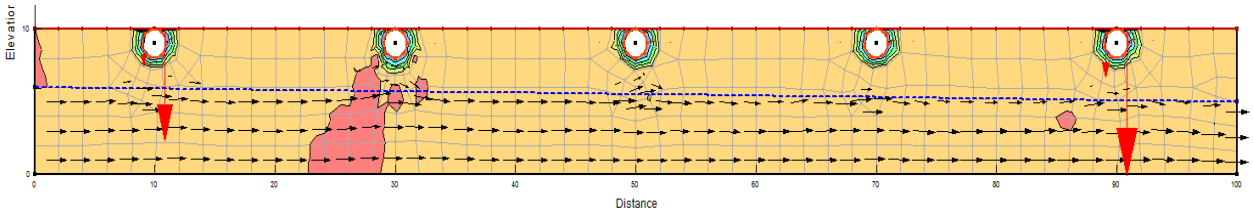

Figure 2. Vadose zone air venting simulation for the case #2: all pipes for suction

As one can see in the above figure, no noticeable pressure gradient was observed in this scenario. Only a small boundary near the pipe was affected by the suction pressure and only a little amount of air from atmosphere and no horizontal flow was observed, which is presumably due to the relatively higher pressure in the atmosphere than subsurface.

For the last case, alternating condition was simulated. In this case, 5 pipes were assigned as suction (-100 kPa) and blower (+100 kPa) alternating from left to right. The pressure gradient was higher than the other two cases and the resulting air flux (expressed as a red vector) was also well developed (ca. 120,000 g/day; horizontal air flux between two pipes) in longitudinal direction in subsurface.

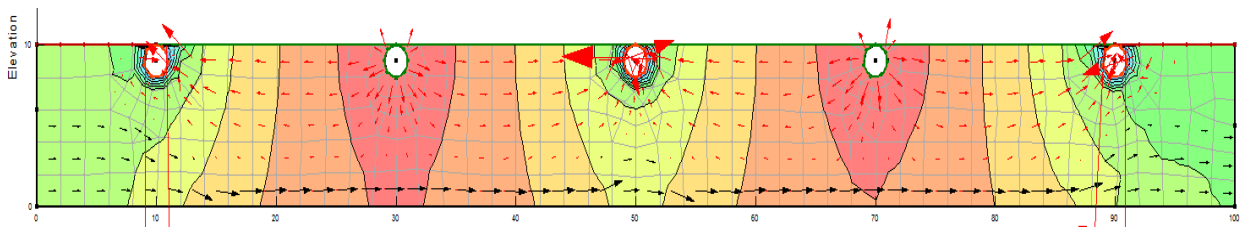

Fig 3. Vadose zone air venting simulation for the case #3: alternating condition

Metrics:

Name	Rank	Department	Professor	Institution
Chung, Jae Shik		Environmental Engineering	Townsend	University of Florida
Daroosh, Roya		Environmental Engineering	Townsend	University of Florida
Wally, James		Environmental Engineering	Townsend	University of Florida

Invited TAG members include:

- Richard Tedder, Florida Department of Environmental Protection (Tallahassee)
- Gary Bennett, Sarasota County
- Jason Gorrie, Covanta
- Ron Beladi, Neel-Schaffer, Inc.
- John Power, Pasco County
- John Banks, Geosyntec
- Kelsie Oswald, Pinellas County
- Paul Hauck, CDM Smith
- Jay Berry, Waste Management

A TAG Meeting was held on May 27, 2014. The slides for the meeting will be posted on the project website.