FAMU – FSU COLLEGE OF ENGINEERING
DEPARTMENT OF CIVIL & ENVIRONMENTAL ENGINEERING
2525 Pottsdamer Street
Tallahassee, Florida

Tag Meeting No. 1

Friday, February 6
10:00 – 11:30, Room B202

MINUTES OF MEETING

Project Title: Usage of Water-Filled Trench in Improving Groundwater Quality
Tag Members: Lee Martin, Peter Grasel, Jim Langenbach, Subramanian Ramakrishnan, Michael Watts, and Clayton Clark
Principle Investigators: Gang Chen, Amy Chan Hilton, and Kamal Tawfiq

In attendance: Tim Vinson, Lee Martin, Peter Grasel, Subramanian Ramakrishnan, Michael Watts, Clayton Clark, Gang Chen, Amy B. Chan Hilton, Pawan Kumar Subramaniam, and Matthew Cumming. Jim Langenbach provided reviews and comments by mail after going through the presentation and discussion.

1. Project Overview, Research Plan and Preliminary Data — presented by Gang Chen (Detailed presentation will be available at www.eng.fsu.edu/~gchen)

Project objectives:

1. Explore the possibility of the usage of water-filled trench in treating contaminated groundwater
2. Identify dominating mechanisms
   - Organic decomposition
   - Volatile organic compound vaporization
   - Metal oxidation and precipitation
3. Investigate the effect
   - Effect of dissolved oxygen
   - Effect of alkalinity
   - Promote field applications
   - Quantify removal rate

Preliminary data of TCE, benzene, toluene and xylene vaporization
— conducted by Pawan Kumar Subramaniam

Preliminary data of ferrous sorption on iron consortia
— conducted by Pawan Kumar Subramaniam

2. Discussion

Lee Martin: Based on the preliminary results, above 90% of TCE, benzene, toluene and xylene can be evaporated after 90 minutes. The PIs concern that the capacity of the water filled trench may be too much to achieve this goal. Lee pointed that it is practical. Especially if the groundwater flow rate is low, retention time of 90 minutes and above can be achieved.

Tim Vinson: Tim recommended that the kinetic processes of organic decomposition, volatile organic compound vaporization, and metal oxidation and precipitation be described for the project.

Peter Grasel: Peter pointed out that pH played a very important role for metal precipitation and dechlorination. He briefed some literatures on petroleum BTEX degradation. Peter also mentioned that for landfill leachate degradation, more oxygen was required as compared to pure sugar compounds.

Lee Martin: For the proposed treatment of groundwater using water filled trench with aerobic filter, the PIs should think about the reuse of the filter material. This is important especially for future large scale applications. The PIs have proposed to use mulch as the filter material. Can the material be used somewhere else after use?

Amy Chan Hilton: Properties of mulch vary when they are produced from different sources. Thus the pH and other water chemistry may be affected when mulch is introduced as the filter material. The impact of the introduction of mulch on the treatment efficiency as well as the water quality should be evaluated.

Peter Grasel and Lee Martin: Peter and Lee briefed some literatures on mulch study and mulch properties.

Michael Watts: This research should include the impact of variation of BTEX, TCE and PCE concentration on the treatment results.

Jim Langenbach provides the following constructive comments.

Comment No. 1

I would have liked to have viewed a conceptual layout of how the investigators envision that the water-filled trench concept would be deployed in the field. Is it anticipated that this would be an extended length reactive trench cut into an aquifer and installed perpendicular to groundwater flow, or is it planned that impacted groundwater would be pumped to a shallow trench system for treatment? I would recommend a conceptual drawing(s) be added to future presentations.

Comment No. 2

Since petroleum compounds will biologically degrade under aerobic conditions in-situ, I would consider trying to minimize volatilization from the trench and maximize in-situ biodegradation under aerobic conditions. This would be similar to what a biosparge barrier is designed to accomplish. As configured in the presentation slides, the aeration cylinder is

functioning as an air sparge point, stripping the VOCs from the groundwater (not much different than an air sparge curtain).

To me what is interesting about the technology is that it could serve as a low-energy, fairly passive approach. As an example, a number of landfills have issue associated with iron and other metals from changes to groundwater geochemistry. A trench installed along the downgradient edge of the landfill, designed to receive surface runoff (or minimally aerated) could serve to provide passive in-situ treatment.

Comment No. 3

I would recommend, if possible, that the investigators evaluate the effect of iron precipitation. For example, if iron precipitation within the trench results in fouling of walls and/or media, the associated reduction in permeability may result in flow bypassing the trench. Would this mean the trench and/or media would require removal/replacement? If lab setup is run with filter media, the hydraulic conductivity of the media can be run pre/post testing.

Comments No. 4

Has arsenic been considered as a metal to evaluate? Arsenic is and will be a “hot topic” in Florida.

3. Website Development

A website has been developed for this research (www.eng.fsu.edu/~gchen). All the information regarding this project is uploaded to this site to facilitate the dissemination of the research discovery.

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