

## **PROGRESS REPORT**

November 1, 2006 to January 31, 2007

**PROJECT TITLE: Soils underneath Florida Landfills and their Role in the Occurrence and Fate of Iron and Arsenic in Groundwater**

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### **Progress to Date:**

The preparation of the review document for Task 1 continues during this period. The report is being prepared in the form of a journal manuscript. The iron experiments for Task 2 are underway with initial results being obtained and analyzed. The soil samples collected for the experiment were analyzed for several parameters including total iron, SPLP leaching iron, oxalate and citrate-dithionite extractable iron. A sample of result set is as presented in Table 1.

A set of laboratory experiments are being conducted to measure the amount of reducible iron in these six soils under reducing conditions similar to those beneath a landfill. The soils were incubated anaerobically after a small amount of cellulose was added to serve as an electron donor for microbial iron reduction. The Figure-1 presented here shows a data set for a particular soil type. Increase in water extractable iron follows the trend of reduction in ORP with time for this soil. For this sample, the combined amount of iron extracted with KCl and HCl was about five times greater than that extracted with water. The other soils in the study are showing similar behavior but the amounts of iron released differ depending on the mineralogy and total iron content.

The first TAG meeting for this project was conducted on Dec. 01. 2006. The meeting was attended by DEP personnel, industry people and several representatives from different Counties attended the meeting. The initial results from the ongoing project were presented and feedback from the audience was received.

Table 1 Parameters evaluated on soil samples collected for this study

Sample ID	Total Soil iron content (mg/kg)	SPLP results (mg/L)	Amorphous Fe using Oxalate extraction (mg/L)	Citrate-Dithionite-Bicarbonate Extractable Fe(mg/kg)	Soil pH
Sample-1	7730	3.77	115	1410	4.56
Sample-2	31000	27.2	1130	12700	4.47
Sample-3	11800	118	557	768	5.68
Sample-4	6500	1.32	52	2640	5.09
Sample-5	9920	0.36	66	3150	4.92
Sample-6	996	0.32	73	455	5.37

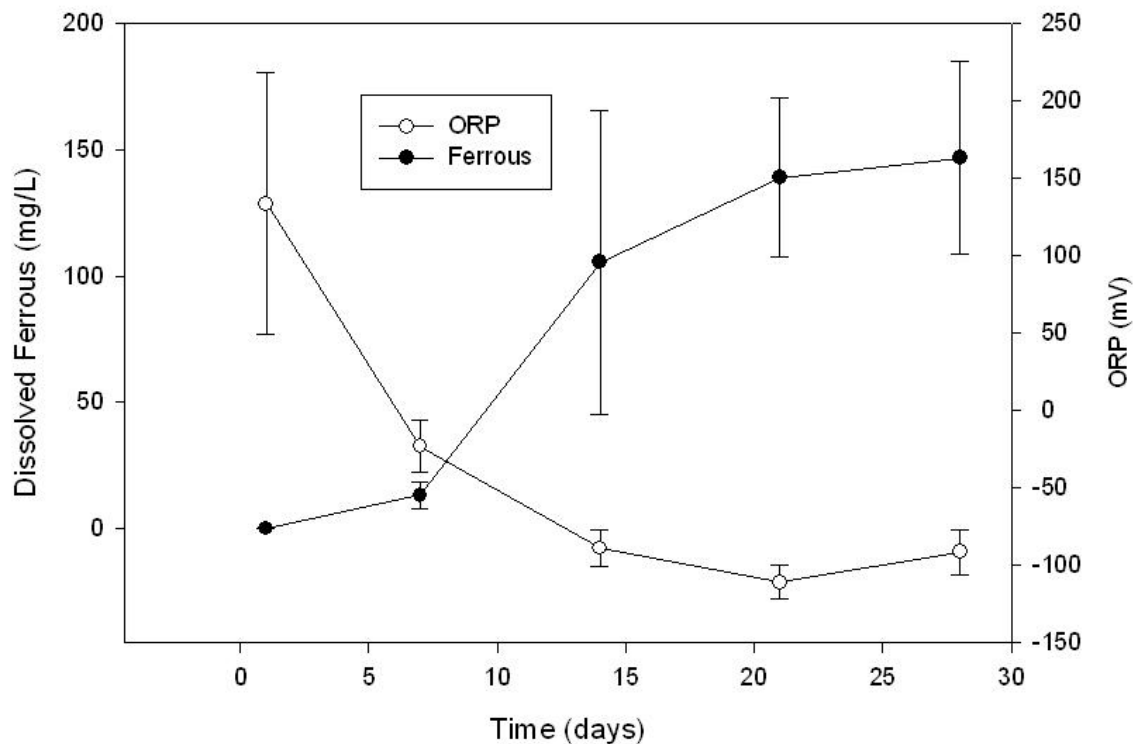


Figure 1 Ferrous & ORP variation over time from the biological leaching test

### Future Work:

The website of this project is under construction which will be posted on website in coming weeks. Experiments measuring reducible iron (Task-2) will be completed in the coming quarter period of this project. Reducible iron will be correlated with extractable iron as measured by oxalate and citrate-dithionite and these extractants will be evaluated as potential predictors of biological reducible iron. Several chemical reducing leaching tests will also be conducted. In the Task-3, sorption of arsenic(III) will be measured by soils typically found beneath C&D landfills. These studies will be conducted under anaerobic conditions to simulate actual C&D landfill conditions. Sorption of arsenic (V) will be estimated using phosphate sorption data and the potential for arsenic leaching beneath C & D landfills will be modeled accordingly.