

QUARTERLY PROGRESS REPORT

Dec. 2003 – Feb. 2004

PROJECT TITLE: Control of Odors from Construction and Demolition Debris Landfills

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1.0 Introduction

Odor problems associated with hydrogen sulfide (H_2S) emissions at C&D landfills have been a concern in Florida for a number of years. It is well known that H_2S results from the biodegradation of gypsum drywall, one of the major components of C&D debris. A number of studies have been conducted in the field and laboratory (Lee, 2000; Yang, 2000; Plaza, 2003) to evaluate this phenomenon. One research project (Townsend et al. 2000) found that some materials naturally present in C&D debris have the ability to react with H_2S in the gaseous phase. These laboratory column experiments indicated that crushed concrete and the lime-amended soil reduced H_2S flux rates greater than unamended soils (Plaza, 2003). This observation led the investigators to test the idea of amending landfill cover soil with inexpensive materials (e.g. crushed concrete fines, lime) to create a “filter” for removing attenuation H_2S emissions. This progress report describes activities on the project from December 2003 through February 2004.

2.0 Work Completed This Quarter

Earlier in the project, a several plots containing different types of cover soil were added to the surface of a C&D debris landfill. Sampling probes were installed in different locations within and underneath the soil (Figure 1). H_2S concentrations were monitored weekly with the exception of a period when the Jerome meter was sent to the manufacturer to repair.

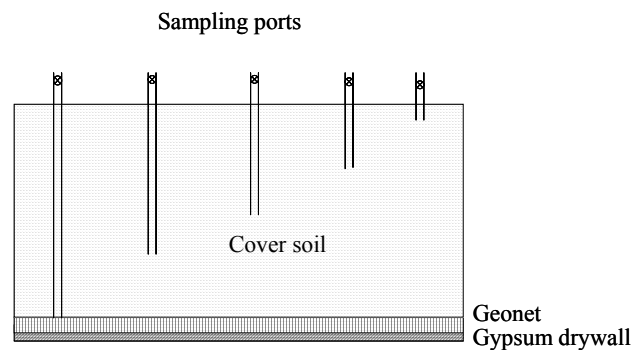


Figure 1. Schematic of the Sampling System

3.0 Results and Discussion

Table 1 provides data collected prior to the return of the Jerome meter for repair. These data were collected by direct measurement from the sampling tubing. These results should be considered as preliminary as the research team is still evaluating how best to collect samples that are meaningful to the objectives of the research.

Table 1. H₂S Concentrations (ppb) Profiles in Different Cover Soils

Date	12/2/2003				
	12inch	9inch	6inch	3inch	1inch
Sand	110	10	7	4	2
Fine concrete	32	12	4	4	4
Compost	3	1	NR	NR	NR
Ag-lime	NR	NR	NR	NR	NR
Hydrated lime(1%)	17	13	5	2	NR
Hydrated lime(3%)	NR	NR	NR	NR	NR

Date	12/10/2003				
	12inch	9inch	6inch	3inch	1inch
Sand	120	6	NR	3	NR
Fine concrete	130	17	5	5	3
Compost	14	4	3	3	NR
Ag-lime	3	2	NR	NR	NR
Hydrated lime(1%)	13	5	3	2	NR
Hydrated lime(3%)	NR	NR	NR	NR	NR

Date	12/16/2003				
	12inch	9inch	6inch	3inch	1inch
Sand	4300	11	6	NR	NR
Fine concrete	170	16	10	8	4
Compost	7	3	2	1	2
Ag-lime	3	1	2	1	1
Hydrated lime(1%)	4	3	2	NR	NR
Hydrated lime(3%)	3	2	1	NR	NR

NR: No Reading

Different methods of collecting samples are being evaluated. It is apparent that for some soils the flow rate pulled using the Jerome meter causes some short circuiting of air into the collection devices. One method that has been evaluated for correcting this is the use of a 3-way valve, a syringe and a Tedlar bag (Figure 2). When taking gas sampling, port 3 is closed and a gas sample is extracted using the syringe. Port 1 is then closed while port 3 is opened. The gas sample is then pushed from the syringe to the Tedlar bag for Jerome meter measurement.

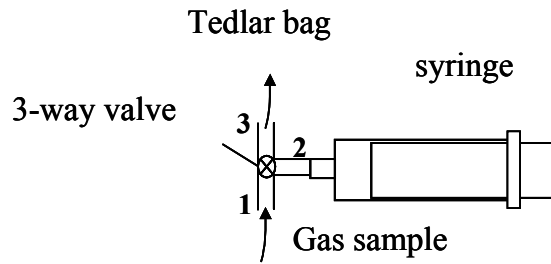


Figure 2. Schematic of Sampling Method

In addition to the different depths of H₂S profiles from the sampling ports within the soil, gas samples are also being collected from the geonet underneath the soil. Figure 3 presents H₂S concentration profiles for the sand and fine concrete. Again this data is preliminary as is intended to provide an example of the types of measurements being collected.

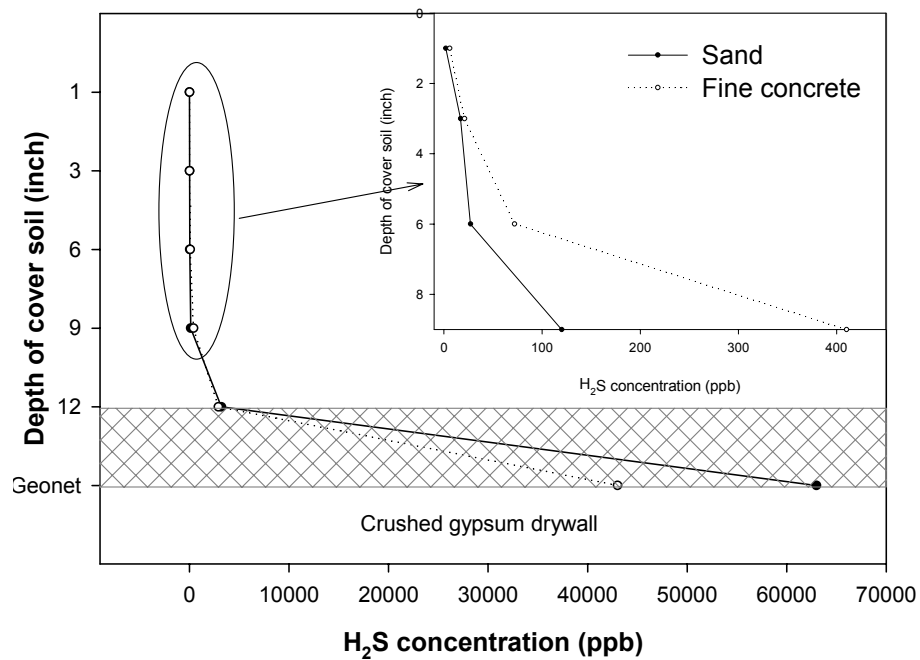


Figure 3 H₂S Concentration Profile in Sand and Fine Concrete

4.0 Work to be completed in the next quarter

The measurement of H₂S concentrations will continue on a weekly basis and the flux will be measured on a bi-weekly basis.

REFERENCES

Lee, S. (2000). "Landfill Gas Composition At Florida Construction And Demolition Debris Facilities." Master of Engineering Thesis, University of Florida, Gainesville, FL.

Plaza, C. (2003). Master of Engineering Thesis, University of Florida, Gainesville, FL.

Townsend, T, Chadik, P, Bitton, G, Booth, M, Lee, S., and Yang, K (2000). "Gypsum drywall impact on odor production at landfills: Science and Control Strategies." Report submitted to the Florida Center for Solid and Hazardous Waste Management. Report #00-09.

Yang, K. (2000). "Hydrogen Sulfide Generation In Simulated Construction And Demolition (C&D) Landfill Laboratory Columns" Master of Engineering Thesis, University of Florida, Gainesville, FL.