

**MEMORANDUM**

**DATE: October 7, 2009**

**TO: Laboratory Group B**

**Steven Klekas, Mitchell McDonald, Raphael Erickson**

**FROM: Tony Butterfield**

**Engineering Training Supervisor**

**SUBJECT: Hydrogel Amended Soil**

Our client produces a granular hydrogel product used to amend soils. Crystals of dry hydrogel are mixed into soil. When watered, the hydrogels swell as they absorb the liquid, and in dry conditions they are then meant to release their water to the surrounding root systems, thereby ameliorating periods of drought.

Our client would like to find a quick means of testing the effectiveness of their product. The obvious method would be to measure the water lost from soil samples at ambient temperature, pressure, and humidity. However, such a method takes a good deal of time. Your task is to use our vacuum drying oven to explore the possibility of using the pressures and temperatures attainable within to achieve an accelerated, yet effective method of quality control testing.

I will provide you with the soil and hydrogel samples. Our client recommends approximately 2 tsp of dry hydrogel per gallon of soil, and claims that a soil sample of, at least, 6 cm in depth is necessary for testing. Before our preliminary lab meeting, please give thought to the sort of container you will use and your sample preparation.

In addition to whatever control experiments are necessary, please also compare your results using the oven to those obtained at ambient conditions for our client. It may take some special time considerations to obtain the necessary measurements under ambient conditions, but do the best you can with the time you have in the lab and feel free to ask me to take measurements at times when you cannot.

In your report, please describe the theory you used to model the dynamic water content of your samples under your experimental conditions, and the assumptions used. Justify your methods, particularly your sample preparation, experimental conditions, and measurement techniques. Explain any significant divergence from theory you find in your data. Our client is particularly interested in knowing if there are detectable differences in the rate limiting processes when going from atmospheric conditions to those in the vacuum, and it might be helpful to also look at the loss of water from the hydrogels without soil. Finally, address for our client if it will be possible to use conditions similar to those in our vacuum oven to accurately and quickly quantify the effectiveness of their product compared to un-amended soil or soil amended with their competitor’s products, even though the product is to be used at atmospheric conditions.

Please contact me with any questions you may have, and I look forward to meeting with you regarding this project on or before Monday, October 19, 2009.

Thank you, and best of luck.