**Problem set for Module 5: Start up, operational monitoring & H2S**

Planning for operational monitoring

1. Zickefoose and Hayes and Drosge identify critical operational parameters that AD operators should monitor in order to maximize the efficiency and safety of AD. Create a plan for operational monitoring by:
   1. Deciding which parameters should be monitored daily vs. weekly vs. monthly;
   2. Which measurements would be performed using automatic, in-line monitoring?
   3. Describe how, where and when you would collect samples for other testing.
   4. Finally, list the tests you would perform on those samples.

NB: You may find it useful to use a grid or table to organize your plan.

Feeding and biogas production

1. Using the TS & VS data for May of 2015, calculate the organic loading rate if VTCAD is fed 16,000 gallons of “prep pit” feedstock per day.
2. If 50 gallons of ferric chloride solution is added to each 16,000-gallon feeding, calculate the ferric chloride dose in gallons of ferric chloride per kg or lb of VS.
3. Calculate the expected range of biogas produced from this 16,000 gallons of “prep pit” feedstock at:
   1. 50% VS destruction
   2. 75% VS destruction
4. The 105,000-gallon hydrolysis tank is 70% full and is fed 16,000 gallons per day. Every 2 hours, 1,167 gallons is transferred from the hydrolysis tank to the 317,000-gallon AD tank. Calculate:
   1. Hydrolysis tank HRT for seven consecutive days
   2. AD tank HRT for seven consecutive days

Converting test data to results

1. Using the TS / VS protocol and data in Excel spreadsheets posted with this module, write out one set of sample calculations showing how data is converted to results.
2. Using the Ripley protocol and data in Excel spreadsheets posted with this module, write out one set of sample calculations showing how data is converted to results.