Conference Call Notes: Stakeholder Meeting for Emissions Inventory for Produced Water Facilities  
10/5/2017, 1:00pm – 2:30pm

Goals:
1. Review and discuss the work that has been done so far to create the inventory
2. Create a technical workgroup to create an interim emission factor so that a produced water emissions inventory can be finalized to update the 2014 NEI and in the longer term, refine emission factors for an accurate inventory of produced water ponds.

Presentations:
1. Produced Water Emissions Research Summary  
   Marc Mansfield, Huy Tran, Seth Lyman, Utah State University
   • Flux chamber: a floating dome on the water: calculate emissions flux by calculating the concentration of emissions inside the chamber vs outside the chamber.
   • Problems:
     ▪ Covers water entirely
     ▪ Wind variability causes poor data
     ▪ Only measures small part of the pond at once, but adds potential spatial variability across pond
   • Results:
     ▪ Pond categorization: skim ponds, active ponds, inactive (haven’t received water in a long time)
     ▪ Pond water Composition:
       ▪ Primarily alcohols, low formaldehydes
     ▪ Emissions flux composition:
       ▪ Fewer alcohols, more alkanes especially in skim ponds (called skim ponds because they accumulate oil that is skimmed off and sold)
   • Modeling
     ▪ Inverse-modeling: case study using AERMOD and HEGADGAS-S as dispersion models
       ▪ Wind speeds at water surface are very different than 6m above ground level
       ▪ Emission rate is not uniform throughout the pond surface
         ▪ Mainly released from the up-wind part of the pond
         ▪ This method consistently over-estimates emissions data
     ▪ Mass transfer coefficient (includes influence from temp, wind speed, salinity, nature of compound, etc.)
       ▪ Mass transfer law states that emissions flux and concentration of compound in water are proportional according to the mass transfer coefficient
       ▪ When compared to estimates of the EPA WATER-9 model, this method/algorithm matches within 1 order of magnitude
     ▪ Attempt to correct for wind speed
     ▪ Scale up the pond data to the entire Uinta Basin
       ▪ Largest emission: CO2 likely due to carbon oxidation

2. Produced Water Facility Emissions
Todd Wetzel, Utah DAQ

- Mass-balance approach, collecting throughput and emissions from facility evaporation ponds on a monthly basis (starting in May 2017; not yet analyzed/reported here)
  - Emissions = facility throughput * emission factor (water sample concentration)
  - This info is already required to be reported to the Utah Division of Oil Gas and Mining (UDOGM)
  - Right now, we have an average of samples from evaporation bonds from 1 sample date in 2016 and 1 single data point from a skim pond sampled at the same time
- We get: gas range GRO (C6-12), diesel range DRO (C10-28), (per Colorado assume 50% evaporated to air, 50% remain as sludge etc). Also speciate for BTEX
- Assumption: water goes through skim pond before evaporation pond, so both emissions factors apply
- 2014 EI
  - Total emissions from produced water facilities: 72,762.55 TPY of VOC
    - Not much of this value is C12+
- Issues
  - Not all facilities are equal in reporting or producing, so these results are imperfect
  - Not very many data points
  - Several assumptions made to get the result for the 2014 EI
  - Over estimation of emissions due to
    - Assume all GRO species evaporate
    - Not accounting for oil that is skimmed off, not all of it is evaporated
    - Sludge accumulation, all DRO?
- Results
  - Emissions factor needs to be refined

Discussion:
- Evaporation pond number from USU method is similar to results from DAQ’s method of multiplying emission factor times throughput.
  - USU skim pond estimate is lower than DAQ method. (On the order of 1,500 t/y USU method, compared to 71,000 t/y DAQ method).
    - In making this comparison “we aren’t comparing apples to apples” due to different sampling methodology
- There were several questions from the stakeholders about the presentations
- Call was wrapped up by asking participants to return to the goals stated at the beginning of the call
  - Create a technical workgroup - email Whitney to be included in the group. First meeting in a few weeks to focus on the following task:
    - Adjust skim pond emission factor for 2014, because it is currently an overestimate (final decision by Nov. 15th, 2017)
  - Goal of future workgroup calls:
    - Decide on better methodology for 2017 emissions inventory - resolve to work with throughputs collected from DOGM
- Idea: invite DAQ members from WY or OK for advice fixing EI 2014 to technical work group
- Questions were asked about deadlines for completing the 2014 and 2017 emission inventories.