



UAA Professional Development Seminar Series

Alaska Water Sewer Challenge Update

Presented by **Aaron Dotson**

As of February 2015, just over 8,000 people in rural Alaska are living in 33 communities which are considered to be "unserved." Unserved is defined as where 55% of residents or less are served by piped water/sewer, septic tank & well or a covered haul system. Installation of conventional infrastructure to serve these communities has historically been considered unfeasible due to environmental conditions (e.g., arctic conditions, climate change, etc.) and cost (e.g., estimates of upward of \$400,000 per home for some of these communities).

The University of Alaska Anchorage (UAA) is leading one of three teams demonstrating their technologies in full-scale laboratory simulation settings as part of the Alaska Water Sewer Challenge. The teams are scheduled to complete testing in late Spring 2017, and will present their findings to the State Steering Committee in early Fall 2017. This presentation, will focus on the efforts being made by UAA.

Located behind the Engineering & Industry Building on the UAA campus is a non-descript cabin (12' x 24') and an insulated metal shipping container (10' x 8'). Although these facilities are powered from the building, they are not connected to the building water or sewer system. All water required and wastewater generated is hauled by hand to and from the facilities. The systems were designed to require hauling of about 1-2 gal/person/day in and out of the home. This hauling rate corresponds with that previously observed in unserved communities in Alaska. The cabin contains a prototype home with innovations such as low pressure air-driven greywater collection, power-managed distributed water heating, and a dry urine diverting toilet. The container contains the water reuse treatment system. The structures are connected through a insulated duct created from structurally insulated panels.

From July 2016 – January 2017, the first reuse treatment system was built into the metal shipping container and subjected to stress scenarios (typical of NSF 350 standard) and special stress scenarios such as freeze/thaw. During this period, the system reused (about 15x reuse) water treated in daily batch's through treatment with the following unit processes: filtration, soap removal, nanofiltration, reverse osmosis, ultraviolet disinfection and ultraviolet light generated ozone for tank disinfection. To date, these stress scenarios have been performed without upset and the process produced water for reuse that was free of coliform bacteria, had a total organic carbon concentration of less than 1 mg-C/L and turbidity around 0.1 NTU. In February 2017, the prototype was rebuilt to be skid mounted and fully automated. This prototype corrected many of the minor plumbing and potential operation issues identified in the 1st version. Summer 2017 operations have focused on water quality and microbial challenge testing.

Friday, September 1, 2017

11:45am - 12:45pm

UAA College of Engineering, EIB 211