



State of Alaska's R&D Project: The Alaska Water & Sewer Challenge

Bill Griffith / Fatima Ochante

Village Safe Water Program

Alaska Department of Environmental Conservation

Progress in Alaska Village Sanitation



- 30 years ago, fewer than 25% of rural Alaska households had running water and flush toilets.
- In 1996, 55% of rural homes had piped or covered haul service.
- Today, approximately 85% of rural homes have indoor plumbing (over 90% if regional hubs are included in the calculation).



However...

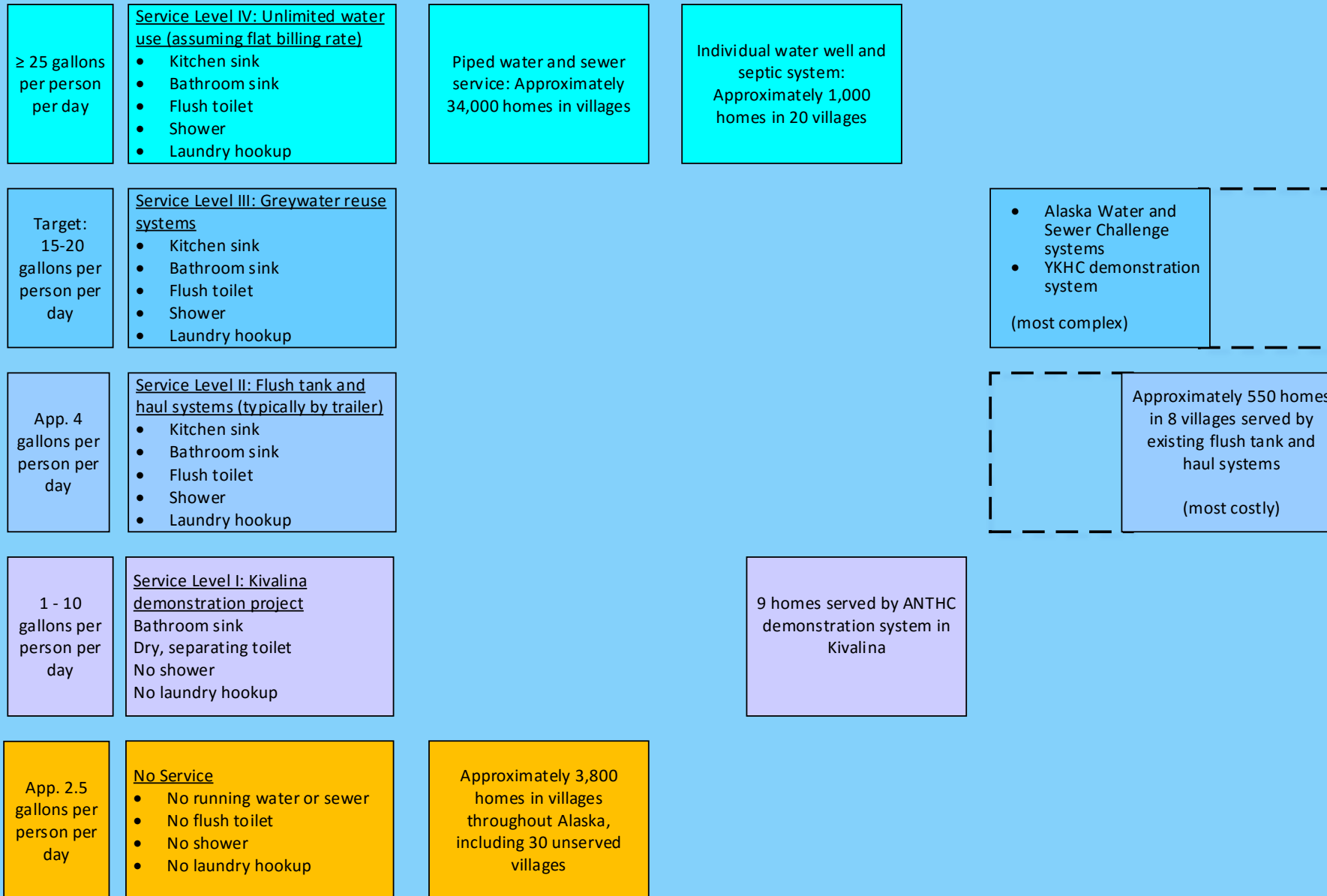
- Conventional, community-wide piped systems and truck haul systems are expensive to construct, maintain and replace.
- Many communities cannot afford the high operation and maintenance costs associated with piped or haul systems.
- Available funding is not adequate to serve remaining homes and make needed improvements.
- Innovative approaches were needed in order to address health problems associated with water and sewer system deficiencies.



Comparison of Health Benefits vs. Cost and Complexity of Different Water and Sewer Service Types

January 2016

Health benefits of household water and sewer service



— Expense and degree of difficulty of maintaining and operating household equipment +



State of Alaska Water & Sewer Challenge

The Problem



"Honey bucket," a plastic bag lined bucket that collects urine and feces.



Plastic bags of feces from honey buckets are disposed of in a sewage lagoon.

- Over 3,300 rural Alaska homes lack running water and a flush toilet. Many more depend on aging and deteriorating piped and haul systems.
- Lack of in-home water and sewer in Alaska contributes to severe skin infections and respiratory illnesses. Residents of Southwest Alaska suffer rates of invasive pneumococcal disease that are among the highest in the world.
- To address this public health problem, agencies have funded conventional, community-wide piped and truck haul systems. These systems work, but they are expensive to construct, and many communities cannot afford the high operating costs.
- Funding to build systems has declined severely while costs have risen sharply. The deficit between available funds and needs is over \$1 billion.
- Capital and operating costs of traditional approaches have become unsustainable. An innovative approach is needed.

The Solution

The Alaska Department of Environmental Conservation, in coordination with tribal, state, and federal agencies, has initiated a project to spur widespread research to develop innovative and cost effective water and sewer systems for homes in remote Alaska villages. The project focuses on decentralized water and wastewater treatment, water re-use, and minimization. These approaches have a high potential for use in individual homes and housing clusters. Our goal is to significantly reduce the capital and operating cost of in-home running water and sewer in rural Alaska, so every home can have service.



www.WaterSewerChallenge.alaska.gov

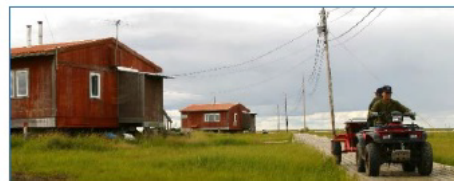
(Revised September 2016)



State of Alaska Water & Sewer Challenge

The Project

- ❖ Phase 1 (COMPLETED) Engineers, social scientists, innovators, and people with rural Alaska experience formed joint venture teams.
- ❖ Phase 2 (COMPLETED) Funding awarded to select teams to research and develop new and sustainable in-home water and sewer systems.
- ❖ Phase 3 (ONGOING) Development of working prototypes and lab testing of pilot systems.
- ❖ Phase 4 (2017-2019) Field test systems in rural homes.
- ❖ Phase 5 (2020+) Select successful systems that will be affordable to build, operate, and maintain.



Hauling household sewage around Atmautluak.

The Teams of Phase 3

DOWL Alaska

DOWL Alaska proposes a graywater re-use system located in a small vestibule attached to the house. The vestibule minimizes space requirements and avoids expensive heat trace to an outside holding tank. DOWL's prototype is at the Cold Climate Housing Research Center in Fairbanks. DOWL is also testing a Point-of-Use filter for drinking water.

Summit Consulting

Summit proposes an entirely in-home system designed to minimize water and wastewater hauling. Raw water is treated by multi-stage cartridges, an ultrafiltration membrane and disinfection to produce drinking water. Graywater is treated by a biological process and then disinfected. Summit's system is at their main office complex outside Tok.

University of Alaska Anchorage

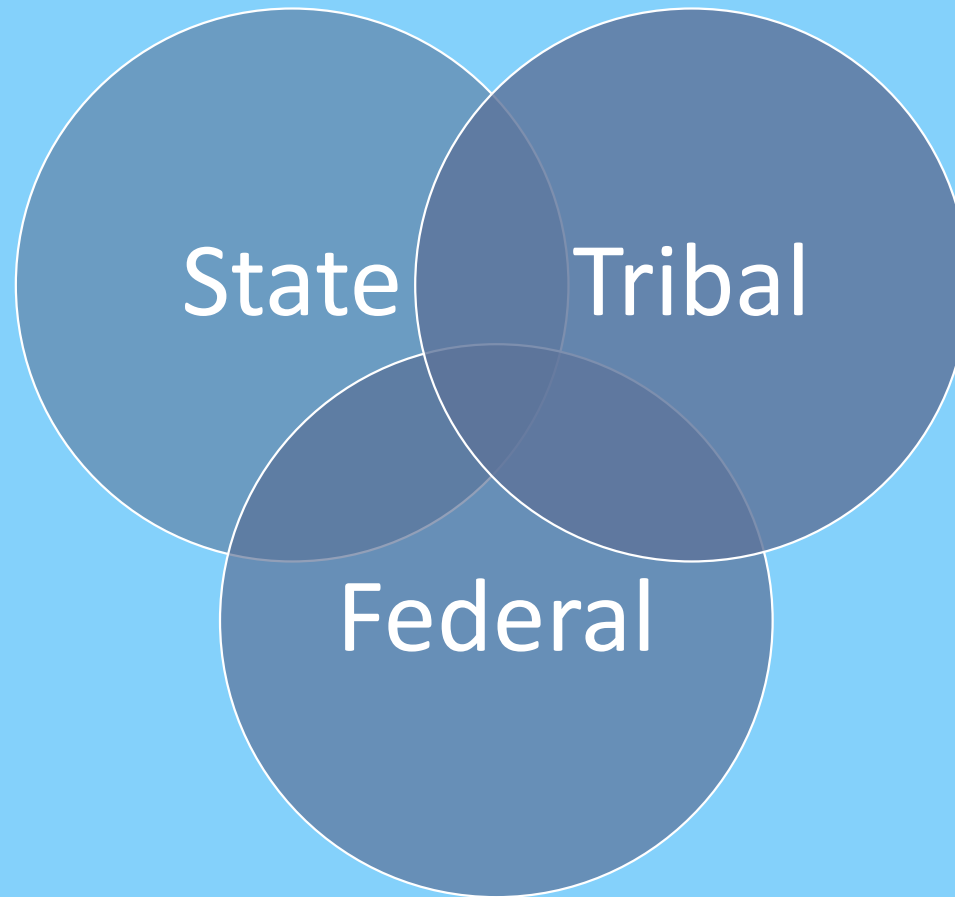
UAA proposes to treat both graywater and some blackwater, as well as a modular approach that allows home-owners to select in-home components that fit their lifestyles and space available. Membrane treatment and high dose ultraviolet disinfection are used to produce non-potable wash water. UAA's system can be found on campus in Anchorage.

Alaska Water and Sewer Challenge



- State-funded research and development project projected to last 5 – 7 years
- Focus is on “decentralized” approaches – household based systems that utilize water re-use technologies
- Private sector driven – with ownership of intellectual property retained by project teams
- Goal is to significantly reduce the capital and operating costs of in-home running water and sewer in rural Alaska homes
- Funding to date is \$4 million in state and federal funding. Additional funding will be required to complete the project

Multi-Agency Steering Committee



Project Timeline

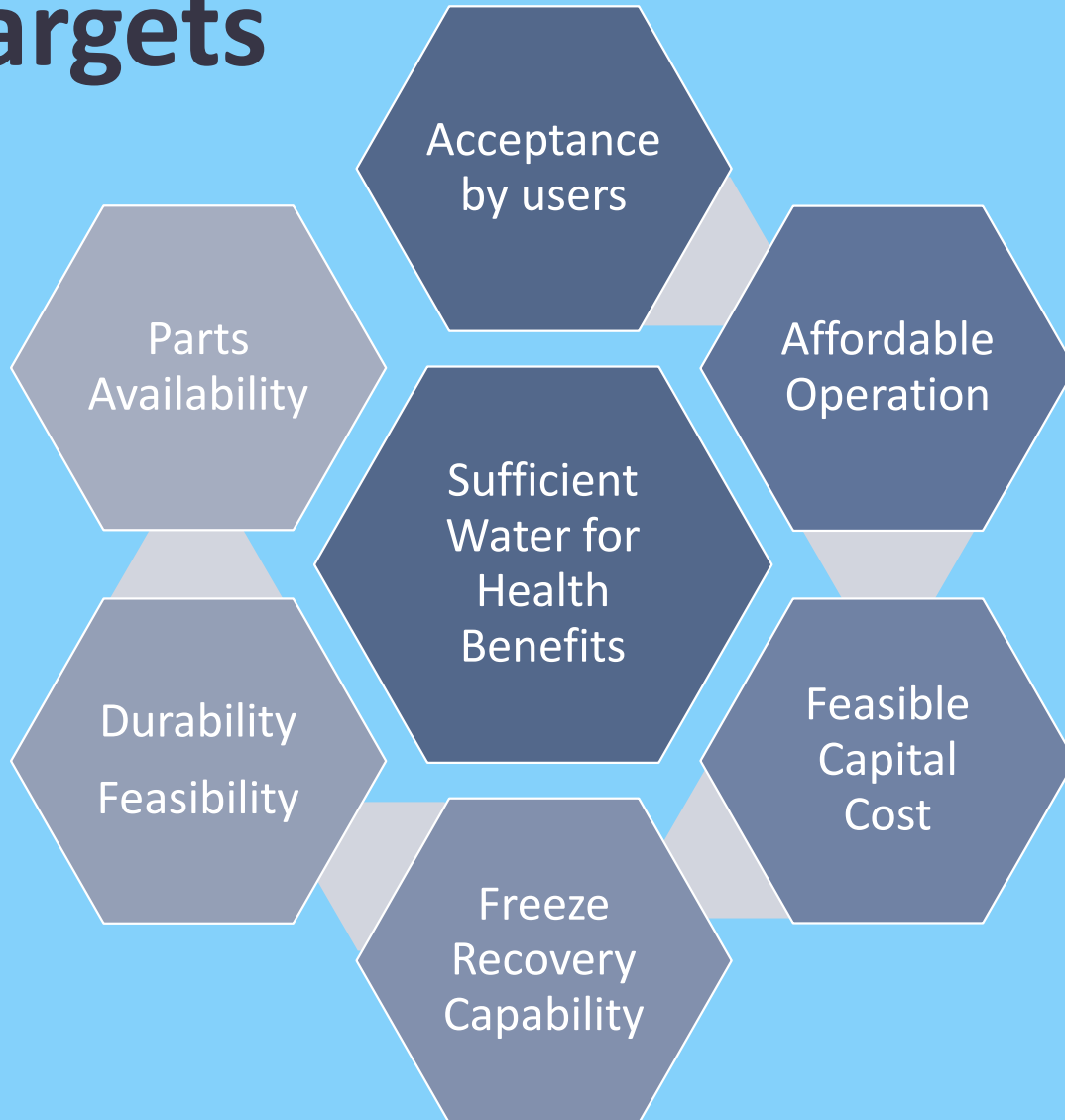
Phase	Approximate Timeframe	Duration (months)
Team Formation	Fall 2013 – Spring 2014	9
Proposal Development + Presentation	Fall 2014 – Summer 2015	8
Prototype Development + Pilot Testing	Fall 2015 – Summer 2017	21
Field System Development + Testing	Fall 2017 – Summer 2019	21
Technology Refinement + Improvement	2020 and beyond	?

Phase III: 2015 - 2017

Prototype Development and Testing

- Three proposals funded for prototype development and testing.
- Targets and testing requirements have been provided.
- Engineering plans will be reviewed and approved.
- The results of testing phase will be presented to the Steering Committee.
- Systems that demonstrate promising results will be selected for field system development and testing.

Performance Targets



Village Input

- End users provide the most valuable feedback for appropriate technology design
- ADEC partnership with rural communities to better inform the development of future home-based systems
- Teams are required to work with communities from different regions





ALASKA WATER AND SEWER CHALLENGE (AWSC)

PROJECT HIGHLIGHTS

NEW – Conference on Water Innovations for Healthy Arctic Homes

(Sept. 18-21, 2016 – Anchorage, AK)

AWSC Teams will debut their prototypes at the WIHAH conference. This circumpolar conference is being produced in conjunction with the U.S. Chairmanship of the Arctic Council as an endorsed project of the Sustainable Development Working Group. If you want to participate or learn more, go to: WIHAH2016.com



ABOUT THE ALASKA WATER AND SEWER CHALLENGE

To improve the health of rural Alaska residents, the Alaska Department of Environmental Conservation, in coordination with tribal, state and federal agencies, is spearheading a research and development effort to find better and more affordable ways to deliver drinking water and sewage disposal services to rural Alaska.

PROJECT INFORMATION



- Timeline
- Performance Targets
- Frequently Asked Questions

PEOPLE



- Project Management Team
- Steering Committee Members
- Participating Teams

PHOTOS AND VIDEOS



SYSTEMS IN RURAL ALASKA



RESOURCES AND STUDIES



PRESS, ARTICLES, LINKS



Project Contacts:
bill.griffith@alaska.gov
fatima.ochante@alaska.gov

www.WaterSewerChallenge.Alaska.gov

Project Website