

The Portable Alternative Sanitation System (PASS), May 2020

To improve hygiene and reduce water-washed diseases in the villages, the Alaska Native Tribal Health Consortium (ANTHC) has developed an initiative to provide basic water and sanitation to unserved rural households. Their solution, the Portable Alternative Sanitation System (PASS), makes use of a waterless urinal and urine-diverting dry toilet, treats rain catchment and self-hauled water with a Cryptosporidium-rated cartridge filter and an activated carbon filter followed by chlorination. Treated water is stored in either a 50-gallon or 100-gallon tank and feeds a single low-flow sink in the home. Greywater from the sink and separated urine is disposed of in an onsite underground seepage pit and dried fecal matter is disposed of at the landfill. The PASS is hypothesized to provide greater health benefits to a household than using a honeybucket, outhouse and/or reusing hand wash basin water through decreased pathogen exposure, but still likely has some deficiencies compared to a full piped water and sanitation system. For example, households must still manually haul water and solid waste from their home. Since development of the system in 2014, 56 PASS units have been installed in six villages in rural Alaska. Major projects to install PASS in the remaining unserved homes in three communities are planned for 2020-2021, and more unserved communities are becoming interested in financing PASS units as an alternative to pipes in future years.

Globally, 2.1 billion people lack access to safe drinking water and 4.4 billion people lack access to safely managed sanitation. In resource-poor communities or isolated rural areas, centralized and high-tech water and sanitation systems are too expensive or lack the required operation and maintenance capacity to be sustainable. Low-tech systems such as countertop water treatment systems and pit latrines often target a minimum level of service and may not provide all of the desired health benefits. There is therefore an emerging role for “mid-tech” water and sanitation systems that require only simple, homeowner operation and maintenance but can fully meet health and environmental standards. In rural Alaska, thousands of households still lack running water and safe sanitation due to extreme weather conditions, difficult transportation, and lack of funding. Rural communities have thus become platforms for a variety of innovative and experimental water and sanitation interventions, such as incinerating toilets, composting toilets, household greywater reuse systems, insulated pump-and-haul tanks, and “freeze-proof” septic tanks. Although many of these interventions represent promising technical solutions to rural water and sanitation issues, there is a growing acknowledgement in water and wastewater engineering that sound technical infrastructure is insufficient for providing a long-term solution. Most of these alternative interventions are employed on a household scale and, as a result, must address the significant hurdles of human behavior, neglect and low-skill operation and maintenance. The Portable Alternative Sanitation System is one such “mid-tech” household system that was designed with several features targeted for success in remote, rural Alaskan communities:

- 1) The underground seepage pit is built to work with the natural freeze/thaw cycles of the ground to ensure appropriate treatment and drainage.
- 2) The system is simple and convertible, so homeowners can add features and use it in a way that best reflects their household’s needs.
- 3) The system involves minimal permanent infrastructure, so communities that may need to relocate due to the threat of climate change can have water and sanitation that is able to move with them.
- 4) Operation and maintenance of the PASS was designed to be simple enough that homeowners should be able to keep it running and do repairs on their own with minimal expertise and easy-to-access parts and tools. All homeowners are provided with training materials to properly operate and maintain their systems. ANTHC is conducting regular follow-up and warranty assistance for one-year following installation.