

# Key Informant Interview Report: Water System Challenges in Tribal Communities



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# Contents

Authors .....	2
Rachel Stokes, DrPH, MPH, REHS, National Environmental Health Association .....	2
Background.....	4
Key Informant Interview Findings.....	5
Key Findings from Alaska .....	6
Key Findings from the Southwest Region .....	7
Key Findings from the Northwest Region .....	8
Key Findings from the Southeast Region .....	8
Conclusion.....	9



## Background

Indigenous populations throughout the United States often face unique challenges regarding environmental health, including access to drinking water and water quality. While we know these challenges exist, it is difficult to find current data and studies on the problem. The COVID-19 pandemic shined a spotlight on the needs and barriers of some Tribes, specifically around the issues of contaminated groundwater impacting water supply. However, even with this recent media attention, many Tribes continue to face similar burdens and many in the general public remain unaware of the challenges to clean drinking water faced here in the United States. The lack of relevant data on water system challenges in Tribal communities makes it difficult to allocate targeted resources effectively. Understanding these challenges is imperative for the development of appropriate interventions and support programs. This knowledge gap led to our original proposed activity and subsequent methodological pivot to a more equitable approach.

The original proposed activity called for a comprehensive needs assessment survey to be conducted to evaluate the specific training requirements and professional development gaps among environmental health professionals and water safety workers serving tribal communities. The survey would gather detailed insights into current workforce capabilities, technological limitations, resource constraints, and cultural considerations that may impact water system management and safety protocols. This assessment would focus particularly on personnel involved with small private water systems within tribal lands, aiming to identify critical knowledge gaps, operational challenges, and potential opportunities for capacity building.

By engaging directly with frontline workers, such as environmental health specialists, the assessment would help determine priority areas for specialized training programs that address the unique characteristics and challenges of tribal water infrastructure. This data-driven approach would also ensure that future training initiatives are tailored to meet the specific needs of tribal communities, incorporating both technical expertise and cultural competency while strengthening the overall capacity for sustainable water system management and public health protection within tribal territories.

While this approach would have provided valuable insight into the needs, challenges, and successes of the target audience, it ultimately proved very challenging to garner participants. We identified several barriers in this process. One barrier was simply time. From past experience working with Tribal communities, we understand that many of the ideal participants, such as water operators or environmental health professionals in Tribal communities, often have busy workloads and wear multiple hats within their organizations. The limited

time available to those working in Tribal communities would likely be insufficient to support the time needed to craft responses for an assessment.

Another barrier was the variation in how each tribe operates its water system. Some manage multiple wells independently, while others tap into larger municipal systems. Similarly, the challenges faced by water operators varied significantly from one region of the country to another. Overall, creating a single assessment to capture such a diverse array of utility needs proved challenging.

We overcame this challenge by pivoting the activity to conduct key informant interviews (KIIs). The decision to conduct key informant interviews, rather than a broader needs assessment, offered several strategic advantages for gathering nuanced and contextually rich data. These in-depth, one-on-one conversations created an environment where participants could freely express their perspectives, concerns, and insights without the constraints of structured survey formats. This allowed participants to provide feedback on the aspects of the interview that were particularly relevant to their community. For example, more time was spent discussing water scarcity with our participant in the southwestern region than with our participant from the southeastern region. Key informant interviews enabled interviewers to probe deeper into responses, seek clarification on complex issues, and explore unexpected themes that emerged during discussions. This qualitative approach enabled participants to share detailed examples from their experiences, provided historical and cultural context, and offered specific recommendations that might not be revealed through standardized assessment tools.

The interactive nature of these interviews also facilitated the building of trust and rapport, particularly important when discussing sensitive topics or working within tribal communities where relationships and cultural understanding are paramount. Additionally, the flexible format permitted the conversation to evolve organically, potentially uncovering critical issues or innovative solutions that might not have been initially considered in the study design. This method ultimately yielded richer, more comprehensive data that could better inform program development and implementation strategies.

## Key Informant Interview Findings

A comprehensive Key Informant Interview (KII) plan was conducted across multiple regions of the United States to examine private well usage, water quality concerns, and community engagement practices within tribal communities. The study utilized a structured interview protocol designed to capture both quantitative and qualitative insights into water security challenges and preferences for information dissemination. The research focused on understanding the prevalence of private well dependency, resident perceptions of water quality,

environmental contamination concerns, and barriers to well maintenance and water testing. Additionally, the project explored community preferences for receiving water-related education and training, including delivery methods ranging from in-person workshops to digital platforms. Key areas of investigation included identifying primary contaminant sources, understanding opportunities for integrating traditional knowledge, and mapping existing communication channels that effectively reach tribal community members.

The findings presented below highlight regional variations in water accessibility challenges, infrastructure constraints, and community-specific needs. While training and professional development gaps were identified during interviews, the primary focus emerged as understanding the diverse operational and environmental challenges that shape water system management across different tribal communities.

## Key Findings from Alaska

**Interviewee Profile:** Environmental health professional working with multiple tribal communities across Alaska.

The size of Alaska makes the experience of residents vary significantly depending on their location. Private wells tend to be less common in the more rural communities in Alaska but are more common in communities around the Fairbanks area. It's rare for communities in Tundra, where the subsoil is permanently frozen, to have private wells. Among the climate barriers are also challenges with more organic material that complicates the process of making groundwater potable.

Considering the climate, freezing is a considerable concern for large water systems. It can be very expensive to operate a large system properly with the added equipment and maintenance needed, considering the temperature. This is a significant barrier for smaller, more rural Tribal communities to operate a water system. Climate has also impacted access to water. Some tribal communities lack access to water and wastewater resources due to freezing temperatures and infrastructure limitations. For these areas, hauling water from a watering point would be a common occurrence. Climate change has had a significant impact on the permafrost. In areas where the permafrost has melted, there isn't rock underneath. Once the permafrost melts, the water goes away.



Generally, the water quality in Alaska is better than in other regions nationally due to the lack of historical industrial pollution. However, that's not to say there are no water quality concerns. Some residents express concerns about the color and taste of the water due to increased iron levels. Arsenic is also prevalent in some areas.

**Training Gaps Identified:** Limited technical capacity for winterization procedures and equipment maintenance in extreme cold conditions. Need for specialized training on managing organic material contamination and addressing permafrost-related infrastructure challenges.

## Key Findings from the Southwest Region

**Interviewee Profile:** Water system operator serving rural tribal communities in Arizona.

In this Tribal community in Arizona, very few people have and use private wells. There are also a few people who utilize cistern systems. The households are very rural, which makes it difficult for the Indian Health Service to supply water service, and many cannot afford a private well. Cistern systems could present a health concern as the owner is responsible for the maintenance of the system. However, residents typically go through water quickly, reducing the concern about stagnant water in the system.



The primary water source for most Arizona Tribal communities consists of community water systems or hauled water delivered to storage tanks, with some households relying on cistern systems. The extreme remoteness and cost of infrastructure development make traditional water service connections prohibitively expensive for many residents.

**Training Gaps Identified:** Need for education on proper cistern maintenance and water storage safety. Limited training regarding water conservation techniques and alternative water source management in arid environments.

## Key Findings from the Northwest Region

**Interviewee Profile:** Regional water quality specialist working with multiple tribal communities.

Private wells are more commonly used in rural communities, whereas community water systems are typically found in more densely populated areas. Community perceptions of water quality vary. Some communities are not very assured that their water quality is good or are not impressed by it. However, another community may have a completely different view of its water quality. Hauling water is rare in the communities in this region.



Like the perception of water quality, the challenges and barriers the communities and well owners face differ depending on location. Some areas have naturally high uranium, and radionuclides are a significant concern for the residents in those communities. Other areas face concerns with nitrate contamination due to the prevalence of agricultural work in the community, particularly wheat and potato farming operations that utilize nitrogen-based fertilizers.

**Training Gaps Identified:** Limited understanding of radionuclide testing and mitigation strategies. Need for enhanced knowledge of agricultural contamination sources and well protection measures.

## Key Findings from the Southeast Region

**Interviewee Profile:** Tribal environmental health coordinator working with Gulf Coast communities.

There are many small Tribal communities along the Gulf Coast. Access to public water systems depends on several factors, including the size of the community and the community's ability to invest in infrastructure. For one small town in the region, a train derailment helped fund the public water system. Prior to that, everyone

was using groundwater. The cost of maintenance is a barrier for many private water system owners. For many, once the equipment in their systems failed, it was more cost-effective for them to use the public water system.

There is an abundance of groundwater in the Southeast region, which one operator described as needing minimal treatment. While some communities in the Southeast are seeing issues with industrial contamination, a Tribe along the Gulf Coast shared that they have conducted testing for PFAS in their community. While it seems to be affecting surface water in the area, the groundwater appeared to be unaffected, with issues reported in very isolated cases. Saltwater intrusion is a concern for some Tribes along the coast towards Florida. These communities tend to have fluctuating water quality, particularly when surface water is used more for drinking water.

**Training Gaps Identified:** Need for education on emerging contaminants like PFAS and appropriate testing protocols. Resources regarding saltwater intrusion monitoring and mitigation strategies.

## Conclusion

The key informant interviews conducted across Alaska, the Southwest, Northwest, and Southeast regions provided valuable insights into the diverse challenges and needs of tribal water systems. This modified methodological approach proved effective in capturing nuanced, region-specific information that a standardized assessment might have missed, particularly given the significant operational differences between tribal water systems across the country. Future work should consider expanding to other regions not covered in this initial study, including the Great Lakes region, Northeast, and additional Southwest communities, to develop a more comprehensive understanding of tribal water system challenges nationwide.

Several important patterns emerged from these interviews. First, geographical and climatic conditions significantly impact water access, quality, and infrastructure needs. In Alaska, freezing temperatures create unique operational challenges and increased maintenance costs, while melting permafrost threatens water availability altogether. Coastal communities in the Southeast face different challenges, such as potential saltwater intrusion, while communities in the Southwest struggle with water scarcity and infrastructure limitations.

Second, the rural nature of many tribal communities creates substantial barriers to water access and resources for private well owners. In some areas, particularly in the Southwest, the remoteness of households makes connecting to centralized water systems prohibitively expensive, resulting in a reliance on alternative systems,

such as cisterns or hauled water. This reality highlights the need for region-specific training and support for various water delivery methods beyond conventional systems.

Another important consideration is that water quality concerns vary significantly by location, ranging from naturally occurring contaminants such as uranium and radionuclides in the Northwest to iron issues in Alaska and concerns related to industrial and agricultural contamination in other regions. These diverse challenges necessitate tailored training approaches that address the specific contaminants prevalent in each region.

The findings from these key informant interviews underscore the importance of developing flexible, culturally appropriate training programs that acknowledge the unique circumstances of each tribal community. Future training initiatives should not only address technical competencies but also account for local resource constraints, cultural considerations, and the fact that many water operators in tribal communities often fulfill multiple roles with limited time and resources.

By embracing this more individualized approach to training needs assessment, future capacity-building efforts can better serve tribal communities in their efforts to ensure safe, sustainable water access for all residents. Additionally, further research might explore innovative, cost-effective solutions for remote water system management and maintenance that can be adapted to the specific challenges faced by different tribal communities across the country.

