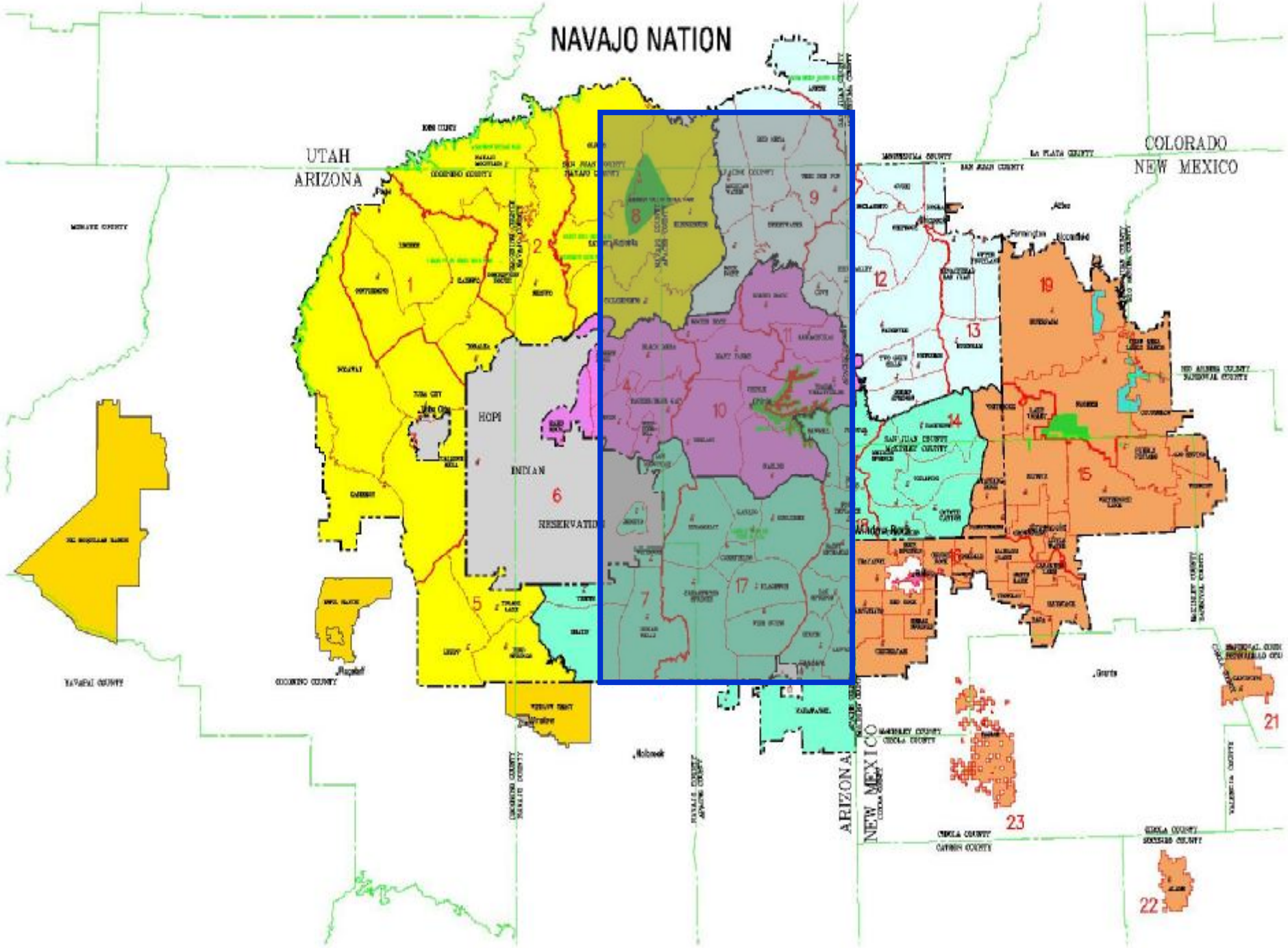
Survey of Unregulated Drinking Water Sources 2006-2007

Centers for Disease Control and Prevention
National Center for Environmental Heath

Navajo Nation Environmental Protection Agency
Public Water Systems Supervision Program


NAVAJO NATION
UTAH
ARIZONA
COLORADO
NEW MEXICO
HOPI
INDIAN
RESERVATION
ARIZONA
NEW MEXICO

Bacterial Analysis

	N (%)* of water sources with bacteria present	
Bacteria Tested	**2006**	**2007**
E Coli	15 (26%)	25 (20%)
Total Coliforms	41 (72%)	103 (79%)

***Percent of total # water samples tested for bacteria during the specified year (57 total in 2006 and 131 total in 2007)**

Arsenic and Uranium Analysis

	N (%)* of water sources exceeding EPA standard and maximum level detected (Max)	
EPA primary drinking water standards	**2006**	**2007**
Arsenic ≥ 10ug/L	2 (3%) Max = 26 ug/L	23 (18%) Max = 190 ug/L
Uranium ≥ 30ug/L	2 (3%) Max = 35 ug/L	7 (5%) Max = 260 ug/L

***Percent of total # water samples tested for inorganic chemical contaminants during the specified year (65 total in 2006 and 131 total in 2007)**

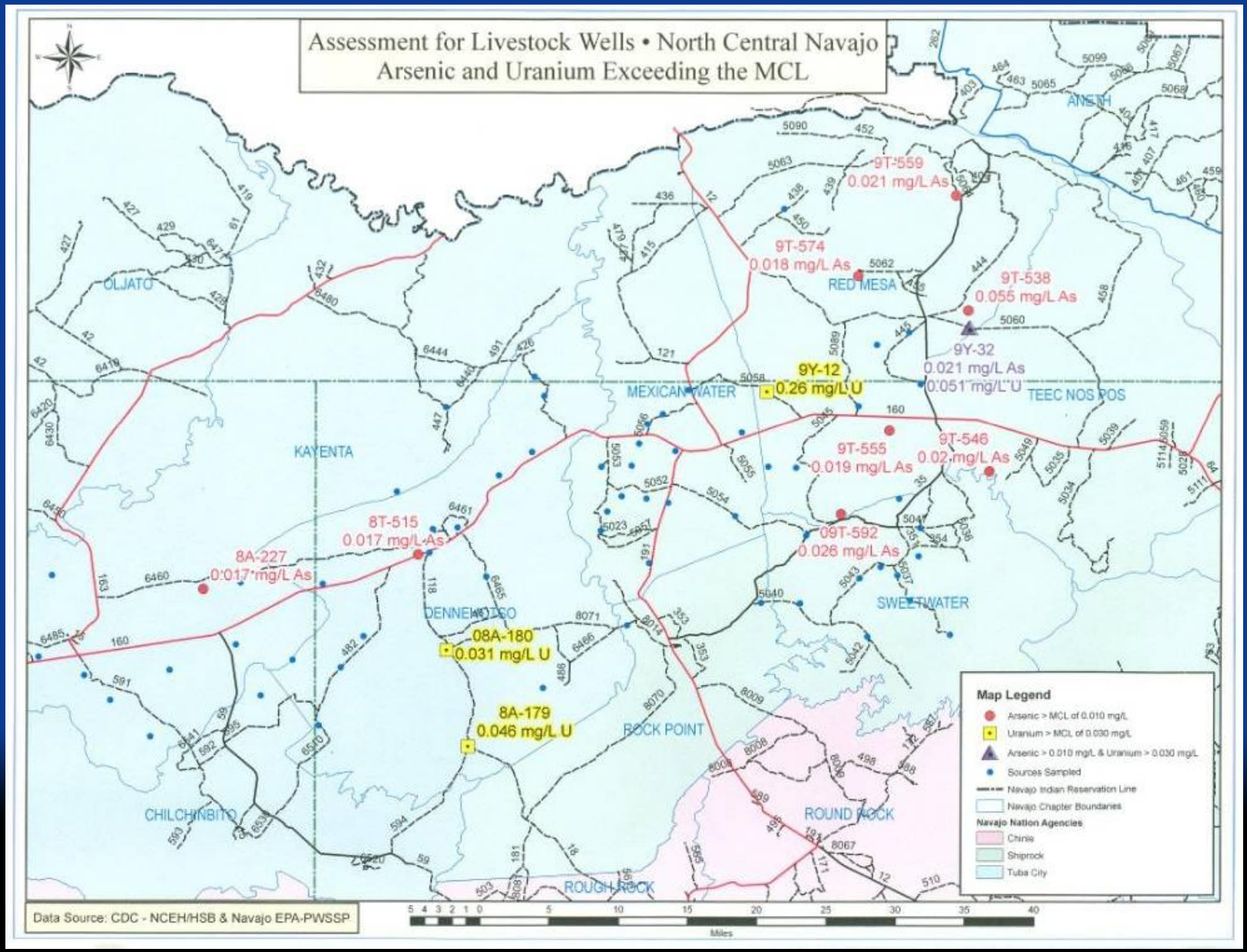
Summary

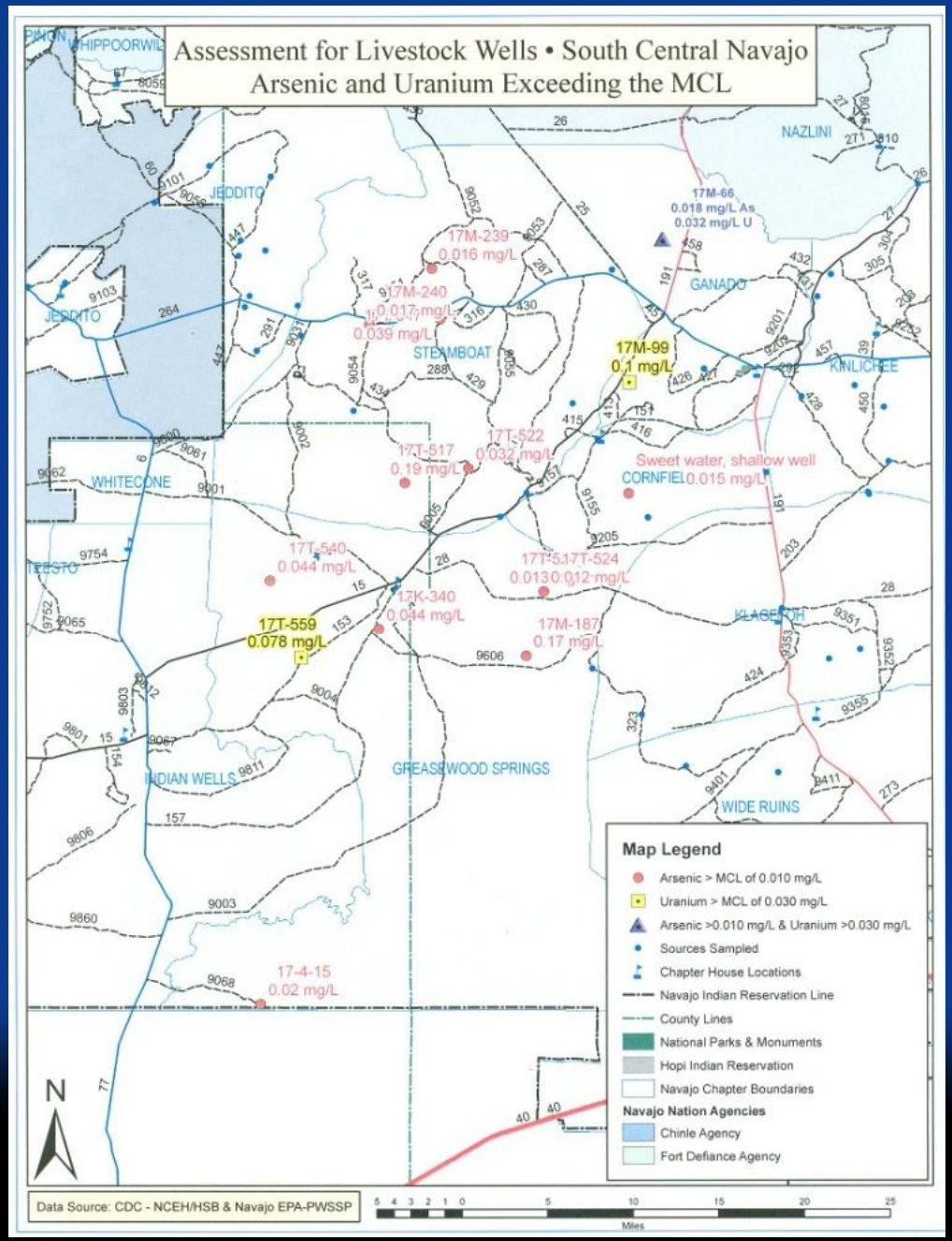
- Widespread bacterial contamination across study area
- High arsenic contamination in 3 chapters
  - Red Mesa, Steamboat and Lower Greasewood
- Isolated uranium exceedances
  - Wells with extremely high levels in Red Mesa, Ganado and Steamboat

Summary

- Health Survey conducted during August and September 2008 of residents living in:
  - Red Mesa
  - Dennehotso
  - Ganado
  - Steamboat
  - Lower Greasewood

North Central Navajo





South Central Navajo

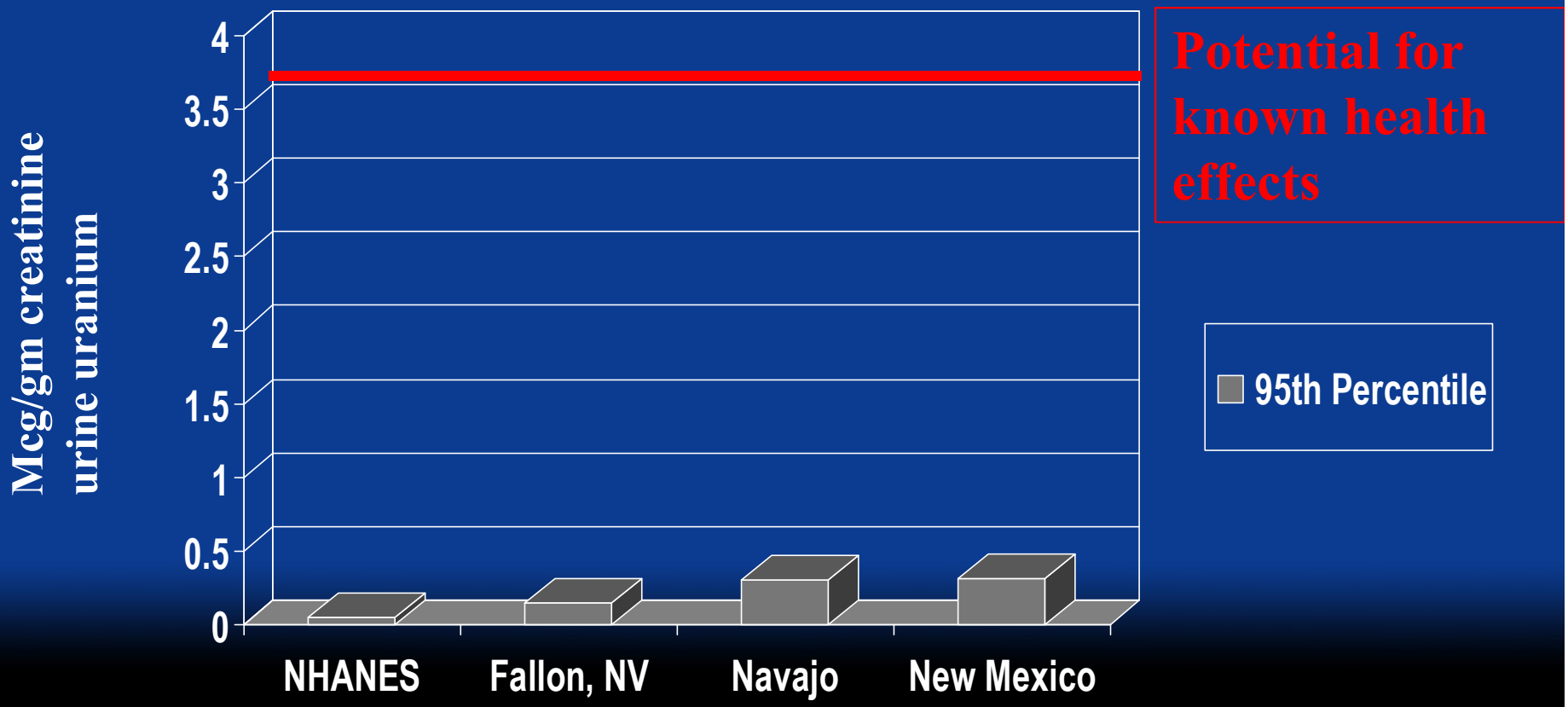
Goals for 2008

- Asses magnitude of the problem and the public health impact
  - What is the extent of human exposure?
  - What are the health effects?
- Develop and implement immediate and long-term interventions to reduce exposure
  - Public education
  - Safe water hauling practices from regulated sources
  - Sample more livestock wells

Proposed Next Steps

- Public Education
  - Collaborative Efforts with CDC, I.H.S., EPA, Division of Health, Department of Water Resources, and other interested parties
- Safe Hauling Water Practices
- Access to Safe Drinking Water

95th Percentile of Urine Uranium Levels



Summary of Key Findings

- A considerable proportion of households haul water including some with access to public water
- Those that haul water are more likely to be exposed to bacterial contaminants in drinking water
- Urine uranium levels were higher than US general population, but comparable to other Southwest populations and below levels known to cause health effects
- Water contamination does not appear to be the sole source of uranium or other chemical exposures found in this population

Cistern Study

Typical Cistern

Underground Cistern

Cistern Sampling

A survey of 70 cisterns within the Navajo Nation was conducted to gauge the level of *Legionella* contamination. Swabs from the water line, representing the biofilm, and bulk water concentrates containing planktonic bacteria were taken from representative cisterns September 15-27, 2011. The samples were sent to CDC for isolation and characterization of legionellae.

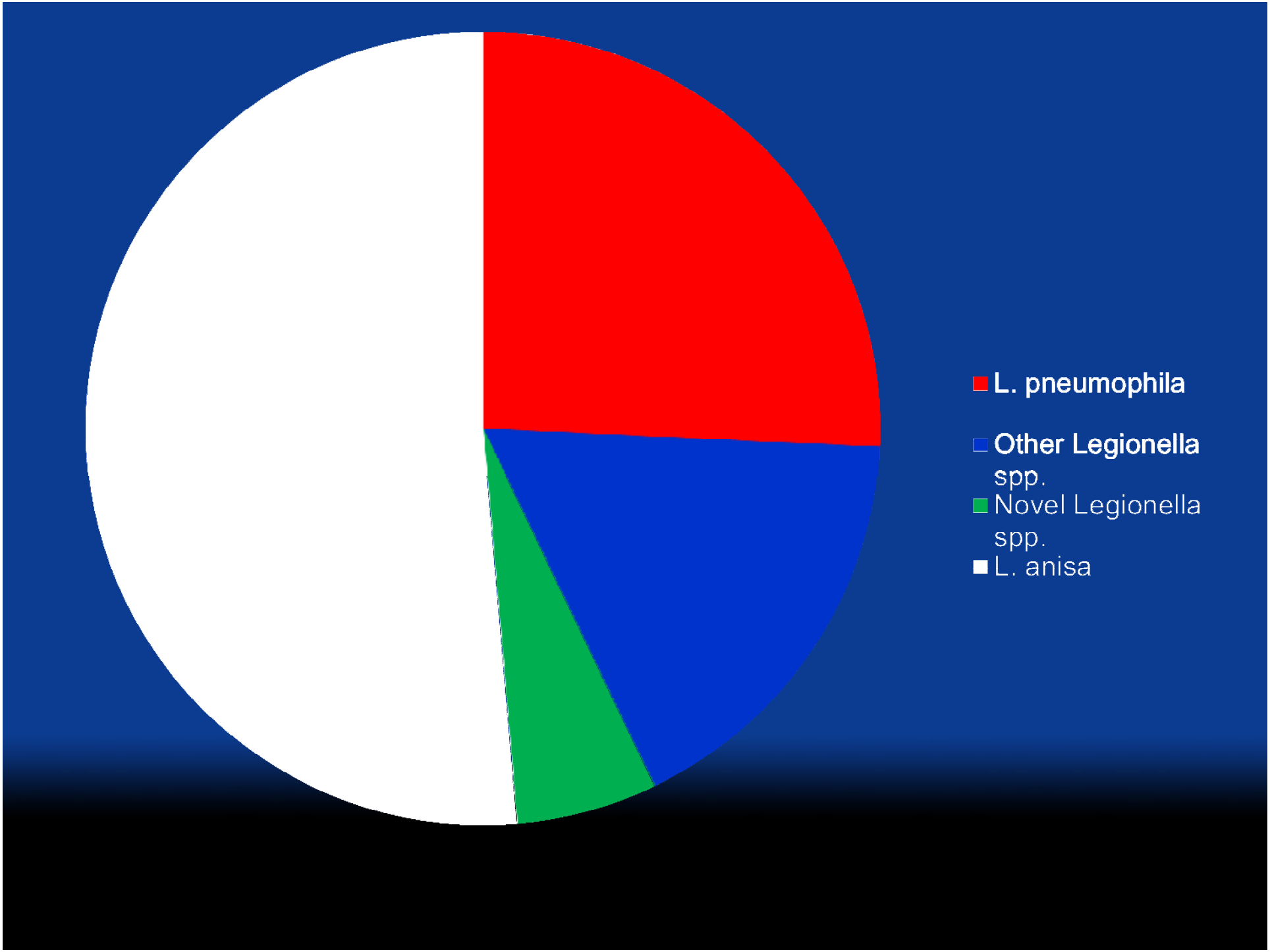
CDC, 2011.

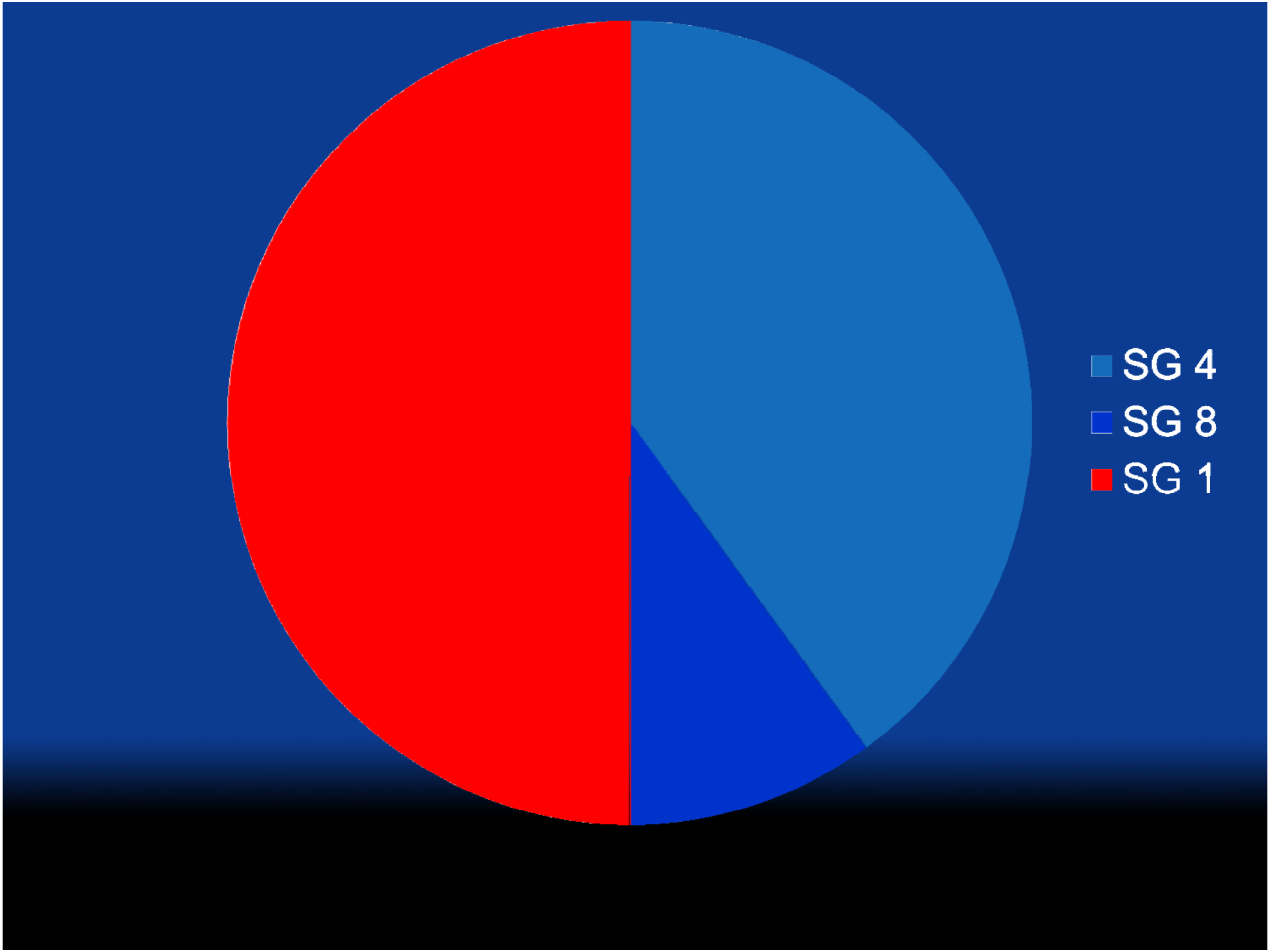
- Of the sites sampled, 47% (33/70) were positive for *Legionella* bacteria. Of the sites positive for legionellae, 30% (10/33) yielded *L. pneumophila.* Sequence based typing identified sequence types (STs) 1 and 59 as well as two allelic patterns for which STs have not yet been assigned. Whereas all four genotypes are commonly found in the environment, ST1 and ST59 are frequently associated with sporadic cases of legionellosis.

- CDC, 2011

The survey found there was considerable contamination of Navajo Nation cisterns by legionellae. Immediate remediation of the most heavily contaminated cisterns was recommended. Monitoring disinfectant levels plus annual draining and cleaning of all cisterns was recommended to reduce the risk of legionellosis among a population with high prevalence of chronic illnesses.

CDC, 2011


L. pneumophila
Other Legionella spp.
Novel Legionella spp.
L. anisa


SG 4
SG 8
SG 1