



# DiNEH Project\*

Diné Network for Environmental Health  
Navajo Uranium Assessment and Kidney Health Project

Phase I Presentation for  
**Becenti Chapter Meeting**  
August 23, 2009



*\*Funded by NIEHS, P30 ES-012072, R25 ES013208, & R01 ES014565*

# DiNEH Project Partners



- UNM-Community Environmental Health Program
- Southwest Research and Information Center
- Crownpoint Service Unit-NAIHS
- University of Texas-Houston Medical Center
- Community Research Advisory Board

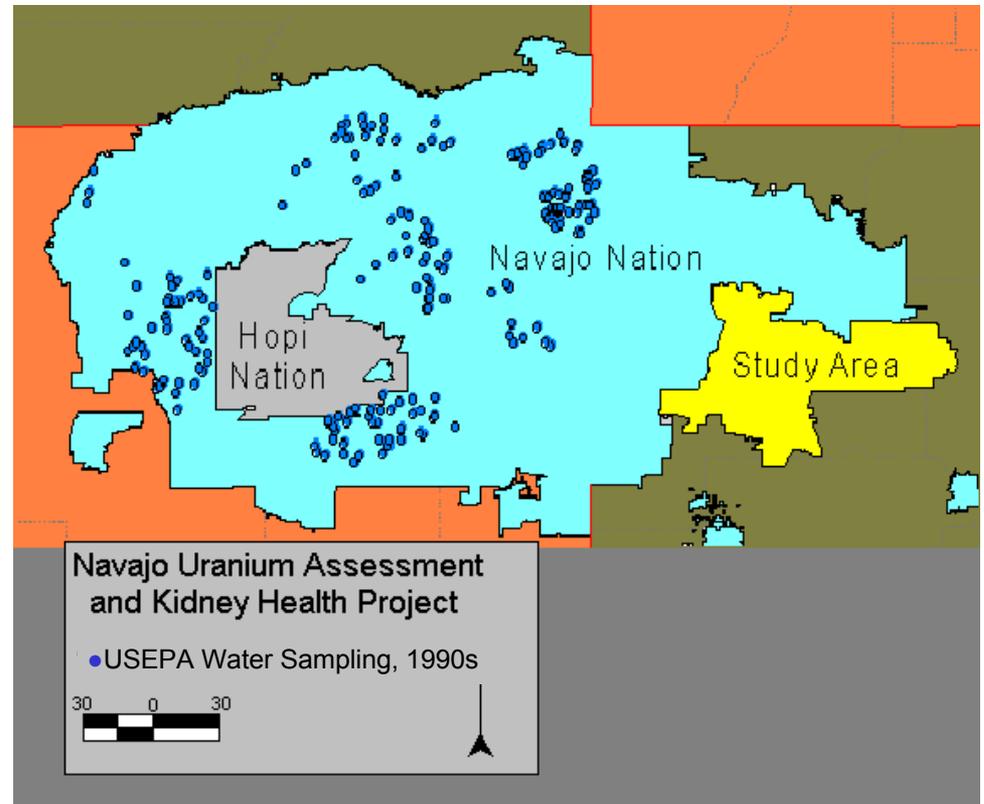


**2009 DiNEH Project Staff** (Left to right): Johnnye Lewis, Glenn Stark, Bernadette Pacheco, Sarah Henio-Adeky, Tommy Rock, Teddy Nez, Miranda Cajero, Chris Shuey, Jeremy DeGroat. Not pictured: Mallery Downs, Sandy Ramone

# DiNEH Project Purposes



- Determine whether exposure to uranium and other heavy metals contributes to kidney disease/ diabetes in 20 Chapters of Eastern Navajo Agency
- Assess water quality in unregulated wells in Study Area



**Diné Network for Environmental Health (DiNEH) Project  
Water and Land Use, Environmental and Health Survey**

*[INSTRUCTION TO INTERVIEWER — PLEASE READ THIS INTRODUCTION AS WRITTEN BEFORE OBTAINING CONSENT OR ADMINISTERING THIS SURVEY.]*

**INTRODUCTION:** Greetings. My name is \_\_\_\_\_ and my partner here is \_\_\_\_\_. We are conducting a survey of how people in the Eastern Agency use water they haul from this and other windmills. This survey is part of a study called the Diné Network for Environmental Health Project, or DiNEH Project. We are testing water in windmills like this one, estimating how people are exposed to uranium and other contaminants that might be in the water and in their communities. And we are working with 20 chapters in the Eastern Agency to identify safe and unsafe drinking water sources.

The DiNEH is supported by \_\_\_\_\_ [insert name of the local chapter] and is being conducted by the Eastern Navajo Health Board, the Crownpoint Hospital, Southwest Research and Information Center, and the University of New Mexico. The project is sponsored by the National Institutes of Health. We also have support from Navajo Nation President Joe Shirley, Jr., and approval by the Navajo Nation Human Research Review Board, or "Navajo IRB." Here are copies of letters from President Shirley and the Navajo IRB. [Hand papers to person.] And here is brochure that describes the DiNEH Project. Feel free to take a few minutes to read it.

This survey is purely voluntary and will take about 30 minutes. And if you agree to be interviewed, we will pay you \$10 voucher for goods, with a limit of 2 vouchers per household. OK, would you like to participate in this survey?

*[If answer is "No", thank the person for their time and tell them they may keep the brochure. If the answer is "Yes," ask the following question:]*

Are you hauling water today for yourself or someone else? \_\_\_\_\_

Have you been interviewed for this survey before?     Yes     No

*[If 'yes', stop here and thank them for their time; if "No," proceed to the next question.]*

What Chapter do you live in?

*[If the person does NOT live in one of the 20 Chapters in the Study Area, tell them they are not eligible to participate in the study and thank them for their time. If the person lives in one of the Chapters in the Study Area, proceed to the Consent Form]*

Would you like to be interviewed in the Navajo or English language?

Navajo                       English                       Combination of both

*[Proceed to the next page.]*

I am going to read this document, which is called "Consent to Participate in Research."

*[Read the Consent Form. Make sure the participant initials each page and obtain participant's signature on the form before proceeding. Hand the participant a blank copy of the Consent Form after he or she has signed the original. You, the Interviewer, will keep the original signed form.]*

# Survey Results

- 924 surveys completed
- 45 questions
  - Navajo and English
- 4 categories
  - Personal
  - Water use
  - Work
  - Health
- All results placed in binders at chapter houses

## Risk factors for kidney disease and-or diabetes

DiNEH survey results confirmed ***commonly known risk factors***:

- High blood pressure
- Family history of diabetes or kidney disease
- Overweight (BMI)
- Increasing age
- Gender: greater risk for women than for men

We also found a **new risk factor**:

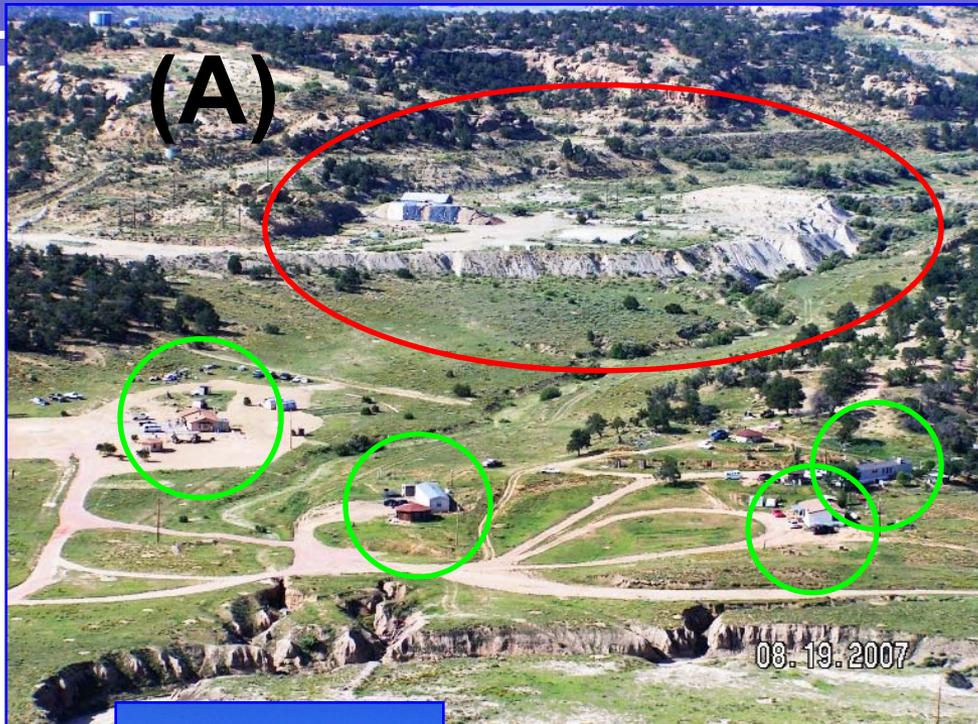
- **Long-term exposure to uranium, in many different ways**

*(see next slide for examples)*

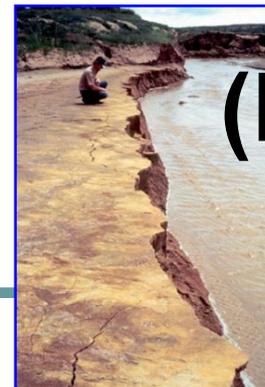
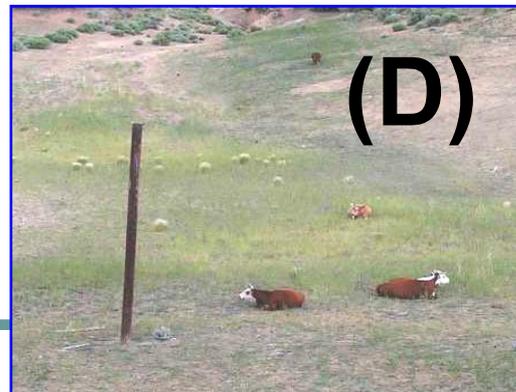
- ***\*Findings based on statistical analysis of about 924 survey responses and geocoding of exposure sources.***
- *Additional factors may be identified as the number of study participants increases.*
- *Earlier results submitted for publication.*

## DiNEH survey findings:

# Contact with uranium increases chance of disease

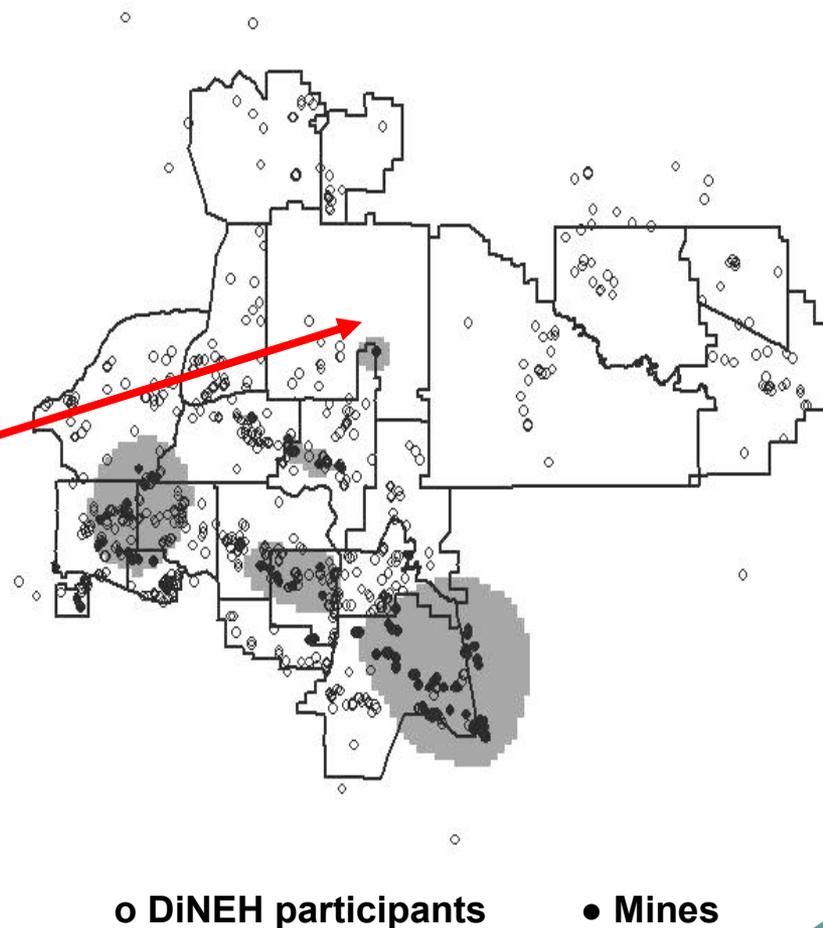


- (A) Lived near abandoned mines
- (B) Played on or near mines, mills
- (C) Used mine materials in home
- (D) Herded livestock in mines
- (E) Drank or contacted mine water
- (F) Washed workers' clothes



# Areas where the risk presented by abandoned uranium mines is estimated to be the highest

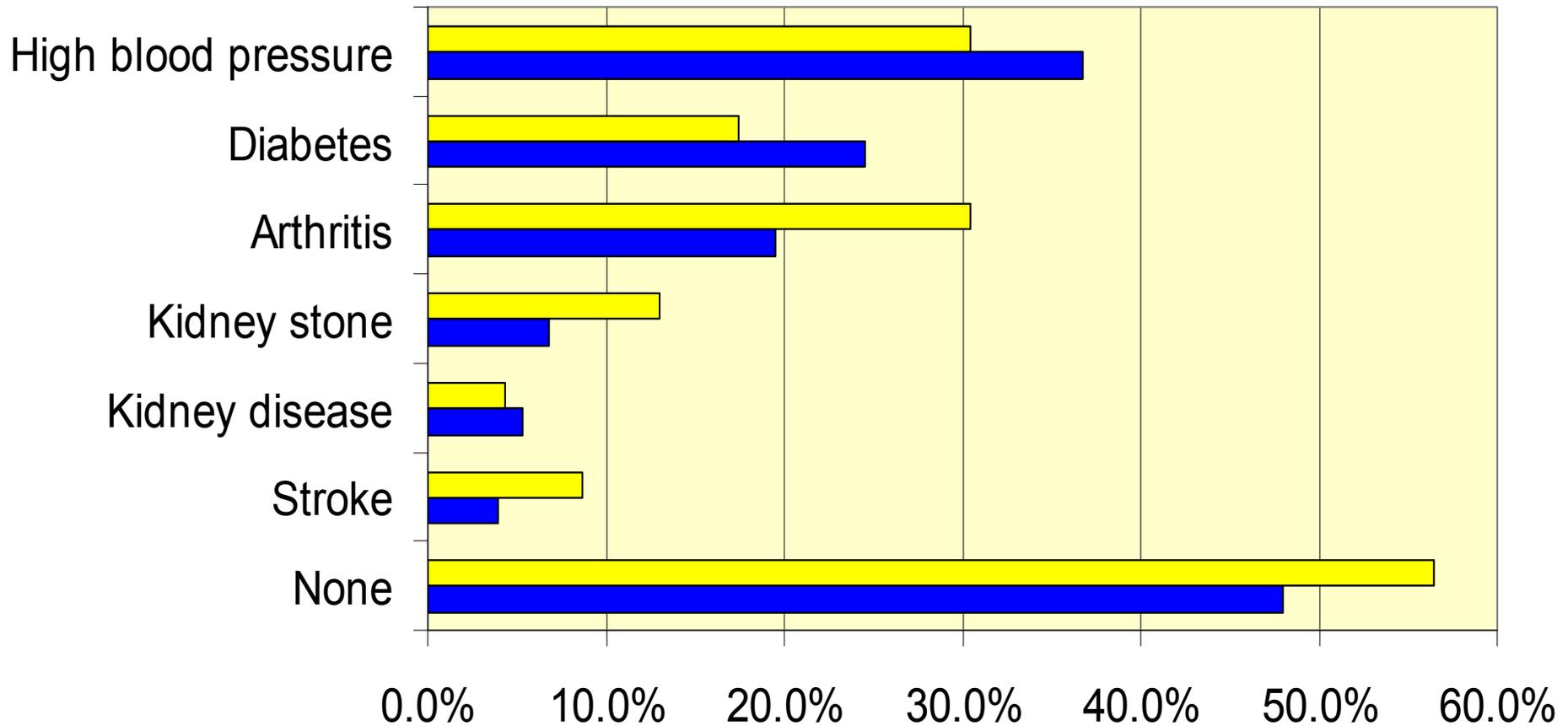
- Areas of highest risk shown in gray shading
- High-risk areas have many
  - mines
  - large mines
  - people living near mines
- **Becenti Chapter**
  - No *producing* uranium mines
  - Nose Rock Mine shafts developed in late-70s, but no ore production



## DiNEH Survey Results

# Self-reported health problems Becenti Chapter v. All Chapters

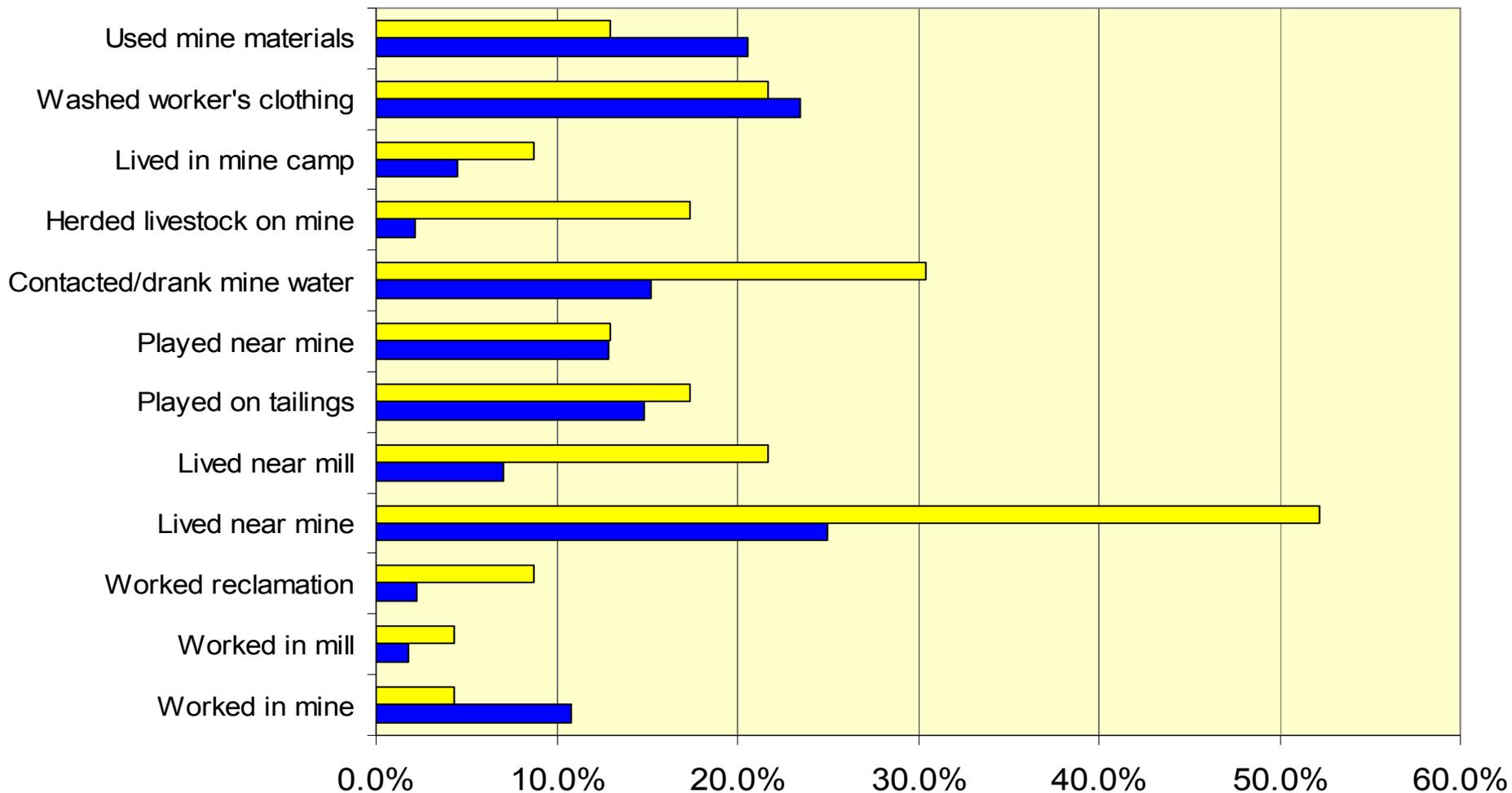
■ All Chapters (n=924) ■ Becenti (n=23)



## DiNEH Survey Results

# Self-reported uranium exposures, Becenti Chapter compared with All Chapters

■ All Chapters (N=924) ■ Becenti (n=23)



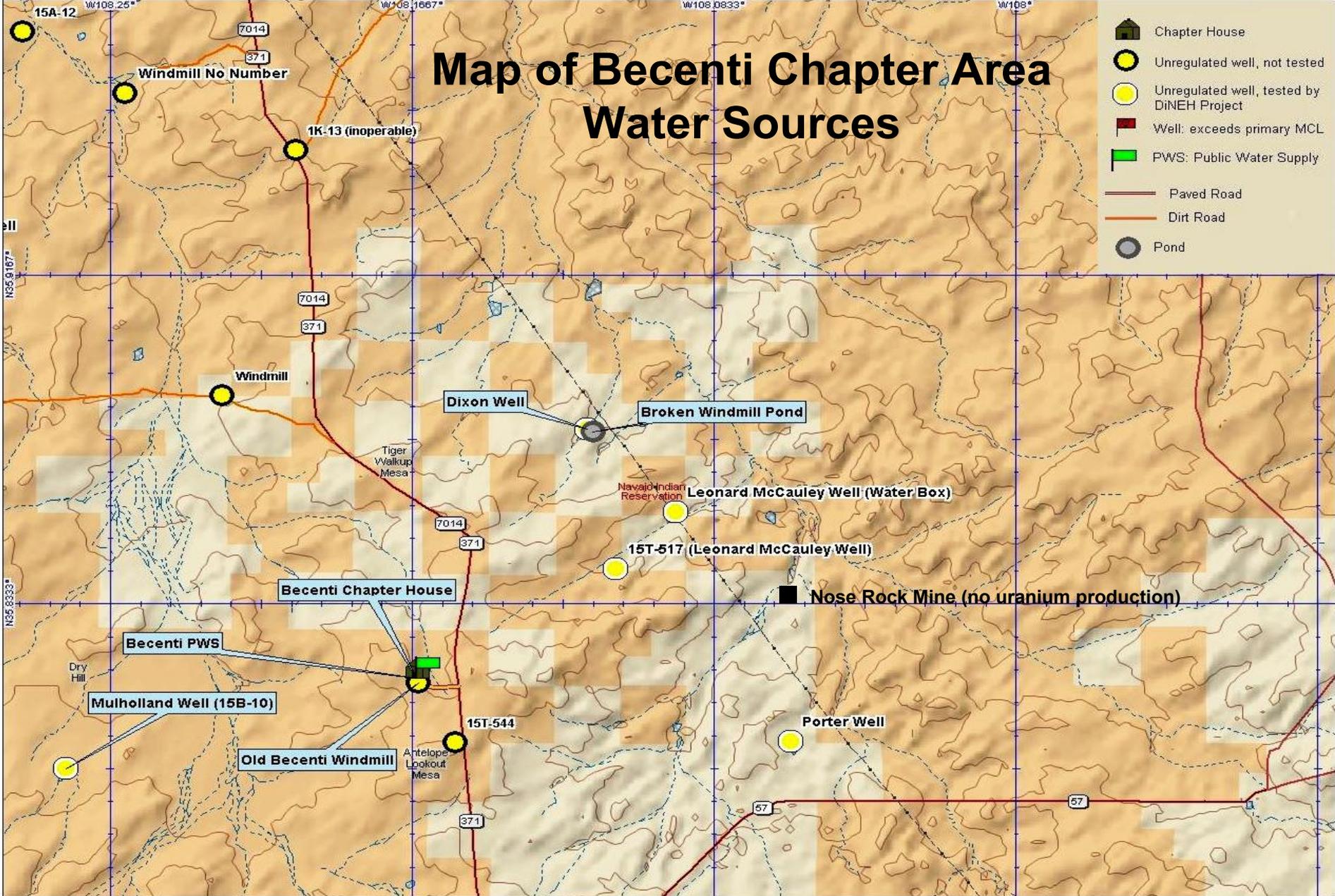
# DiNEH Water Quality Assessment: Becenti Chapter area

- Visited 11 water sources in Becenti area, 2007-2009
  - GPS (lat-long), photographed, mapped (see next slide)
- Sampled, tested 6 water sources in or adjacent to Becenti Chapter
  - Identified by survey participants as used for drinking, domestic, livestock purposes
  - Evaluated water quality for human, domestic and livestock uses



# Map of Becenti Chapter Area Water Sources

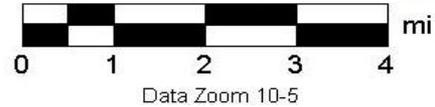
-  Chapter House
-  Unregulated well, not tested
-  Unregulated well, tested by DINEH Project
-  Well: exceeds primary MCL
-  PWS: Public Water Supply
-  Paved Road
-  Dirt Road
-  Pond



Data use subject to license.

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# Regulated v. Unregulated Water Sources

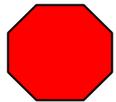
- **Regulated water sources:**
  - “safe” drinking water
  - NTUA water (water stations)
  - Regularly tested and treated
  - Complies with primary drinking water standards
- **Unregulated water sources:**
  - Not regularly tested or treated
  - Windmills, springs, artesian wells, private wells, stock ponds
  - Used for livestock watering, irrigation



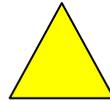
Above: Regulated water at 2 hauling stations  
Below: unregulated water sources



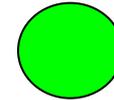
# DiNEH Project Use Recommendations



**STOP! Don't Use!**



**USE CAUTION!**



**OK TO USE!**

- We use water quality results to evaluate —
  - Human use (drinking and cooking)
  - Domestic use (bathing, cleaning, washing)
  - Livestock use (animal watering)
- Compare results with USEPA MCLs\* and SDWSs\*\*
- Unregulated wells NEVER receive a “green light” for human use —
  - We don't test for all contaminants, like bacteria, pesticides and petroleum products
  - *Navajo Nation policy is that livestock-use-only water sources are not to be used for human drinking water*
- **We NEVER shut down wells!**

<b>H</b>
<b>D</b>
<b>L</b>

**Human Use**

**Domestic Use**

**Livestock Use**

\*MCL = maximum contaminant level; \*\*SDWSs = secondary drinking water standards

# DiNEH Survey Results (n=23):

# Top sources of water for Becenti residents

**44% of Becenti participants said their homes are connected to the NTUA water system.**

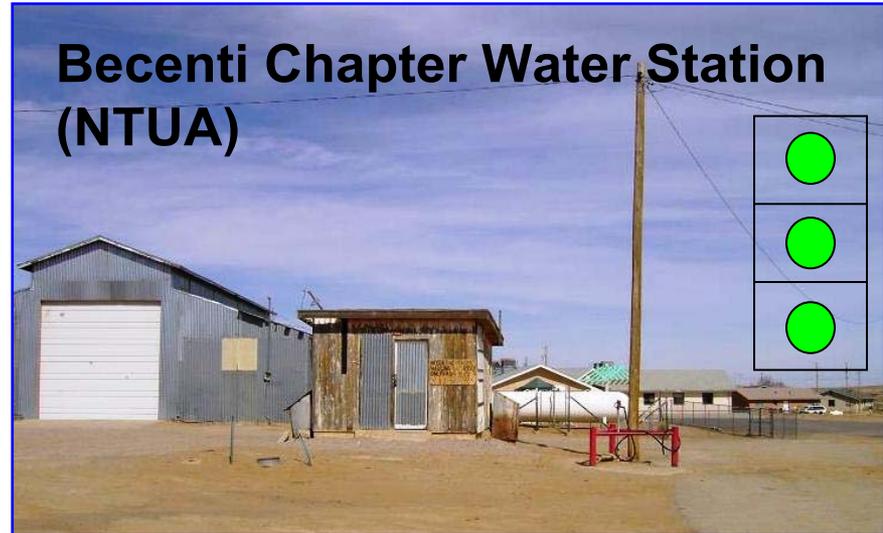
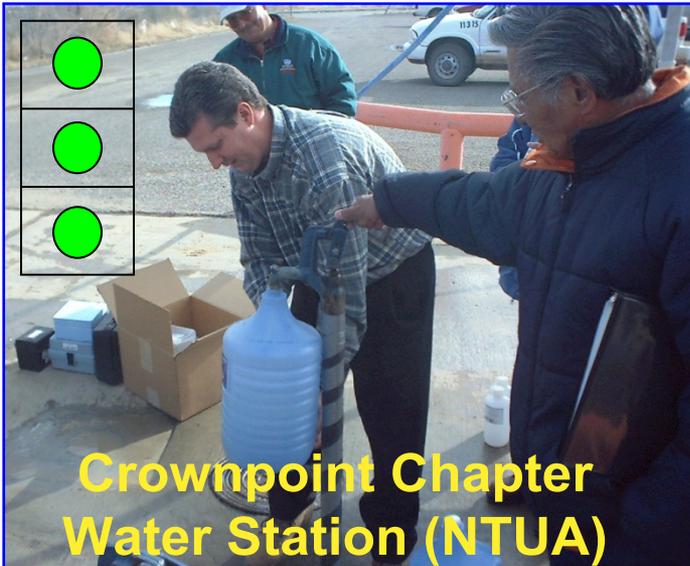


\*Indicates unregulated water sources

DiNEH survey results (n=23):

# Top Becenti water-hauling sources

(with use recommendations)



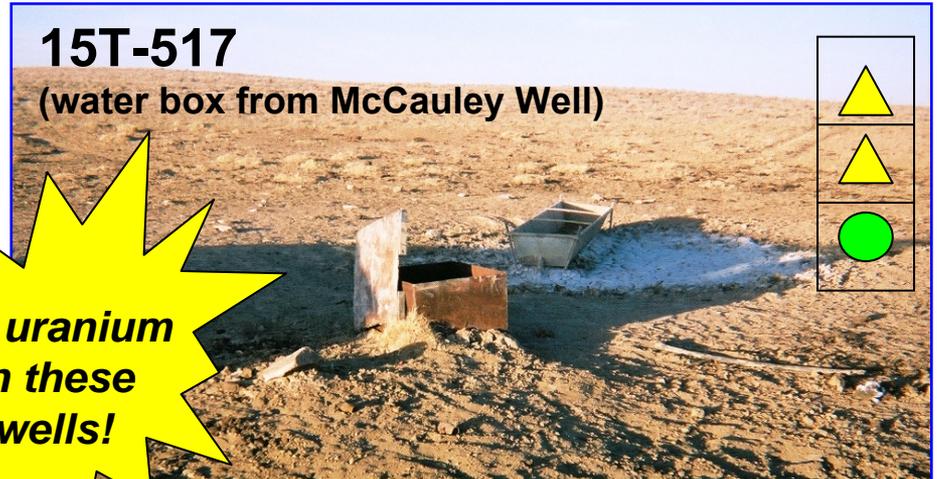
**Little or no uranium in these wells!**

**\*Unregulated water source**

# DiNEH water quality assessment (cont'd):

## Other unregulated Becenti water sources

(with use recommendations)



**No uranium  
in these  
wells!**



## DiNEH water quality assessment:

# Becenti wells have FAIR to POOR water quality\*

(all concentrations in mg/l except pH, which is in pH units)

Date	Well	Al	Cl <sup>-</sup>	F	Fe	Na	pH	SO <sub>4</sub>	TDS/ Cond
USEPA SDWS		0.05-.2	250	2.0	0.3	250**	6.5-8.5	250	500
USEPA primary		None	None	4.0	None	None	None	None	None
<b>MCL</b>									
3/5/09	15A-12	5.6	61	3.7	5.1	470	9.1	370	1,200
5/17/06	15B-10	.013	---	1.2	0.04	313	8.6	380	~1,000
3/4/09	15T-517 water box	0.036	46	1.5	3.6	800	8.9	1,300	2,300
3/4/09	Broken WM pond	3.0	4,200	4.4	2.0	4,200	9.5	2,700	11,000
3/4/09	Dixon	0.17	110	2.9	0.28	680	8.8	330	1,800
8/29/07	15B-33	ND	72	0.9	.48	660	8.6	1,100	1,900

Red highlight = exceeds primary MCL; yellow highlight = exceeds SDWS

\*Data provided to Becenti Chapter president, August 6, 2009

\*\*Sodium (Na) limit guideline for people with heart disease

# Health concerns about “salty” water

- “Salty” water — not good for people with high blood pressure (HBP) or heart disease
  - Sodium (Na), Sulfate (SO<sub>4</sub>), TDS: exceeded SDWSs in all 6 wells
  - Sodium (Na) + Chloride (Cl) = SALT
  - 30% of Becenti residents reported HBP
- Aluminum (2 wells)
  - Al – may have dementing effect contributing to Alzheimer's disease
  - (Nieboer et al, 1995)
- Fluoride exceeded primary MCL in 1 well) and SDWS in 2 wells
  - Bone disease (pain & tenderness)
  - Mottled teeth in children
- Iron (4 wells) — discolor water, corrode fixtures (photo, right)



# Wells found to be inoperative or dismantled



**15T-544**



**Becenti Chapter House Windmill**

# DiNEH Project Next Steps



## Becenti Chapter

- Present Phase II of survey results, update binder

## For the entire Project

- Conduct another 200+ health surveys
- Continue water testing/sampling
- Collect blood and urine samples — 450 participants
- Refer people from at-risk communities to NAIHS uranium screening program

