Uranium Contamination Stakeholders Workshop

Tuba City, Arizona
September 14 -16,- 2010

Water Quality in Unregulated Water Sources

Perry H. Charley,
Dine College – Shiprock
(505) 368-3514

Public Health Concerns Related to Water Hauling on Navajo Nation

- Water hauling is widespread
  - ~14,000 households without potable water
- Use of unregulated, untreated source water
  - Mainly livestock wells and natural springs
  - Found to contain bacteria and chemicals (such as natural arsenic and uranium)
- Unsafe storage and handling

Household Investigation of Drinking Water Exposures- 2008

- Collaboration among Navajo Division of Health, Centers for Disease Control and Prevention (CDC), Navajo EPA, Navajo Epidemiology Center, and Indian Health Service
- Target 5 chapters based on source water survey findings
  - Red Mesa, Dennehotso, Steamboat, Lower Greasewood, Ganado
- Goals:
  To what extent does contamination of unregulated water sources represent a public health threat?

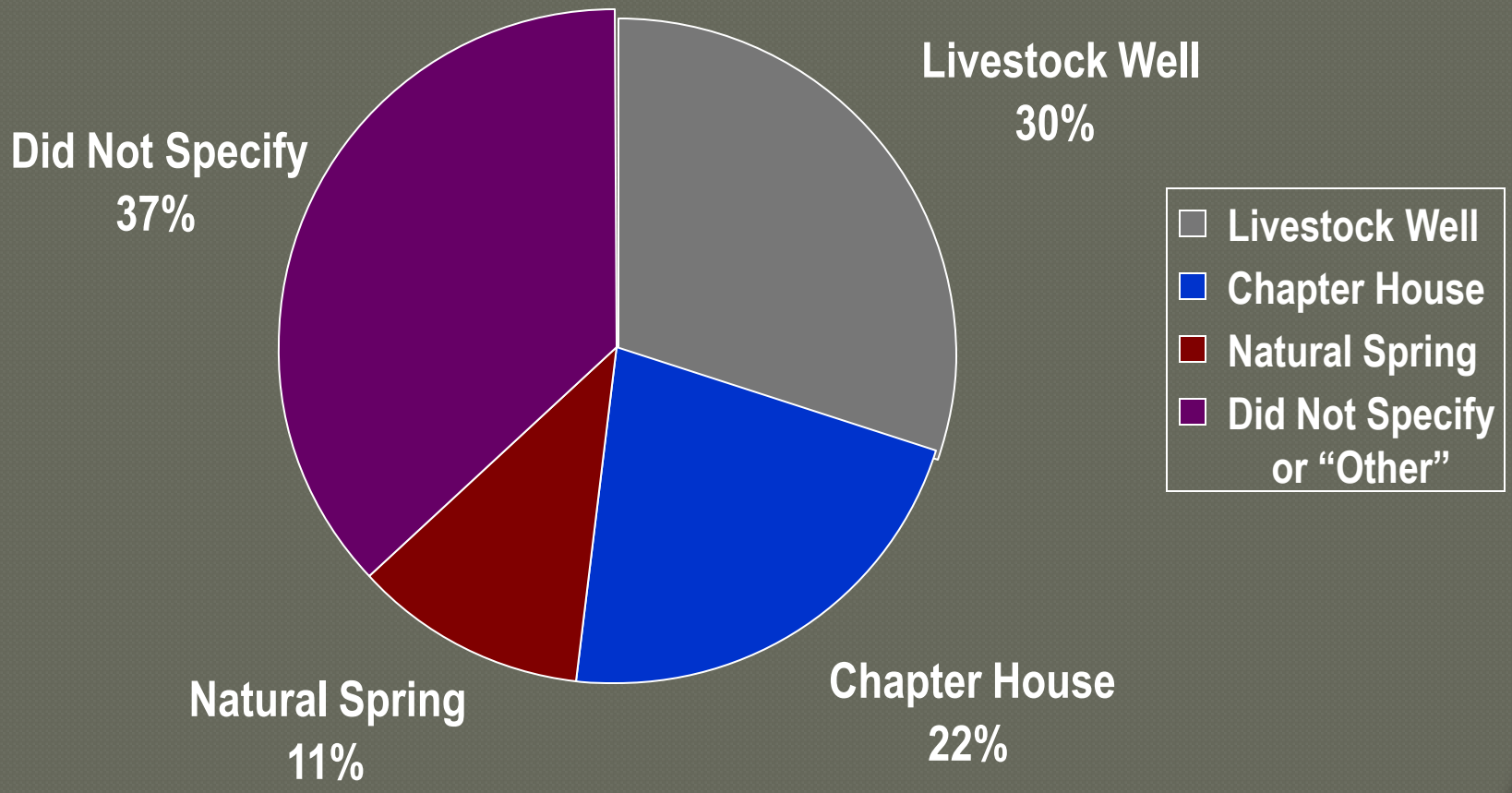
Investigation Design and Data Collection

- Surveyed 296 households in 5 Chapters with and without access to public water
- Community health representatives (CHRs) visited homes and collected information from 1 adult per household:
  - Document water use, hauling and storage methods
  - Test urine for chemical exposures in people
  - Test drinking water in home for bacteria and chemicals
  - Identify additional water sources for further testing
  - Geographic location of home and water sources

How Common is Water Hauling?

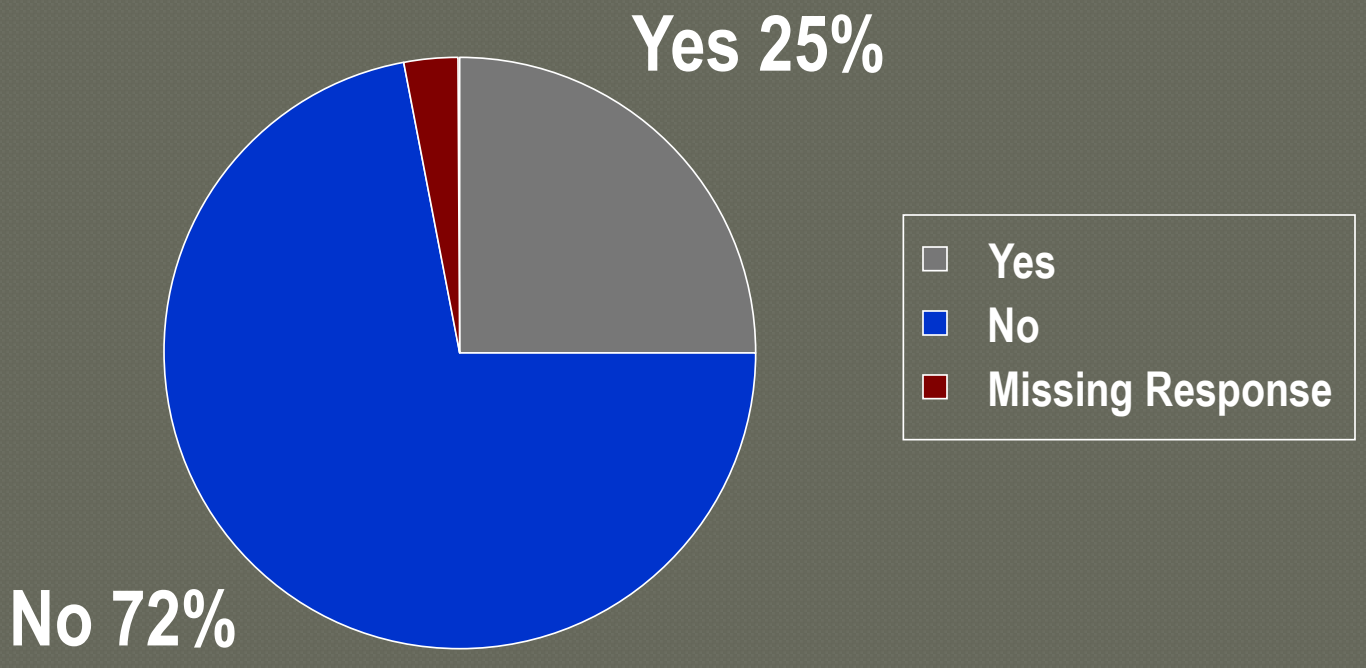
- 65 (22%) haul some or all of drinking water
- 175 (59%) do not haul water
- 56 (19%) could not be confirmed

From Where Do People Haul Drinking Water ?



94 responses, multiple sources could be used by same individual

Do People Who Haul Water Treat Their Drinking Water?



Results for 65 responses from people who hauled drinking water

Investigation Results

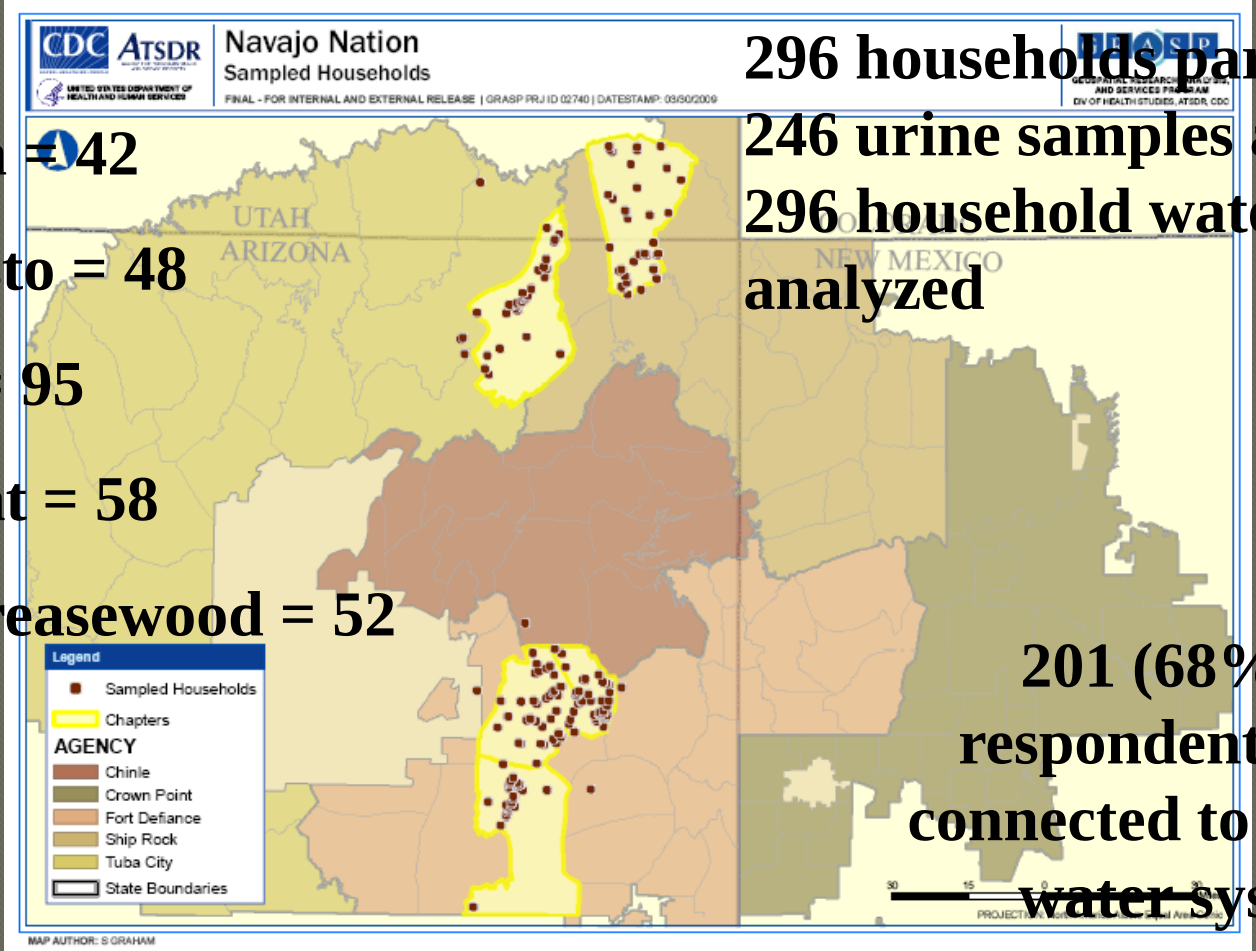
Red Mesa = 42

Dennehosto = 48

Ganado = 95

Steamboat = 58

Lower Greasewood = 52



296 households participated

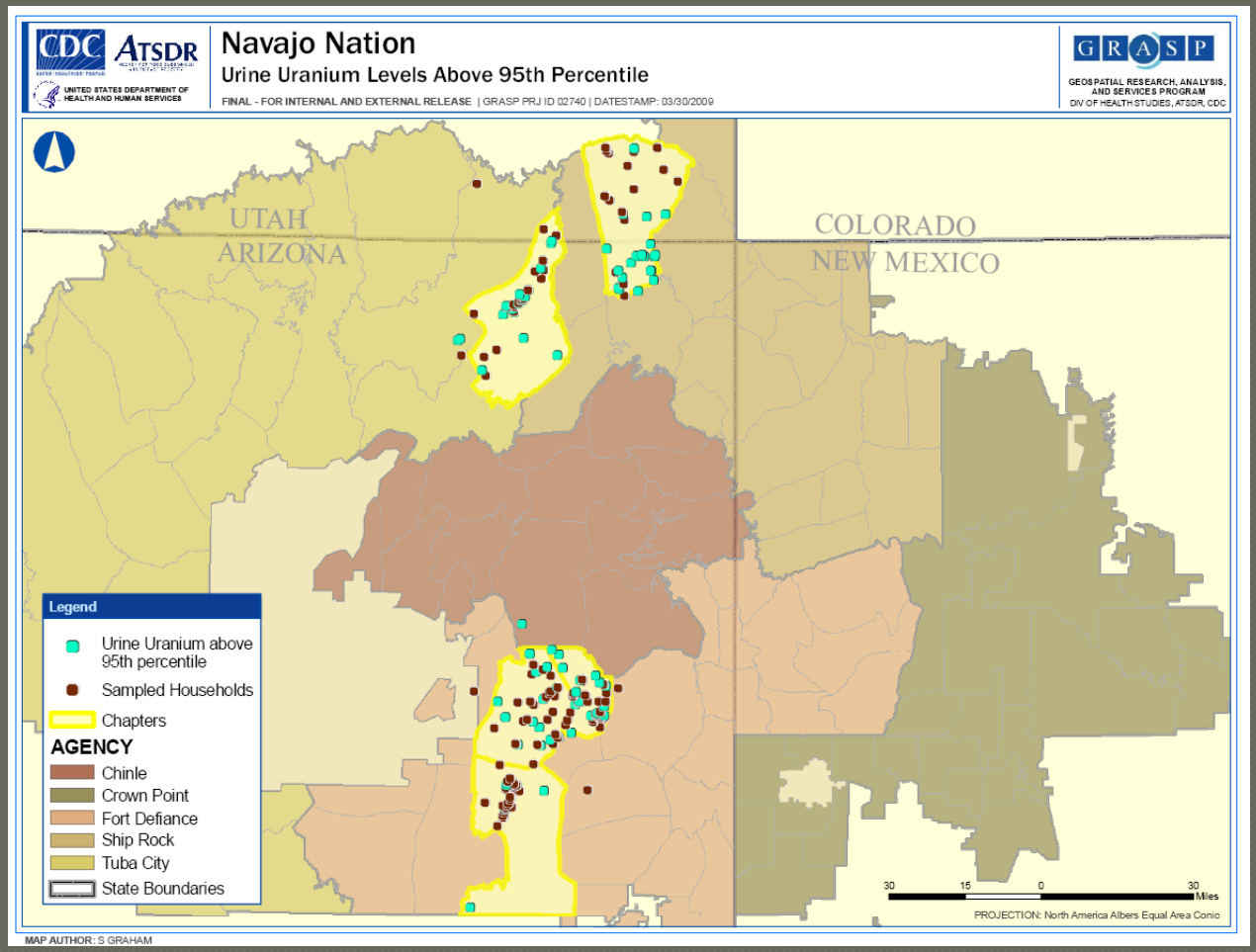
246 urine samples analyzed

296 household water samples analyzed

201 (68%) of respondents were connected to a public water system

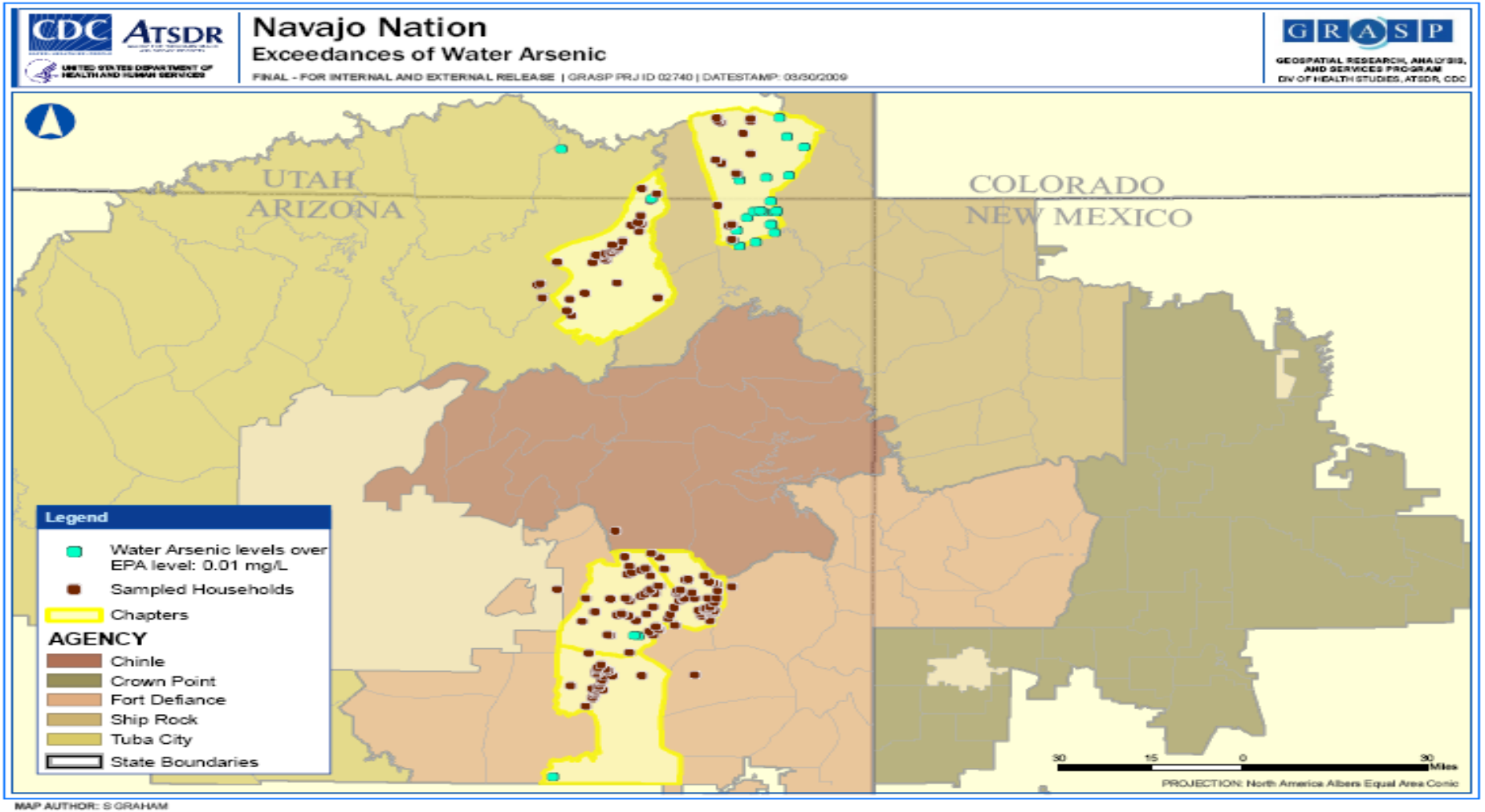
***1 household had missing Chapter data**

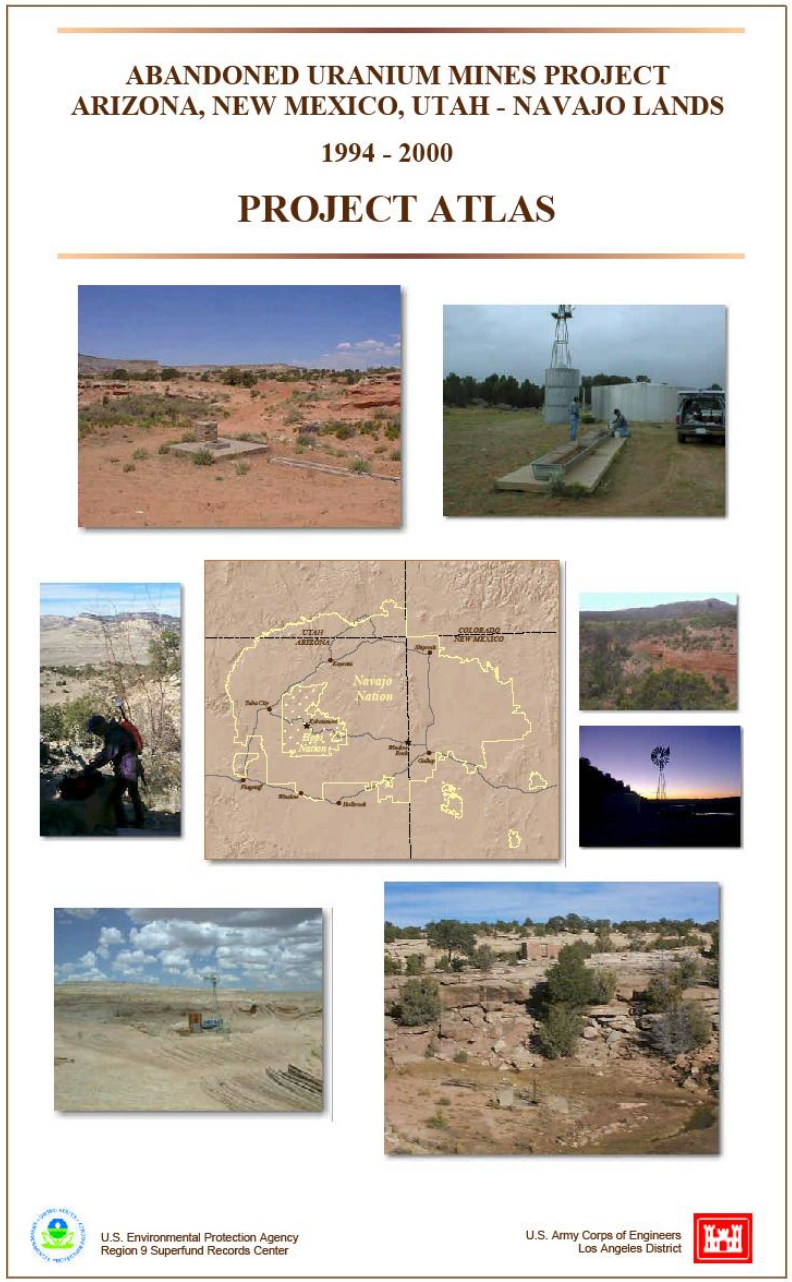
Geographic Distribution of Urine Uranium Levels > NHANES 95%



Geographic Distribution of Water Arsenic Levels

- 82% samples > Arsenic EPA limit were from Red Mesa





Navajo Nation Water Sampling by US-ACE

Glynn Alsupp, PhD

The USACE identified many radiation sources, sampled water used for human consumption, and conducted home surveys.

Between June 1998 and January 2000 the USACE field investigations included 227 water samples, 27 Quality Control Samples (of which 14 were field blanks and 13 were duplicates), 28 home surveys, and 34 radiation surveys.

38 water sources were found to pose significant health risks for radionuclides

ABANDONED URANIUM MINES (AUM) AND THE NAVAJO NATION
Central AUM Region Screening Assessment Report

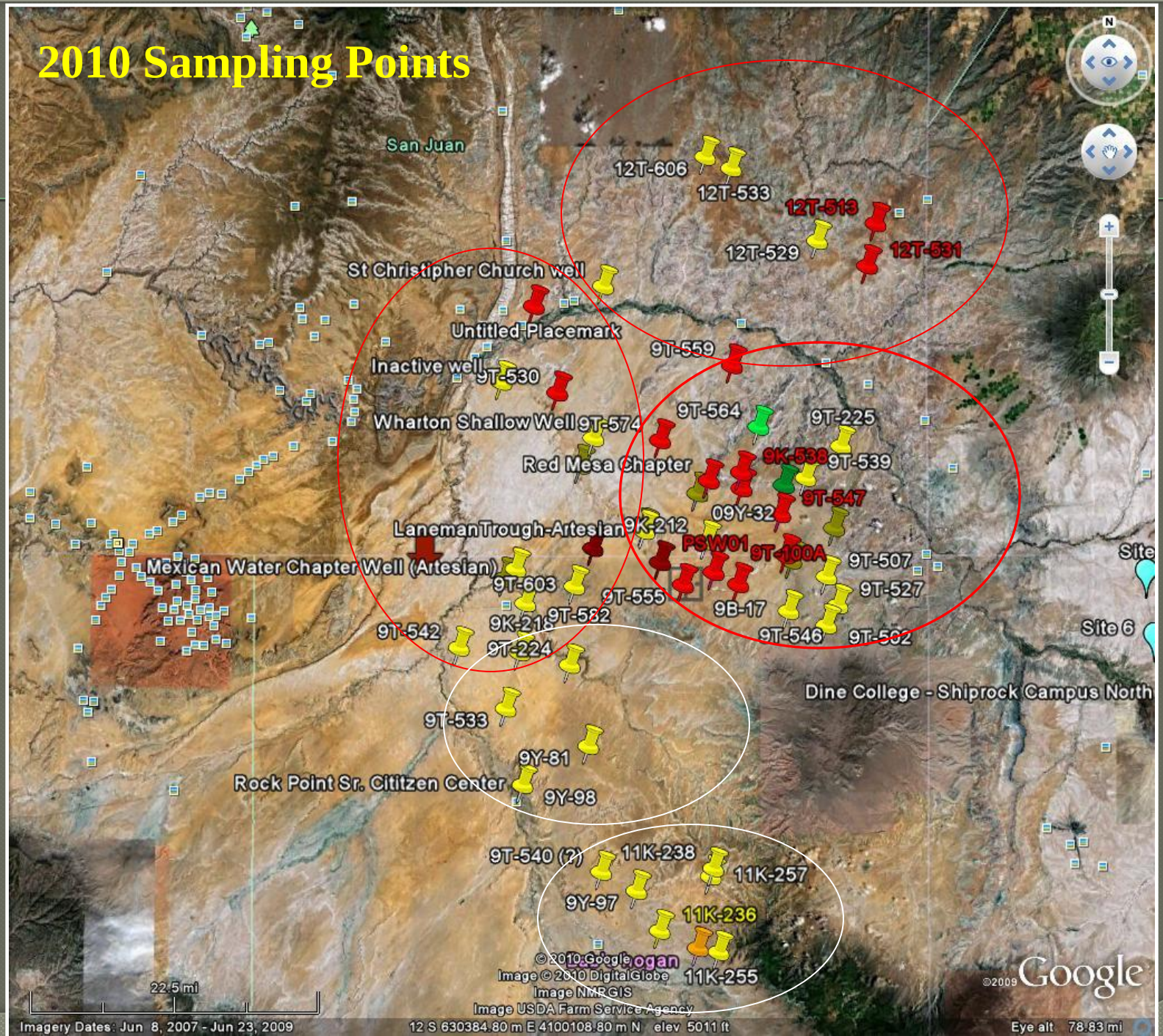
Table 6. EPA Water Samples with Elevated Uranium

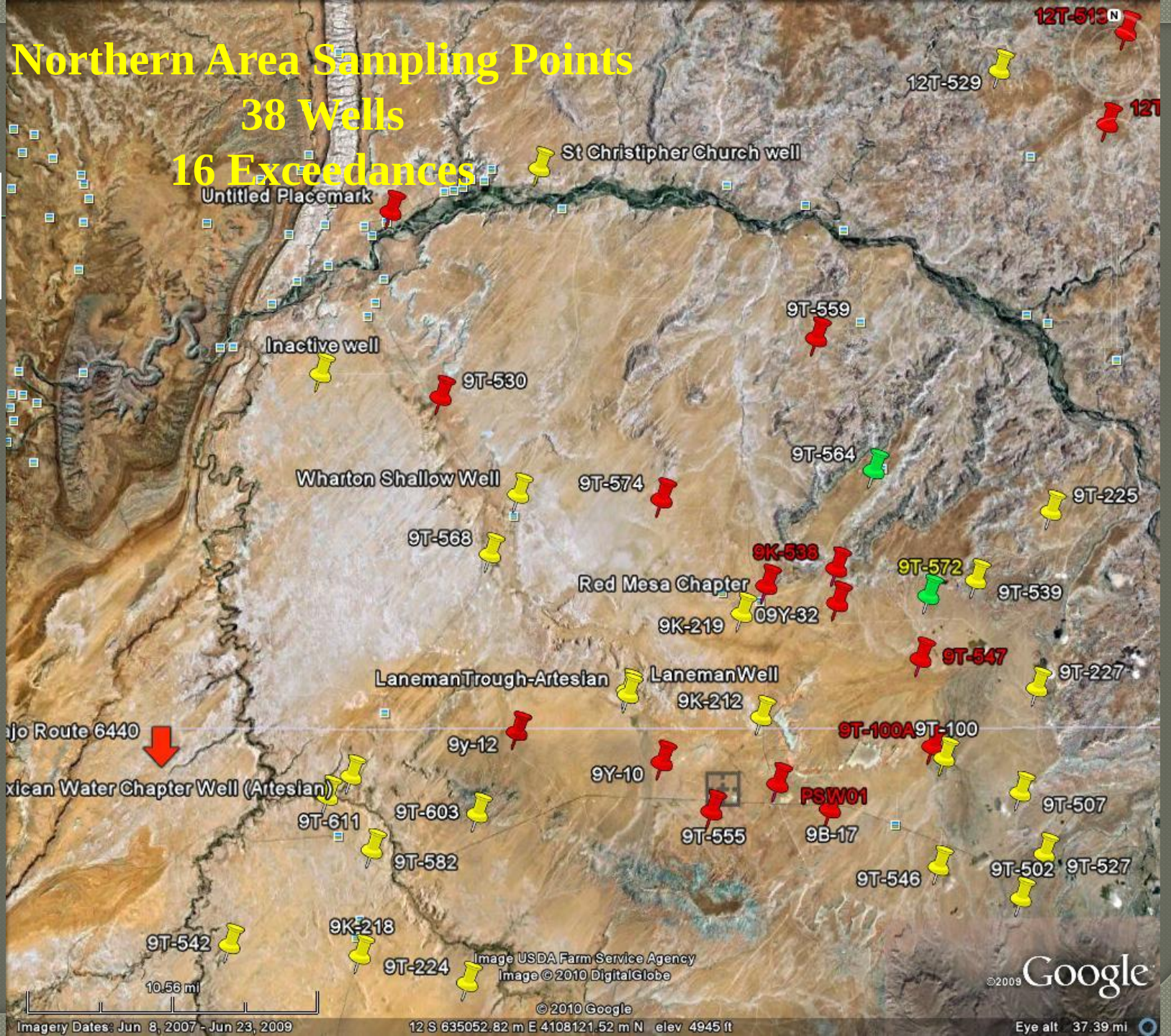
USACE Sample Name	Sample ID	Site Type	Sample Date	Total Uranium (pCi/L)
Benally Spring	KY981008CHS001	Spring	10/08/1998	47.1
Burro Spring	KY981008CHS002	Spring	10/08/1998	60.1
Cottonwood Spring	CH981123CHS001	Spring	11/23/1998	22.4
Tank 10R-51	CH990316TCW004	Wind Mill	03/16/1999	22.3
Tank 10T-533	CH981119TCW003	Wind Mill	11/19/1998	73.0
Tinyehtoh Spring	KY981008CHS003	Spring	10/08/1998	39.9
Waterfall Spring	CH981104BGS001	Spring	11/04/1998	61.7
White Clay Spring	CH981124BGS002	Spring	11/24/1998	45.9

NEXT STEPS

- NNEPA, NAMLRP and EPA should jointly review the report findings.
- NNEPA, NAMLRP, and EPA should collect post-reclamation water samples for water chemistry.
- NNEPA, NAMLRP and EPA should develop a joint prioritization of sites for possible action.
- EPA shall continue to support the Navajo Nation with additional assessment activities at NNEPA and shall address identified high priority areas of concern via the EPA Removal Program, at the request of the Navajo Nation.

2010 Sampling Points




Northern Area Sampling Points
38 Wells
16 Exceedances
12T-513
12T-529
St Christipher Church well
Untitled Placemark
9T-559
Inactive well
9T-530
9T-564
Wharton Shallow Well
9T-574
9T-225
9T-568
9K-538
9T-572
Red Mesa Chapter
9T-539
09Y-32
9K-219
9T-547
LanemanTrough-Artesian
LanemanWell
9T-227
9K-212
9T-100A
9T-100
9y-12
9Y-10
PSW01
9T-507
9T-611
9T-603
9T-555
9B-17
9T-582
9T-546
9T-502
9T-527
9K-218
9T-542
9T-224
Image USDA Farm Service Agency
Image © 2010 DigitalGlobe
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Google
10.56 mi
Imagery Dates: Jun 8, 2007 - Jun 23, 2009
12 S 635052.82 m E 4108121.52 m N elev 4945 ft
Eye alt 37.39 mi

REGION 9 WATER QUALITY
LISTS OF WELLS
POSITIVE E.COLI & EXCEEDING As & U MCLs

ANALYTICAL RESULTS

SAMPLE NAME	CHAPTER	ARSENIC MCL:10 µg/L	URANIUM ICP-MS MCL: 30 µg/L	E. COLI I DEXX Colisure®	Notes/Comments
DCRM080521-9T547 4108038E 639327N	Red Mesa (windmill)	17 3	0 3	27.2 88.4	Windmill: north of Red Mesa buttes
DCRMO8O521-AM02	Red Mesa (windmill)	22	59	74.4	AM= Aero-Motor, designating a windmill blade type, near church
DCRM080521-100 655931E 4086912N	Red Mesa (windmill)			1.0	Windmill: west of Goldtooth camp, east Red Mesa buttes
DCRM080521-100A 655434E 4093896N	Red Mesa (windmill) Well Windmill	12 13 5	260 270 >2	 8.5	Windmill: ½ mile west of windmill 09Y- 100 (above).
DCRM080528- 0559 4118115E 647039N	Red Mesa (windmill)	21		1.0	windmill
DCRM080528- RMSW01 644126E 4101457N	Red Mesa (windmill)			4.1	windmill
DCRM080521-PCW01	Red Mesa	22	36		Needs verification: A Duplicate w/-PWS01, results used for graph.
DCRM080521-9T538 4104193E 649600N	Red Mesa (windmill)	50			Windmill – east of chapter house
DCRM080528-CH 4103125E 645539N	Red Mesa Chapter House (public water supply)	12 12			NTUA jurisdiction - referral
DCRM080521-PWS01 4091588E 646381N	Red Mesa Store (Well)	21 20	36 34		Active well heavily used by community for drinking – closure (?) *Appears as Duplicate sample w/-PCW01 above. Result not used in graph.

Black: 2008 sampling results **Red: 2009 sampling results**

(Con't) REGION 9 WATER QUALITY LISTS OF WELLS POSITIVE E.COLI & EXCEEDING As – U MCL

		ANALYTICAL RESULTS			
SAMPLE NAME	**CHAPTER**	**ARSENIC** MCL: 10 ug/L	**URANIUM** MCL: 30 ug/L	**E.COLI IDEXX**	**RECOMMENDATION**
DCTT080521-09B-17 649491E 4090354N	Tse Tah (windmill)			<1.0	Windmill; not -0913, but 09B-17. Also has two sets GPS coordinates
DCTC080522-9T227 4097409E 661475N	Teec Nos Pos			21.6	Might be 9T-227: needs verification; Verified 3/27/09 by BMaxwell
DCTNP080522-502 4085192E 660685N	TeecNosPos (windmill)			1	Windmill ;along Carrizo Mtn. road.
DCAN080526-0531 4130476E 665113N	Aneth (windmill), North Aneth past Lansing's	11		1.0	Windmill: near Lansing's camp, west of junction of Hovenweep turnoff. Appears a Duplicate, used results in graph.
DCAN080522-531	Aneth			1.0	Most likely the same windmill as above (0531). Appears a Duplicate, This result not used in graph.
DCAN080526-0513 4135843E 666086N	Aneth (windmill)	13			Windmill, south of Hovenweep Nat'l Monument
DCMM080527-0710	Aneth (windmill)			2.0	MM = McCracken Mesa @ North Aneth
DCMC080528-559 4117606E 648258N	Montezuma Creek	21		1.0	0559 at Red Mesa, but this looks to be a different well. Needs verification due to differing analytical data.

Region 9 Water Quality Sampling Project
Contaminated Wells

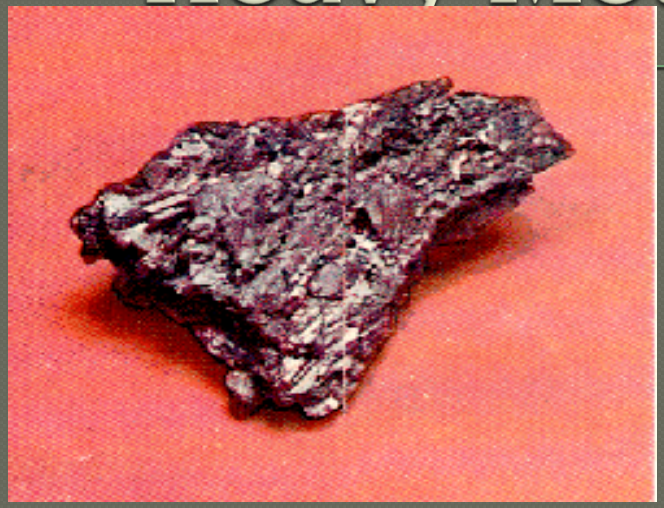
REGION 9 WATER QUALITY PROJECT OF RURAL UNREGULATED WATER SOURCES

Summer 2010 Water Sampling Results

Dine College - Shiprock Campus

			UTM Coordinates			Radionucleide	Heavy Metals			Bacterial	
Well #	Chapter	Type of Well	Northing	Easting	Elevation	Total Uranium	Arsenic	Lead	Others	T. Coliform	*E. coli*
9Y-10	Red Mesa	Kickvalve	4092938	639521	5257ft	9ug/L	46ug/L	<1ug/L		12.2 CFU	8.6 CFU
RMCH	Red Mesa	Kitchen Sink	4103296	645431	5379ft	1ug/L	12ug/L	<1ug/L			
9Y-12	Mex. Water		4072572	705496	4984ft	760ug/L	7ug/L	<1ug/L			
Mesa1	Cove	Stream				84ug/L	<15ug/L	<10ug/L			
MWChap	Mex. Water	Kickvalve				20ug/L	4ug/L	<1ug/L			
PWS01	Red Mesa	Hand pumpvalve	4091814	646291	5467ft	32ug/L	21ug/L	<1ug/L			
9T-580	Red Mesa	Trough kickvalve	4114049	626203	4596ft	<1ug/L	28ug/L	1ug/L			
9T-555	Red Mesa	Windmill	4090513	642458	5483ft	6ug/L	14ug/L	<2ug/L			
9T-538	Red Mesa	Trough	4104400	649535	5466ft	7ug/L	18ug/L	1ug/L			
9T-574	Red Mesa	Trough kickvalve	4108243	639264	5142ft	<1ug/L	11ug/L	2ug/L			
Bluff Sand Island	Bluff	Handpump	4124849	62358	4272ft	<1ug/L	24ug/L	<1ug/L			
9T-547	Red Mesa	Windmill	4099216	654573	5108ft	13ug/L	17ug/L				
9Y-100A	Red Mesa	Windmill	4094096	655360	5190ft	270ug/L	13ug/L				
9T-559							21ug/L				
9T-530	Red Mesa	Windmill	4114049	626203	4596ft		28ug/L				
9Y-32	Red Mesa	Windmill						Well Decommissioned August 2010			
9B-17	Red Mesa	Windmill	4090363	649393	5401ft						
12T-531	Aneth	Windmill	4130668	665055	5066ft		11ug/L				
12T-513	Aneth	Windmill					13 ug/L				

Heavy Metals in Water



Arsenic: B44sh [ib1h7 TO bitah7g77

- **Arsenic is a grey colored metal**
- **Arsenic is poisonous and it is used to make poisons to kill insects & rodents**
- **Causes corns or warts that turn into cancer.**
- **Causes cancers in the liver, bladder, kidney and lung.**
- **Causes teeth and gum deterioration**

Lead: B44sh Doo[‘izh TO bitah7g77

- **Lead is a bluish-gray metal and it is considered harmful if it contaminates exceeds MCL - 15 ug/l**
- **Lead is used to make batteries, paint, and gasoline.**
- **Causes birth defects, low birth weight, premature birth, abortion, brain damage, kidney damage**
- **Can cause high blood pressure and damage reproductive system.**




Uranium: {eetso TO Bitah7g77

- Uranium is soluble in water and considered harmful if exceeds MCL: 30 pCi/l
- Accumulates in kidneys and bone marrow
- Causes kidney failure and cancers


Toxigenic E.Coli; spread thru cattle, sheep/goats, wildlife

E.Coli: Ch'osh doo yit'7inii TO Bitah7g77

- Fecal coliform and E. coli are bacteria whose presence indicates that the water may be contaminated with human or animal wastes.
- Disease-causing microbes (pathogens) in these wastes can cause diarrhea, cramps, nausea, headaches, or other symptoms.
- These pathogens may pose a special health risk for infants, young children, and people with severely compromised immune systems.

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.
- Water contamination does not appear to be the sole source of uranium or other chemical exposures found in this population

Bacterial Analysis

Total # tested for bacteria	Positive for *E. coli*	Positive for total coliforms
285	23(8%)	94(33%)

- A significantly higher proportion (73%) of hauled water samples had bacteria compared to non-hauled water samples (18%)

Other Problems

Dead cattle near pond and windmill

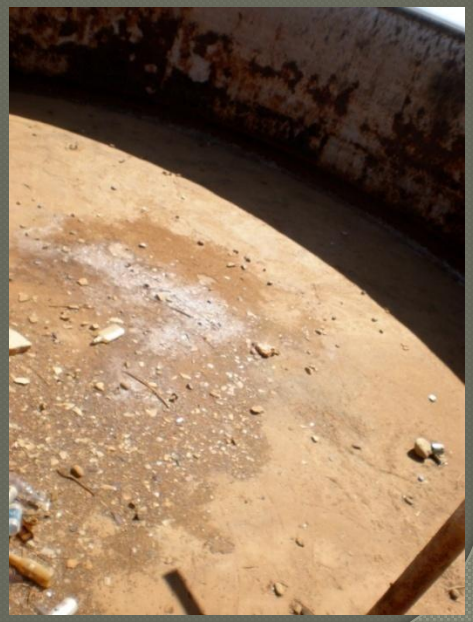
Inactive well

Vandalism

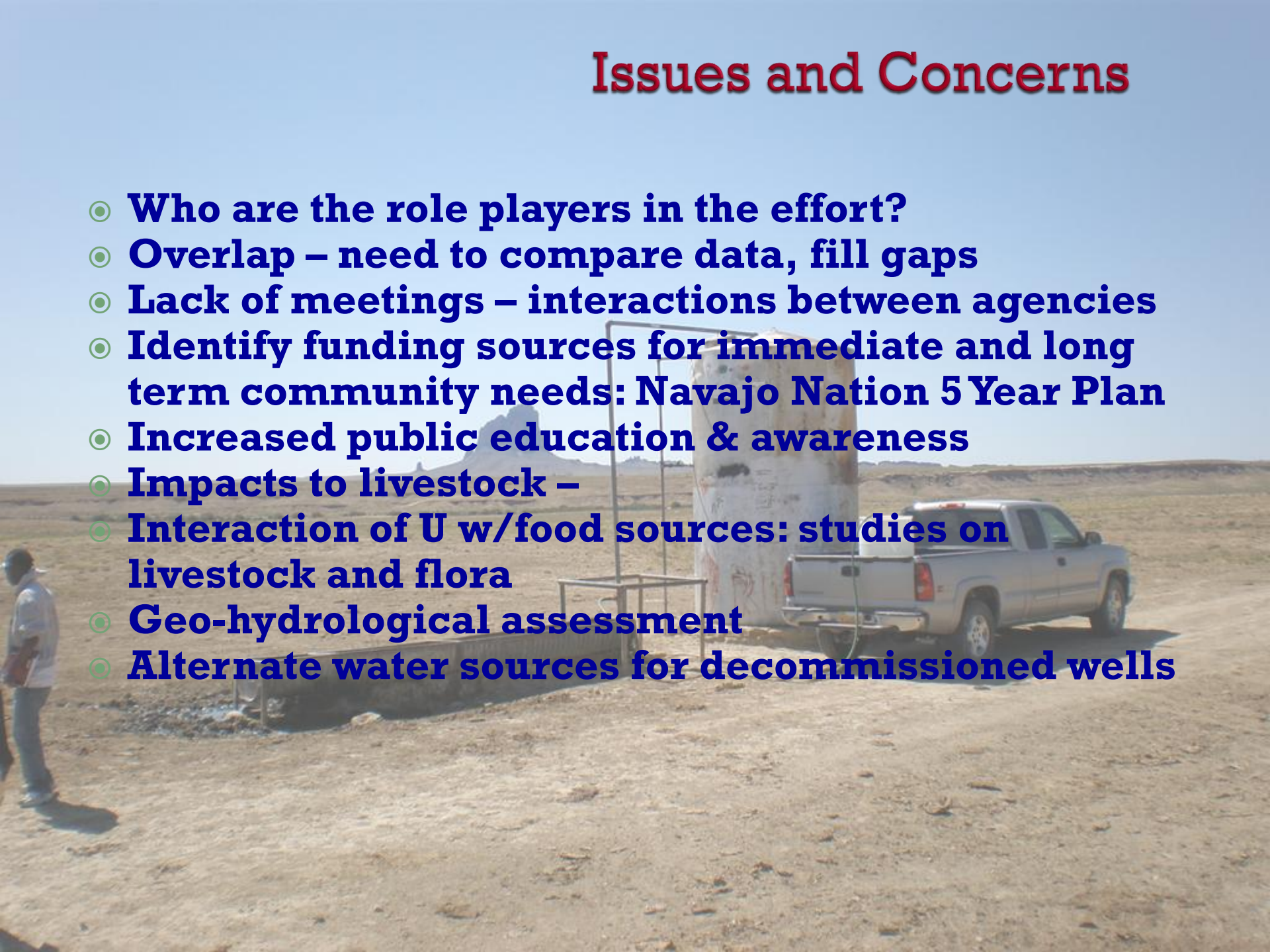
Graffiti

Trash in Storage tanks

Uncovered Storage tanks



Issues and Concerns



- Who are the role players in the effort?
- Overlap – need to compare data, fill gaps
- Lack of meetings – interactions between agencies
- Identify funding sources for immediate and long term community needs: Navajo Nation 5 Year Plan
- Increased public education & awareness
- Impacts to livestock –
- Interaction of U w/food sources: studies on livestock and flora
- Geo-hydrological assessment
- Alternate water sources for decommissioned wells

Key Message for Communities:

- Unregulated water sources were not developed for human consumption.
- They are not routinely tested for contaminants by health officials.
- They are for livestock use only

Axhe'hee doo Ha'gone'

Dine' College – Dine' Environmental Institute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AERMOTOR