Churchrock Area Uranium Monitoring Review

Orientation for Chapter Officials
Churchrock Chapter House
Feb. 5, 2009

Church Rock Uranium Monitoring Project (CRUMP)
Diné for Environmental Health (DiNEH) Project
Multicultural Alliance for a Safe Environment (MASE)
Red Water Pond Road Community Association
Southwest Research and Information Center (SRIC)

Tonight, the Usual Suspects

Chris Shuey, Larry J. King, Teddy Nez and the Teddy Bears

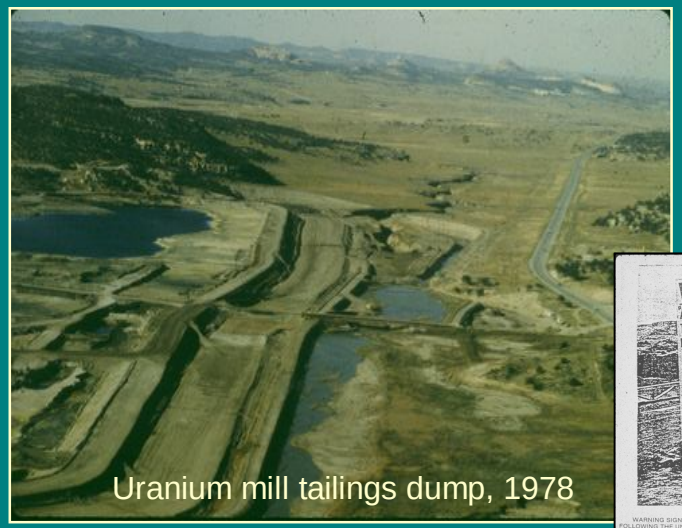
Scotty Begay

Eugene Esplain

DiNEH Project Staff

Our Community's Story:

50 Years of Impacts from Uranium Mining



Uranium mill tailings dump, 1978

WARNING SIGN ERECTED NEXT TO PUERCO RIVER IN 1979 FOLLOWING THE UNC TAILINGS SPILL. MOST OF THE SIGNS WERE TORN DOWN BY MID-1982.

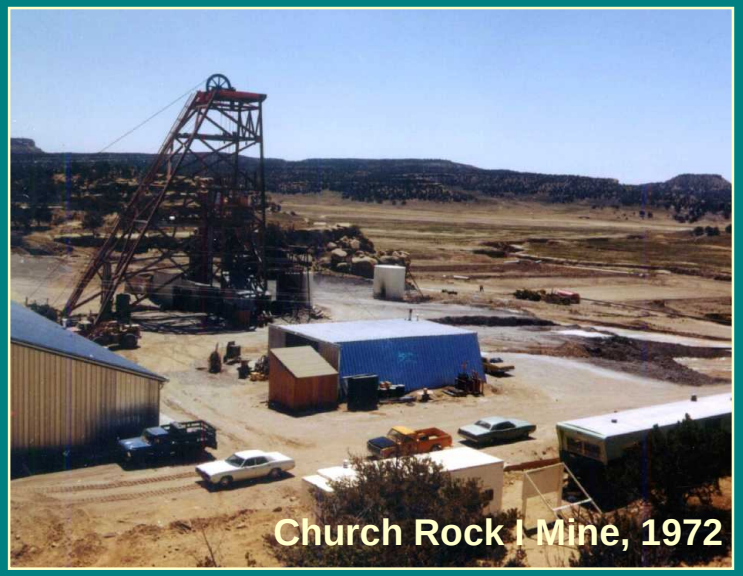
Tailings dam failure, 7/16/79

Navajo home next to uranium mine waste dump, 2005

Radium-contaminated soil removal, Red Water Pond Road, 2007; partially reclaimed abandoned mine in rear

Church Rock Mining History (cont'd)

- Active mining, early-'50s thru mid-'80s
- 19 abandoned mines, 1 closed uranium mill in area (see map, next slide)
- '79 tailings dam failure — U.S.'s largest release, by volume, of radioactive waste
- Mine dewatering for 20 years
- Livestock studies of '80s —
  - uptake of radionuclides in muscle, organs of sheep, cattle
- Little environmental monitoring
- No health studies ever conducted until DiNEH Project started in 2004
- New ISL mining proposed in Churchrock, Crownpoint chapters



Church Rock I Mine, 1972

Unreclaimed mine waste dump next to residence, 2007

Community Responses

- Churchrock Chapter resolutions 2000, 2003, 2005, 2006
  - opposed new mining
  - requested environmental, health studies
  - supported “Indian Country” determination
- Church Rock Uranium Monitoring Project (CRUMP), 2003
  - environmental data needed for community planning, housing, decision-making
  - MTA-Fund grants (2003, 2004), plus in-kind support from community members, tribal, state, federal agencies, universities
- Coyote Canyon, Pinedale chapters
  - Resolutions, meetings, outreach

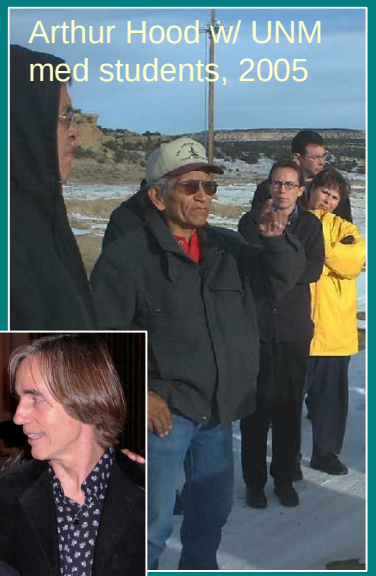
Former Churchrock Chapter CSC Edward Carlisle (top); EH training 12/3/02 (center); CRUMP meeting, 6/24/03

Education, Outreach, Tours, Testimonies

Left: Lt. Gov. Diane Denish w/ Laguna Gov. John Antonio and Churchrock residents Gerald Brown and Larry King (Sept. '08)

NNC Resources Committee tour, Oct. 2004

Community Meeting, July '06



Arthur Hood w/ UNM med students, 2005

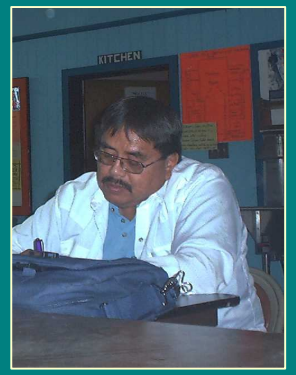
Above: Navajo Nation team at "Waxman Hearings," 10/23/07; right: Edie Hood hanging with Jackson Browne

Church Rock Uranium Monitoring Project, 2003-2007

- Assess contaminants in water, on land, in air in residential areas near abandoned uranium mines
  - Establish human exposures for future health studies
- Train, involve local people in assessments
  - Gerald Brown, 2005-2006
  - Bernice Norton, 2006-2007
- Ensure community oversight of mine cleanup
- Educate, report findings

CRUMP Collaborators

- Churchrock Chapter, NN
- Diné College UEP
- Navajo AML, Navajo EPA, Navajo Dept. Water Resources
- NM Environment Department
- Southwest Research & Information Center
- TAMS Center-NAU/ITEP
- UNM/CEHP
- USEPA-9, Las Vegas Lab



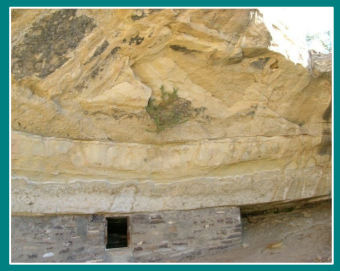
CRUMP Assessments

- Water Quality
- Surface Gamma Radiation Surveys
- Soil Testing
- Indoor Radon Testing
- Air Particulate Monitoring

Water Quality Assessment

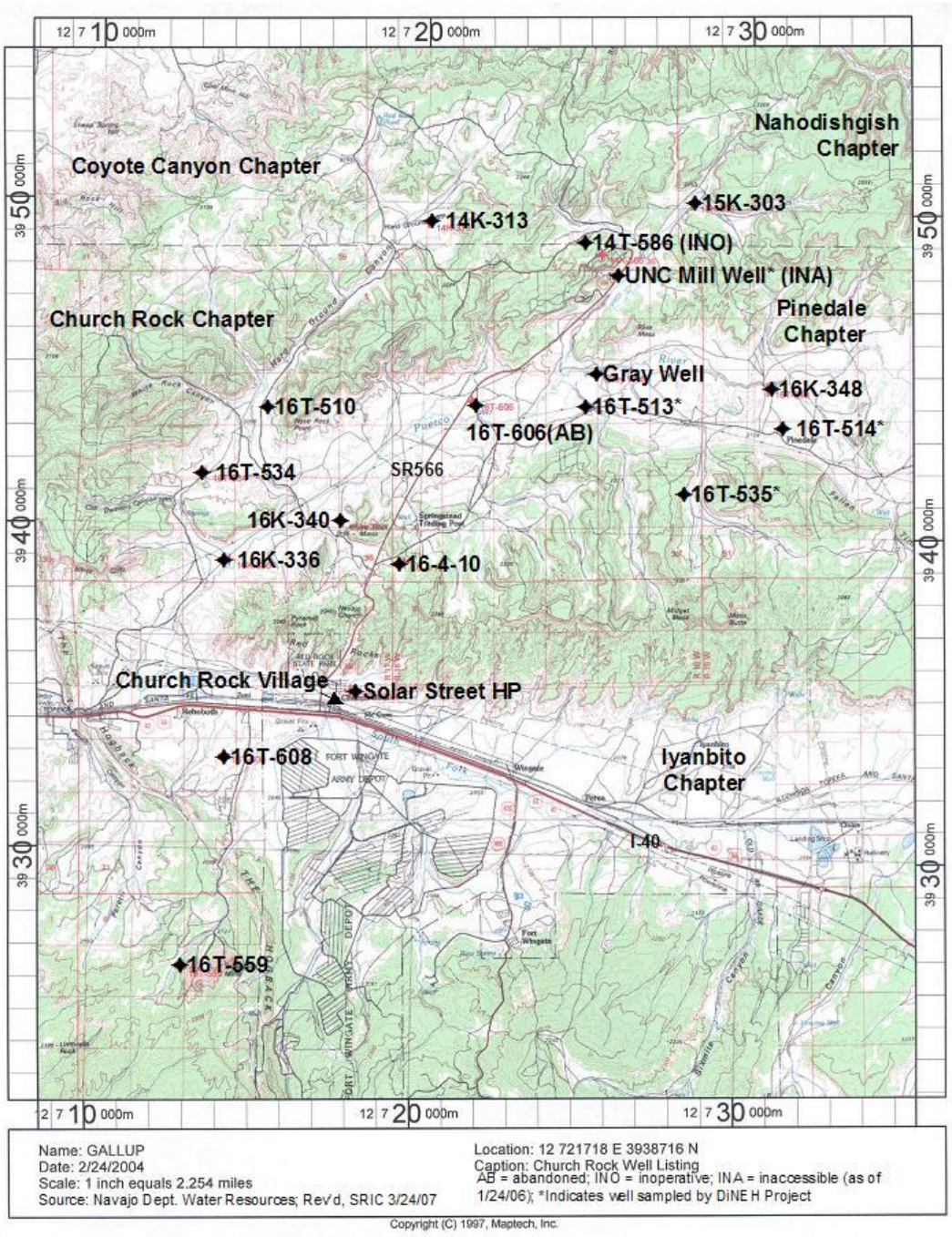
- 1999 survey: >80% CR residents haul water even when connected to public water supply system
- Water hauled for all uses: human, domestic, livestock
- Water tested for general chemistry, heavy metals (like uranium), radionuclides (like radium)
  - no testing for bacteria, solvents, petroleum products

Water Sources, Water Standards



- Public water supplies (top left): regularly sampled, tested, treated for safe water
- CRUMP focus: unregulated water sources
  - windmills, developed springs
  - Human consumption of untreated water
- Compare results with primary and secondary drinking water standards
- Primary standards — based on human health
- Secondary standards — how water looks, smells, tastes
- USEPA and Navajo Nation – IDENTICAL STANDARDS

Water Quality Assessment (cont'd)



- Sampled 17 unregulated water sources
  - wells, springs not regularly tested, treated for safety
- 9 in Church Rock Chapter
- 2 in Coyote Canyon
- 5 in Pinedale
- 1 in Nahodishdish (Dalton Pass)

CRUMP Water Quality Results

"Red light" – STOP, don't use for any purpose

"Yellow light" – CAUTION

"Green light" – safe to use for the uses listed

Well or Water Source	Pollutants Exceeding NPDWS	Pollutants Exceeding NSDWS	2006 Status	Use Recommendations		
				Human	Domestic	Livestock
Annie Grey	Uranium (1/2 std.)	Sulfate, TDS	OP			
Solar St.	Iron	pH, Sulfate, TDS	**INOP** (2004)			
14K-313	Iron	Sulfate, TDS, Tot. Hardness	OP			
14T-586	#Arsenic, Iron, #Selenium	Sulfate, TDS, Tot. Hardness	**ABD** (2003)			
15K-303	#Arsenic, Iron, Selenium	Sulfate, TDS	OP			
16-4-10	Gross alpha, Uranium		OP-LS only			
				"NO HUMAN USE" ADVISORY, 2004		
16K-336	Iron	TDS	OP			
16K-340	#Arsenic, Iron	Sulfate, TDS, Tot. Hardness	OP			
16T-348		pH, TDS	OP			
16T-510	Arsenic	Not tested	**INOP** (2006)			
*16T-513**	Iron	Sulfate, TDS**	OP			
*16T-514**		pH, TDS	OP			
16T-534	#Arsenic, Iron, #Selenium	pH, SO_4, TDS	OP			
*16T-535**	Iron	Fluoride, pH	OP			
16T-559	#Selenium	PH	OP			
16T-606	Gross alpha, Iron, Radium	Sulfate, TDS, Tot. Hardness	**ABD** (2005)			
16T-608	#Selenium	Chloride, pH, TDS	OP			

***Notes:** * Wells sampled by DiNEH Project, 2005-2006; ** TDS estimated from conductivity values (750 uS/cm ~500 mg/l); # Indicates average of two or more values exceeds NPDWS. **Abbreviations:** ABD = abandoned; INOP = inoperative; LS = livestock-only use; OP = operating.*

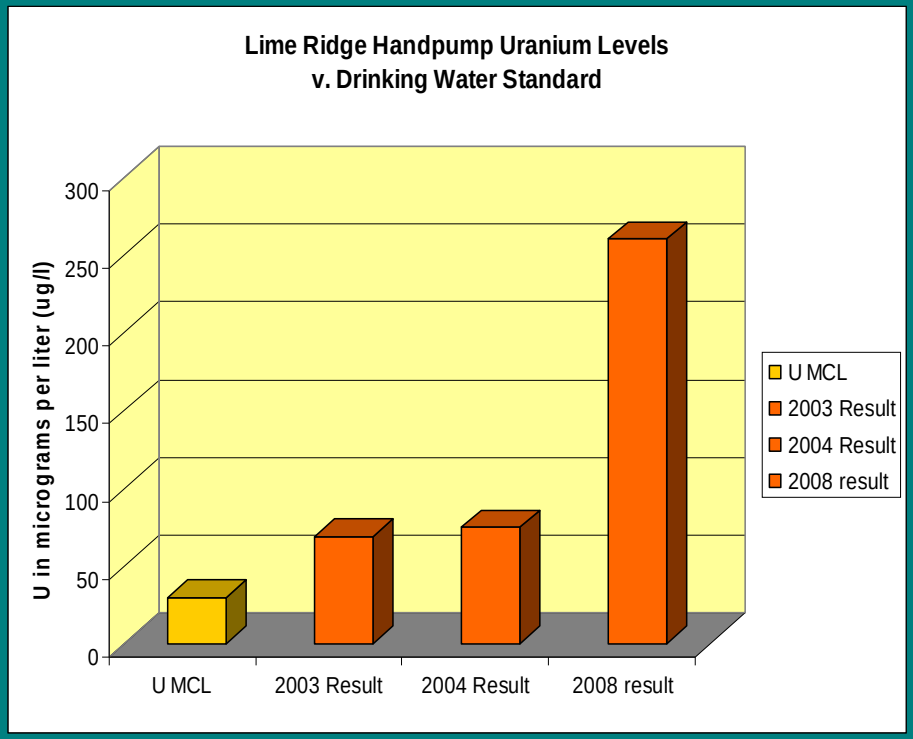
Summary of Water Quality Findings

- None of 17 water sources tested met all primary and secondary standards
- None can be recommended for human consumption
  - 3 of 17 recommended for domestic uses (cooking, bathing, etc.)
- 1 well (16T-606) exceeded primary standard for radium-226
  - windmill located <0.5 mile from Old Churchrock Mine
  - completed in same formation;
  - abandoned in 2005 at request of Churchrock Chapter
- 1 well (16-4-10) exceeded primary standard for uranium
  - Use is discouraged; local residents given health advisory
- 7 water sources suitable for livestock, another 9 are marginal for livestock watering
- Avoid human use of unregulated water sources

USEPA re-sampling, Feb. 2008:

Lime Ridge Well still contaminated

- The water in Lime Ridge Well looks good, tastes good and doesn't smell, *but it contains pollutants that are HARMFUL to human health!* These pollutants may *also be harmful to livestock*!
- Uranium —
  - *69 µg/l* in 2003, *75 µg/l* in 2004 (CRUMP); *260 µg/l* in 2008 (USEPA)
  - Drinking water standard: 30 ug/l
- Gross Alpha Radioactivity —
  - *44 pCi/l* in 2003 (CRUMP); *108 pCi/l* in 2008 (USEPA)
  - Drinking water standard: 15 pCi/l
- Radium (226+228) —
  - 1.03 pCi/l in 2003 (CRUMP); *9.6 pCi/l* in 2008 (USEPA)
  - Drinking water standard: 5 pCi/l



Warnings

- Yellow poster (right) posted at Chapter House
- Mustard-colored warning sign (below) affixed next to well

Díí baa' ádahołchįįh!

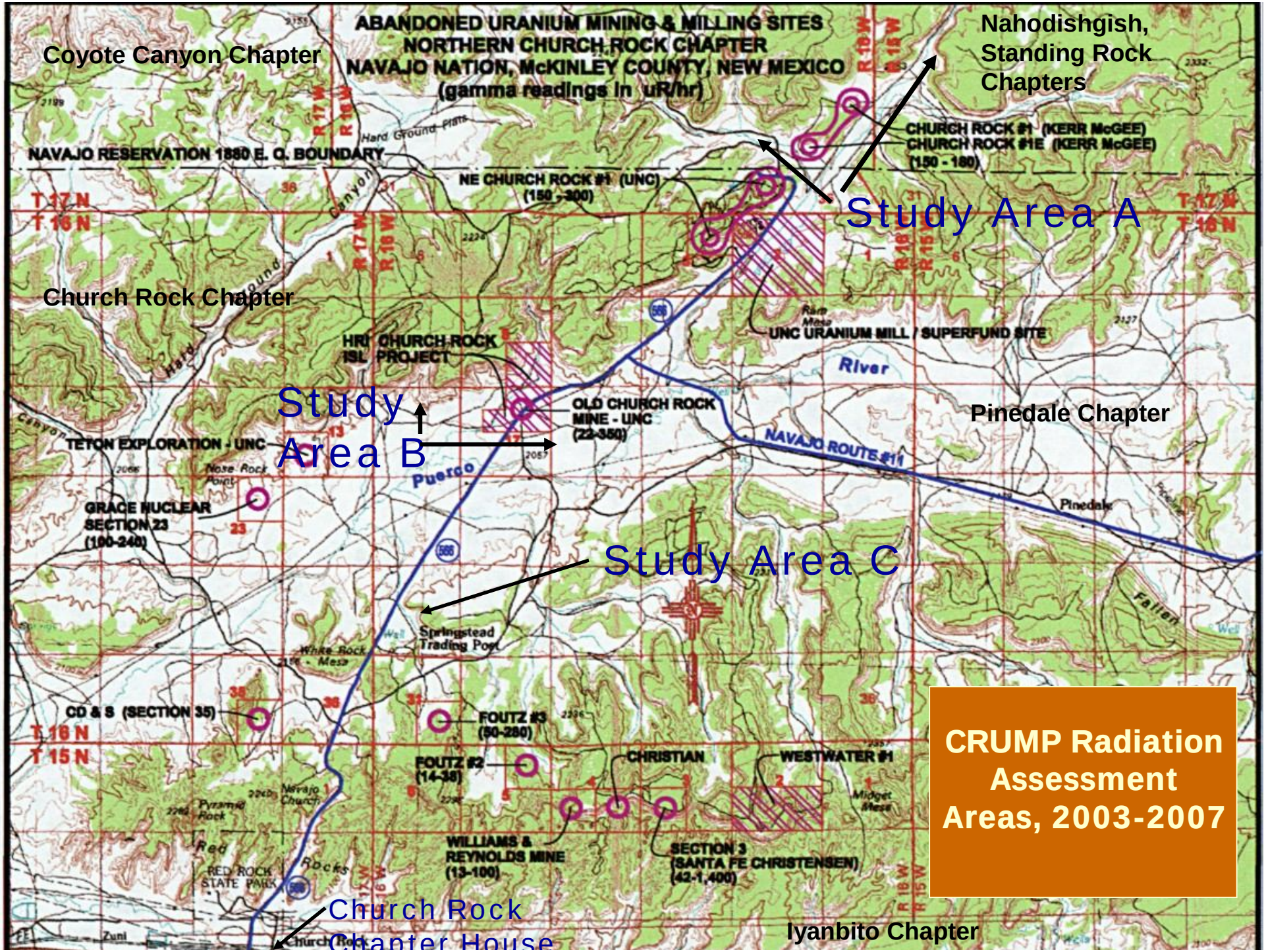
Water from Lime Ridge Handpump* (16-4-10) in Churchrock Chapter is NOT safe to drink

Uranium, gross alpha radioactivity and radium exceed drinking water standards

Advisory issued May 2008 by

Navajo Nation Environmental Protection Agency
U.S. Environmental Protection Agency Region-9
Navajo Nation Division of Health
Navajo Nation Veterinary & Livestock Program
Diné Network for Environmental Health Project
Call 928-871-7755 or 505-262-1862
or visit www.navajopublicwater.org

Navajo Nation policy is that this well is for livestock use only and is not to be used for human drinking water.


ABANDONED URANIUM MINING & MILLING SITES
NORTHERN CHURCH ROCK CHAPTER
NAVAJO NATION, McKINLEY COUNTY, NEW MEXICO
(gamma readings in uR/hr)
Coyote Canyon Chapter
Nahodishgish, Standing Rock Chapters
Church Rock Chapter
Pinedale Chapter
Iyanbito Chapter
NAVAJO RESERVATION 1880 E. O. BOUNDARY
CHURCH ROCK #1 (KERR McGEE)
CHURCH ROCK #1E (KERR McGEE)
(150 - 180)
NE CHURCH ROCK #1 (UNC)
(150 - 300)
Study Area A
HRI CHURCH ROCK ISL PROJECT
UNC URANIUM MILL / SUPERFUND SITE
Study Area B
OLD CHURCH ROCK MINE - UNC (22-350)
TETON EXPLORATION - UNC
GRACE NUCLEAR SECTION 23 (100-240)
NAVAJO ROUTE #11
Study Area C
Springstead Trading Post
CD & S (SECTION 35)
FOUTZ #3 (50-280)
FOUTZ #2 (14-38)
CHRISTIAN
WESTWATER #1
WILLIAMS & REYNOLDS MINE (13-100)
SECTION 3 (SANTA FE CHRISTENSEN) (42-1,400)
RED ROCK STATE PARK
Church Rock Chapter House
CRUMP Radiation Assessment Areas, 2003-2007

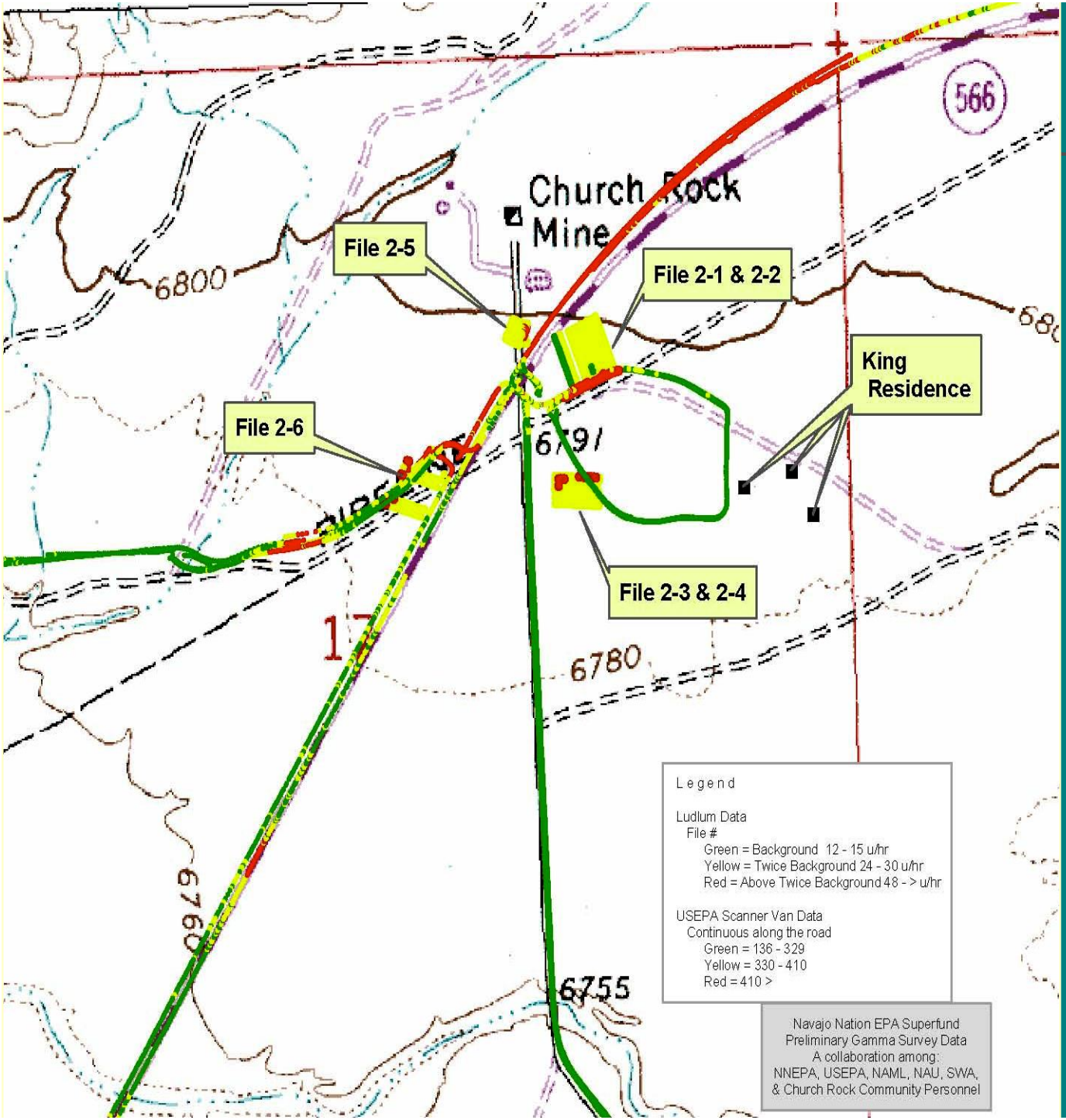
Gamma Radiation Monitoring

- 20+ people from Churchrock, Navajo Nation, SRIC, TAMS Center, USEPA participated in surface gamma surveys
  - community members trained in instrument calibration, field use, data transcription (left)
- Gamma radiation levels measured with hand-held instruments (middle and bottom left), USEPA "Scanner Van" (below) in October 2003

Instrumentation:

• Hand-held: Ludlum-19 gamma detectors, lent by NNEPA-Superfund, Navajo AML

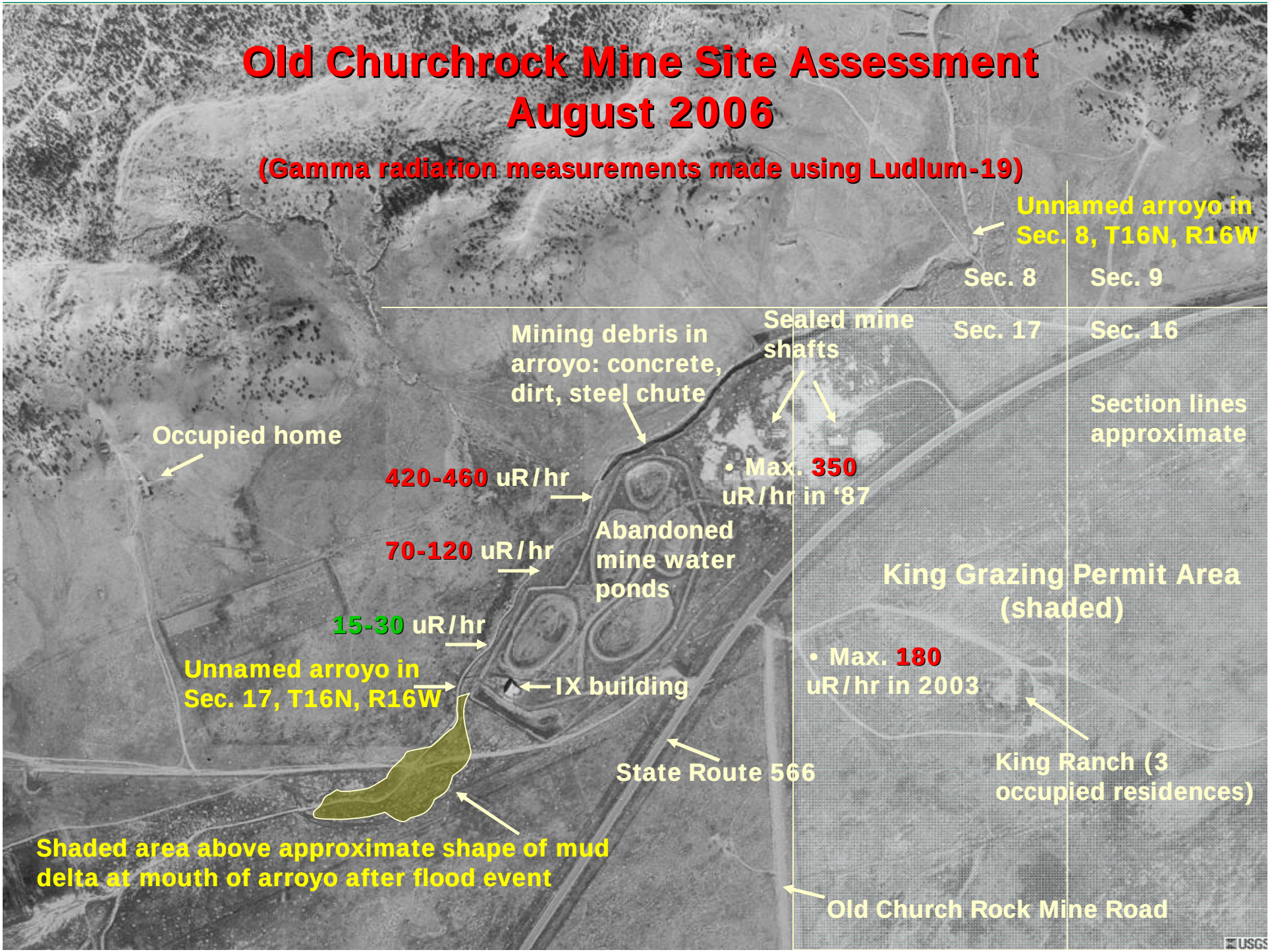
• Scanner Van: 2 Sodium-Iodide (Nai) detectors that "scan" up to 200' from truck; provided by USEPA Las Vegas lab



Study Area B: Offsite transport of contaminated mine waste

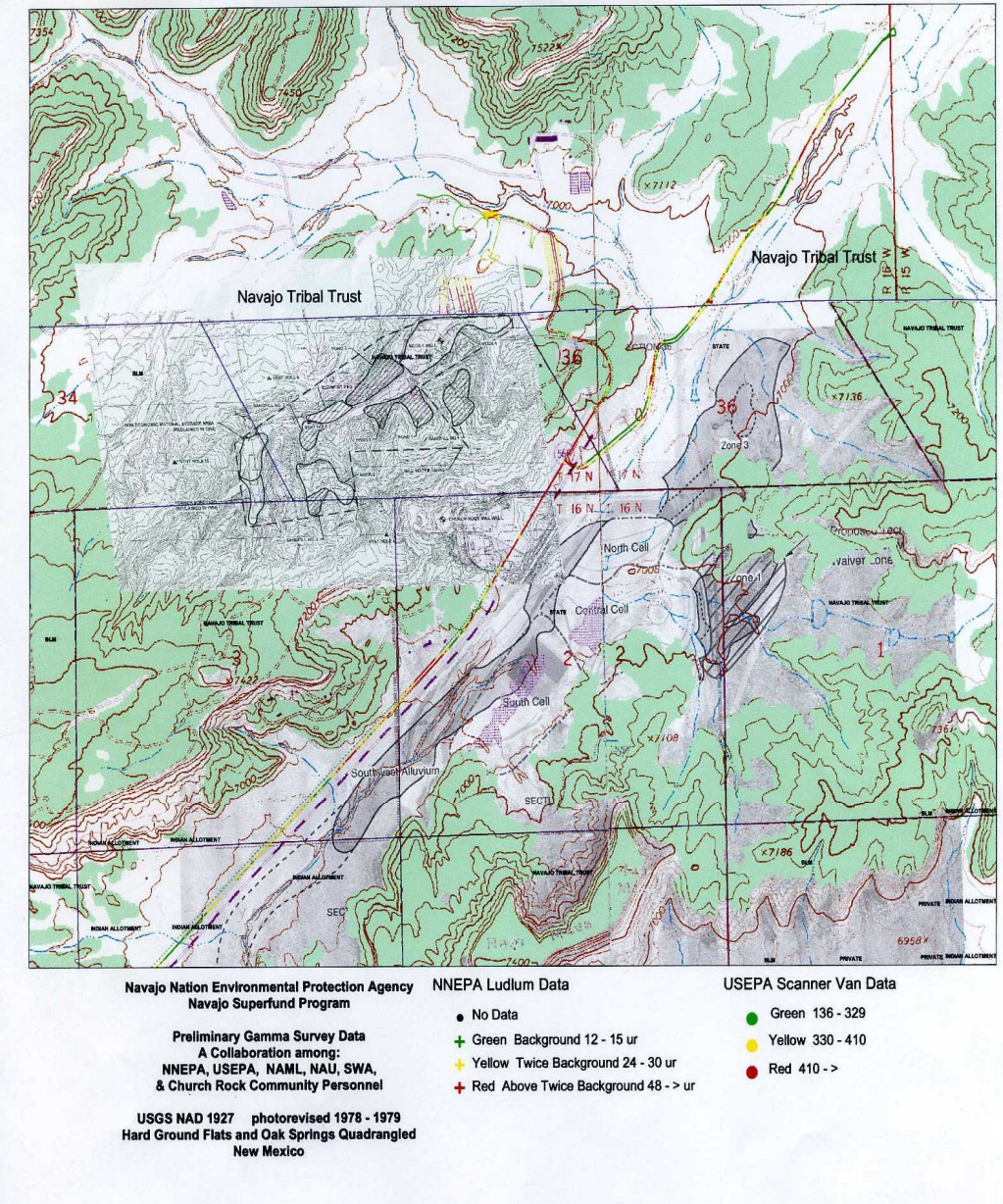
Gamma rates >2x back-ground (shown in red) indicate transport of residual mine waste from Old Church Rock Mine onto King Ranch land

Feb. 5, 2009

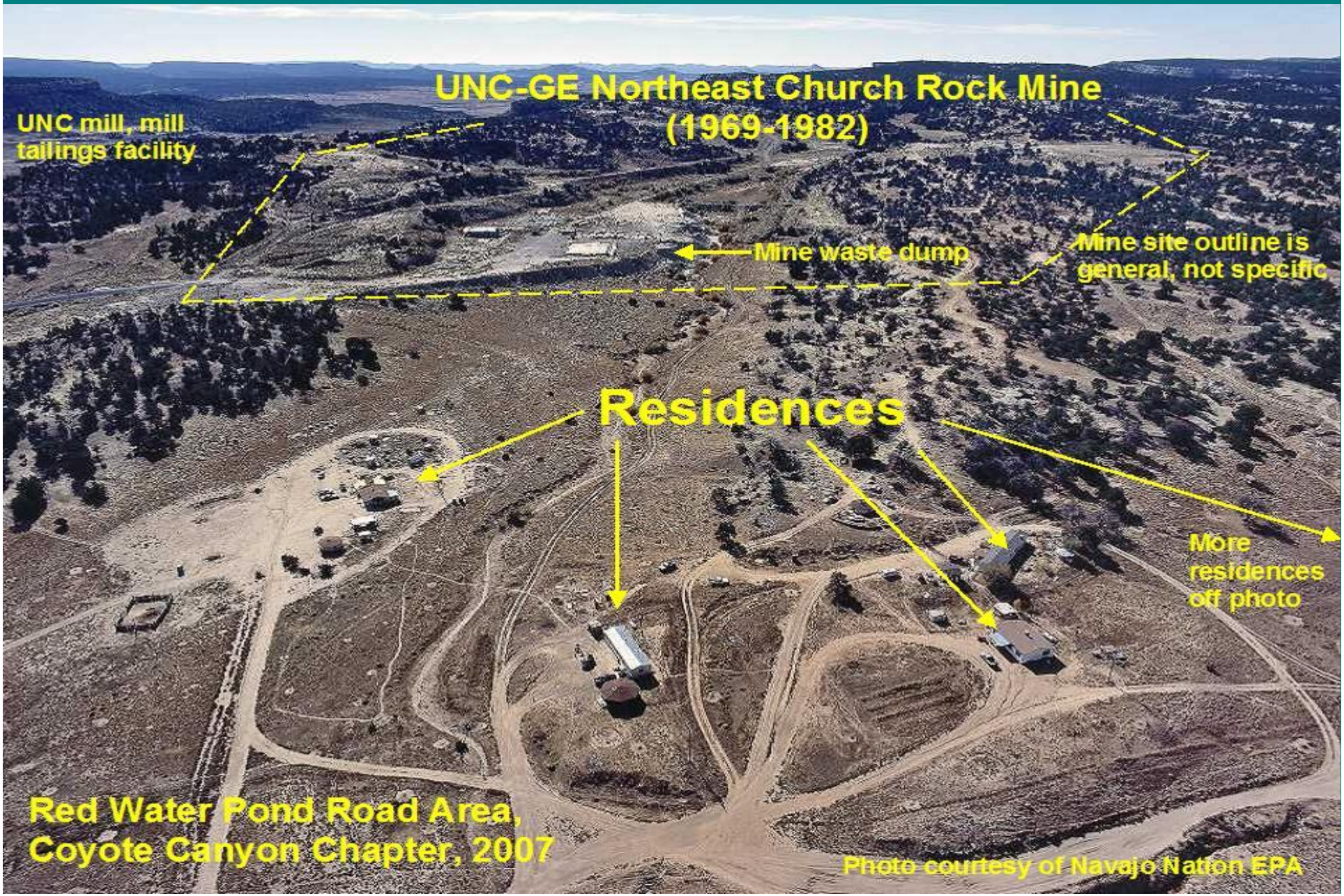

Old Churchrock Mine Site Assessment
August 2006
(Gamma radiation measurements made using Ludlum-19)
Unnamed arroyo in Sec. 8, T16N, R16W
Sec. 8
Sec. 9
Sec. 17
Sec. 16
Sealed mine shafts
Mining debris in arroyo: concrete, dirt, steel chute
Section lines approximate
Occupied home
420-460 uR/hr
• Max. 350 uR/hr in '87
70-120 uR/hr
Abandoned mine water ponds
King Grazing Permit Area (shaded)
15-30 uR/hr
• Max. 180 uR/hr in 2003
Unnamed arroyo in Sec. 17, T16N, R16W
IX building
State Route 566
King Ranch (3 occupied residences)
Shaded area above approximate shape of mud delta at mouth of arroyo after flood event
Old Church Rock Mine Road
USGS

Summary of Gamma Survey Results

- "Background," or normal, gamma rates established from Scanner Van, hand-held measurements
  - 11-13 uR/hr
- Gamma rates significantly elevated over background along State Rt. 566 from Old Churchrock Mine, past UNC uranium mill, to Northeast Church Rock mine (right)
- Surface radiation levels significantly above background detected near residences in Study Areas A and B



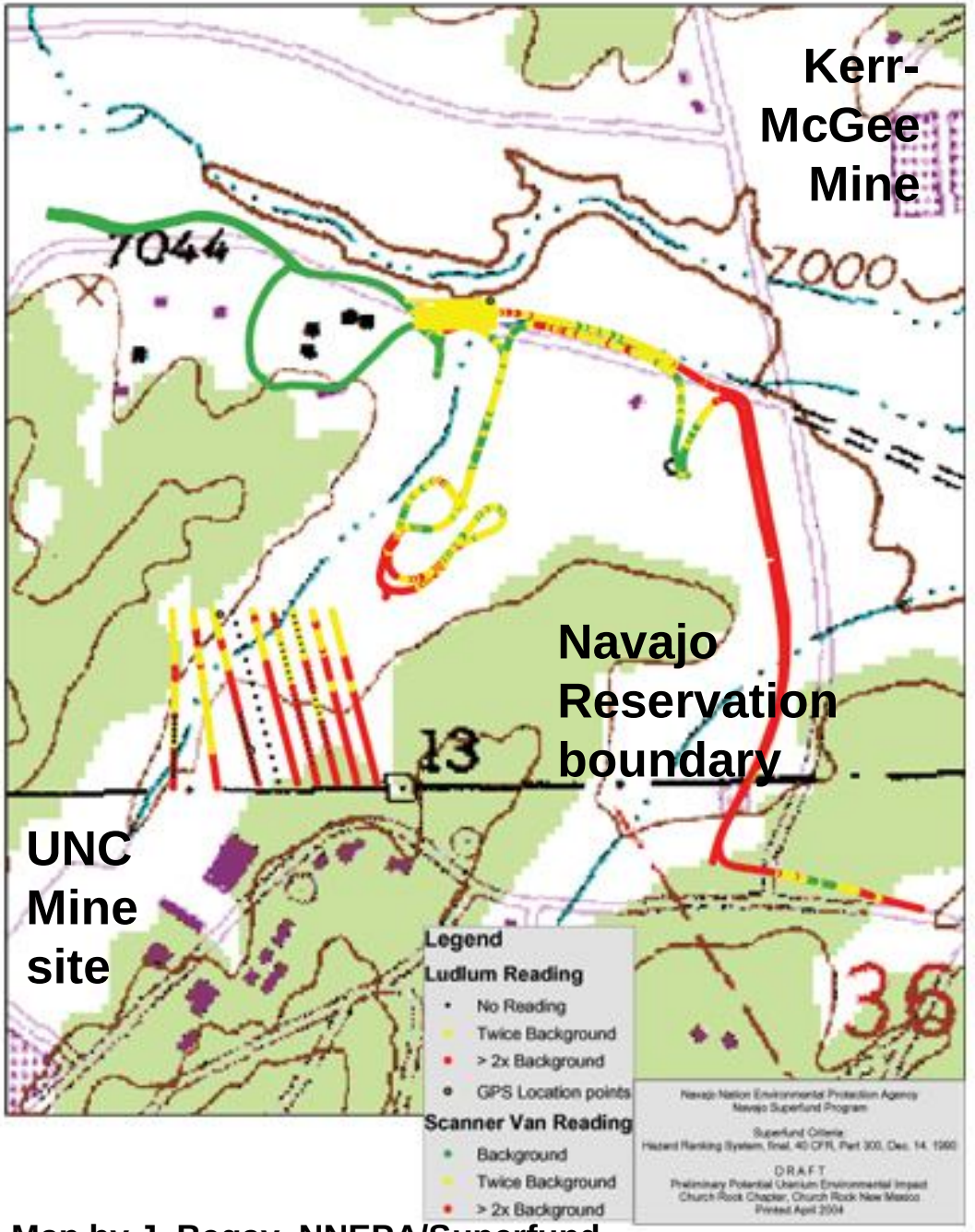
Northeast Church Rock Mine Area (Study Area A1)



Study Area A1: Map of Gamma Radiation Levels

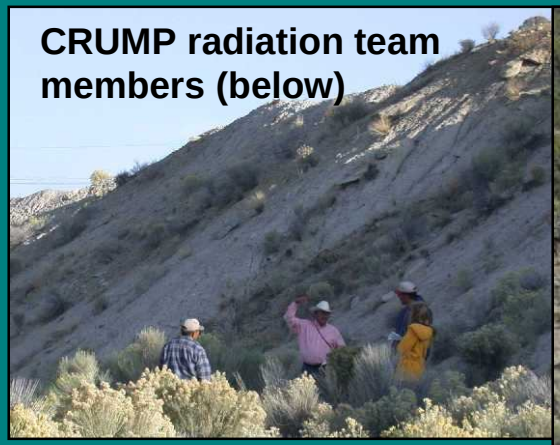
14 Navajo residences located between two abandoned uranium mines

- Gamma radiation levels >2x background shown by red dots and lines
- Gamma levels 9x to 12x above background in arroyo
- *Local kids played in arroyos sands having gamma levels 5 to 10x background!*
- Cattle, sheep drank mine discharge water

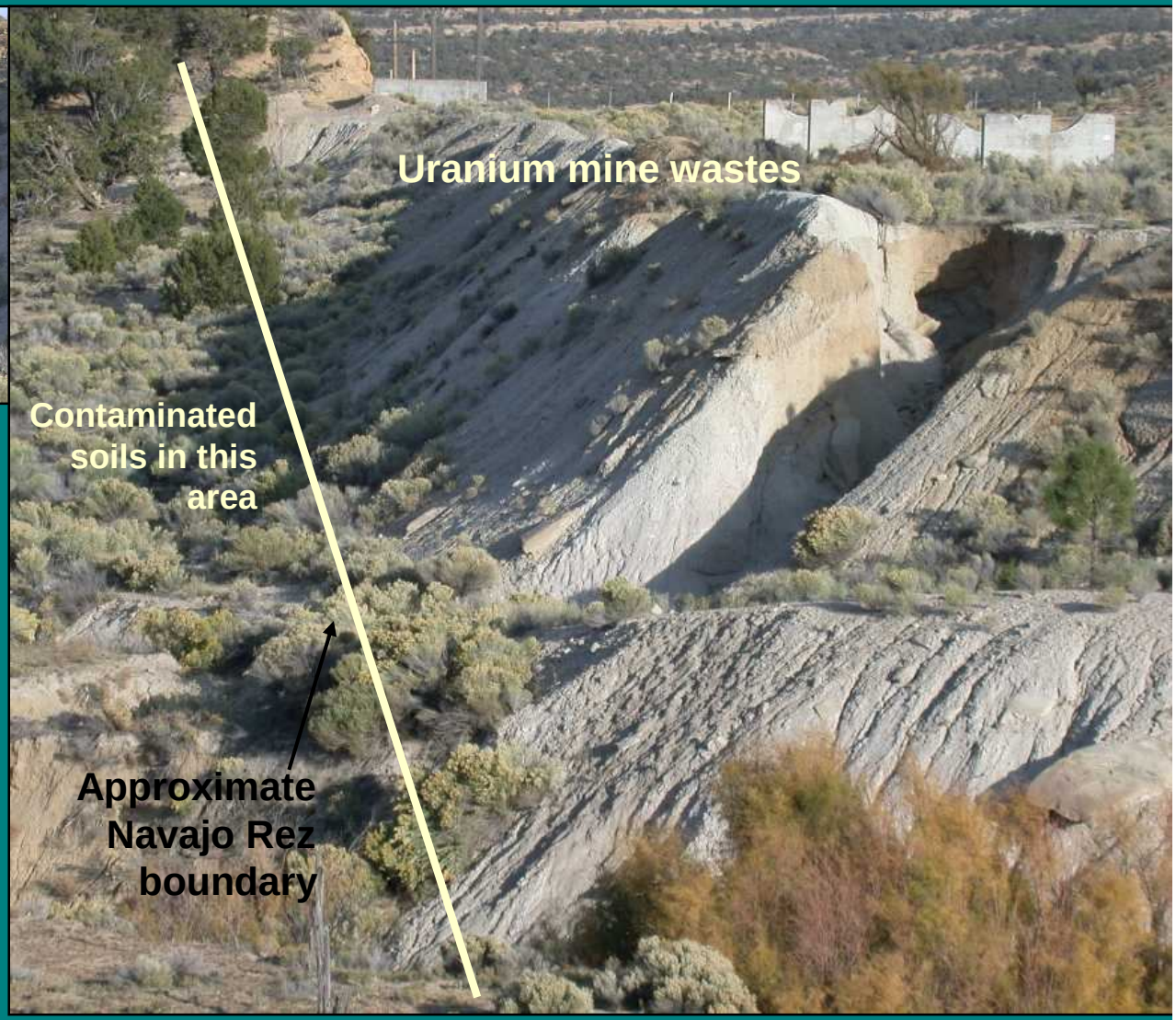


Map by J. Begay, NNEPA/Superfund

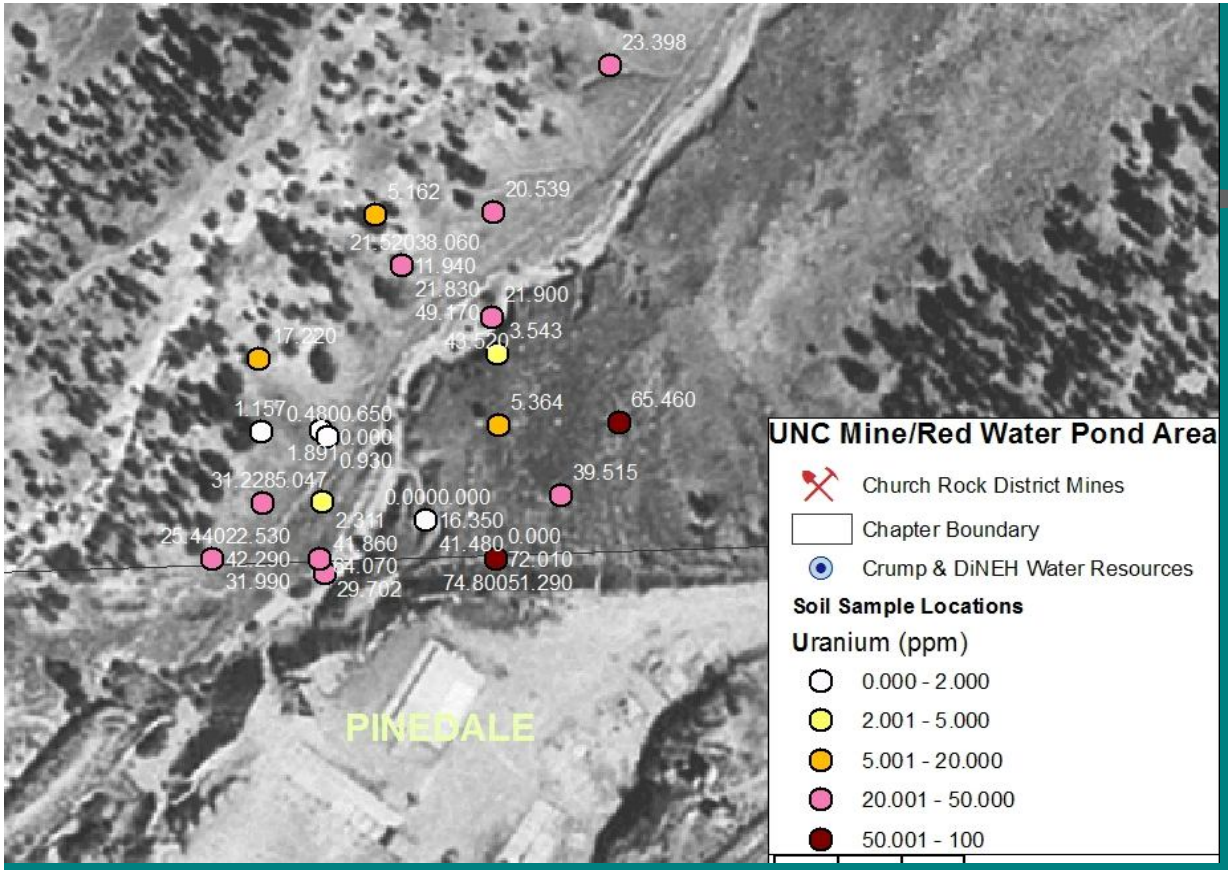
Northeast Church Rock Mine (1969-1983)



Gamma radiation levels at the base of mine-waste pile ranged up to 20x background at the Reservation line; soils contained elevated U



Soil Sampling for Uranium, Heavy Metals in Study Area A1



- Soil samples collected north of NECR Mine waste dump by Stanford Univ. student C. George, December 2004 and August 2005
  - 74% (37 of 50) samples > 5 ppm, which is upper limit of “background”
  - 58% (29 of 50) samples > 16 ppm, which is USEPA’s Preliminary Remediation Goal for cleanup of contaminated soils around residences
  - Uranium levels *increased* with depth in soil column
  - Uranium levels *decreased* with distance from mine waste dump

Uranium and Radium in Soils in Churchrock Area:

Non-Impacted v. Impacted Sites

Sampling Sites	# Samples	Range U in Soils (ppm)	Median (ppm)
Sites NOT or POSSIBLY impacted by uranium mining	**68**	**0.3-2.61**	**0.74**
Red Water Pond Road IMPACTED sites (soil depths, 2”-12”)	**38**	**0.3-88.7**	**16.8**
Red Water Pond Road IMPACTED sites (soil depths, 18”-36”)	**12**	**0.48-72.0**	**31.8**
COMPARISON TO REGULATORY LEVELS AND BACKGROUND			
% Samples > USEPA PRG for U in residential areas (16 ppm)	56%		
% Samples > maximum local background (2.61 ppm)	74%		
USEPA soil sampling in RWPR Road residential area, Nov. 2006	**263**	**Radium-226:** <0.5-857 **pCi/g**	**Mean = 30.7 pCi/g**

Reclamation, Regulatory Issues

- CRUMP gamma surveys, uranium-in-soil studies prompted responses by USEPA, NNEPA
- May 2007: USEPA removed nearly 6,000 cubic yards of radium-contaminated soils from around residences (upper left)
  - Soil removal may not be sufficient for long-term protection of public health
- 2007-2009: Reclamation of NECR mine site (lower left)
  - Goal of community, Navajo Nation is complete removal of mine wastes from tribal trust land

Indoor Radon Monitoring

- 7-day radon canisters placed in 150 homes in Feb.-March ’04; valid results from 143 homes
  - 36 homes (~25%) had Rn levels greater than the USEPA “action level” of 4 pCi/l-air
  - Action level carries lifetime lung cancer risk equivalent to smoking 1-2 packs of cigarettes per day
  - 29 homes (~20%) had Rn 2-4 pCi/l
- Estimated 80% of homes with high Rn located on outcrop of uranium-bearing rock formation
- Mitigation measures shared with residents; retests anticipated in 2007

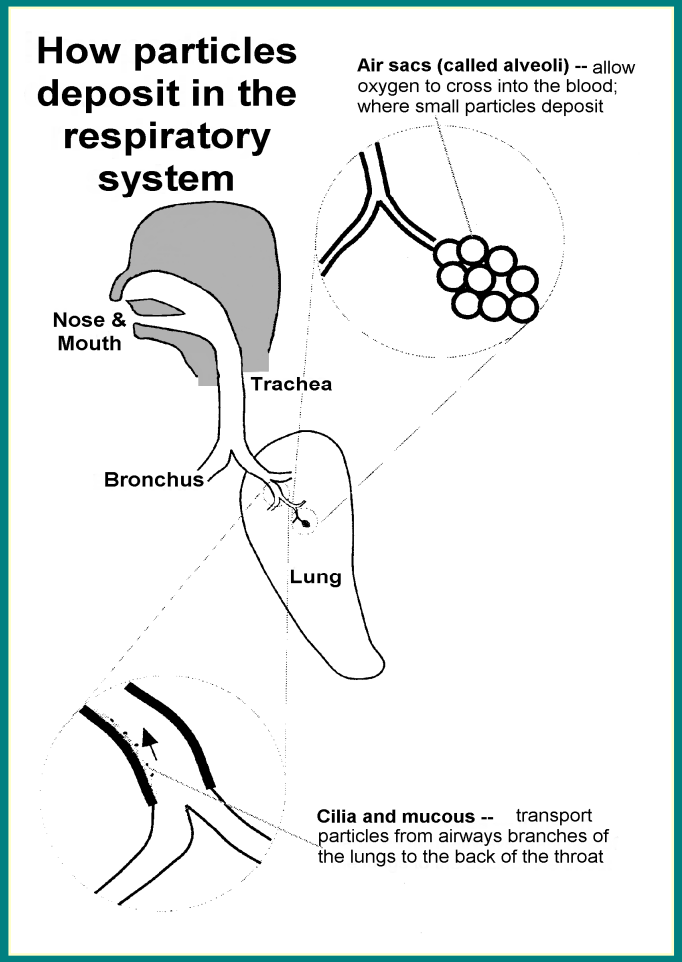
John Plummer, NNEPA Radon Program, shows Pipeline Road resident the charcoal inside a radon canister

Radon Facts:

- Decay product of naturally occurring uranium (U-238)
- Released from soils, rocks
- Second-leading cause of lung cancer in U.S., according to USEPA

Air Particulate Monitoring (Dust)

- Tiny dust particles irritate lungs, make breathing problems worse; can lead to more severe respiratory disease
- Dust may be contaminated with radioactive elements that occur naturally or from mines, mills
- People living near uranium mine wastes more likely to be exposed



Air Particulate Monitoring (cont'd)

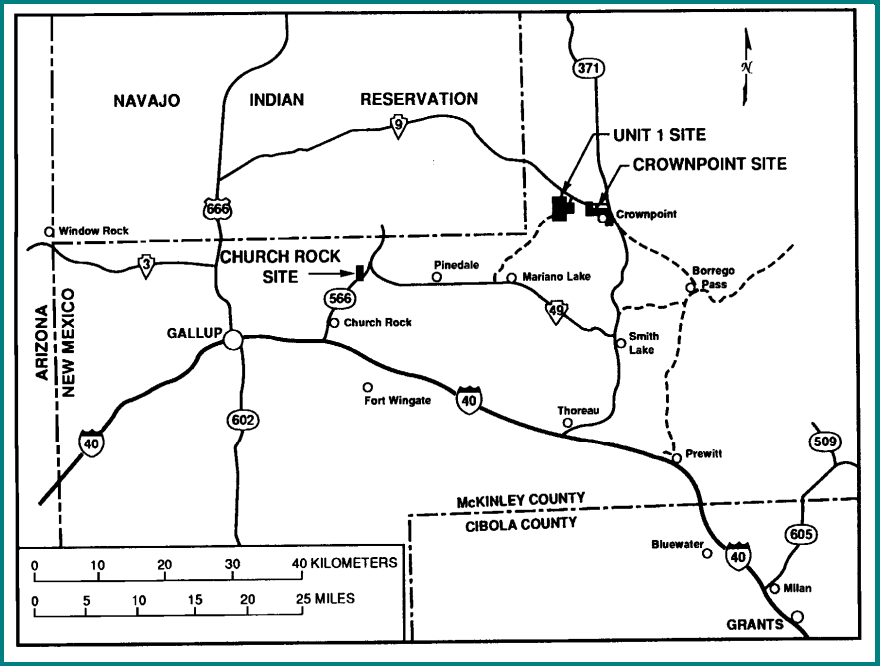
- Monitoring began May 2006
- Two sites: Red Water Pond Road, Pipeline Canyon Road close to residences, abandoned mines
- Compare dust levels with federal particulate limits
  - Through December 2008, highest 24-hr concentration was 15% of national air quality standard for particulate matter
- Requesting USEPA-LV lab analyze 10% of filters for radionuclides
- Develop, validate predictive model of inhalation exposure

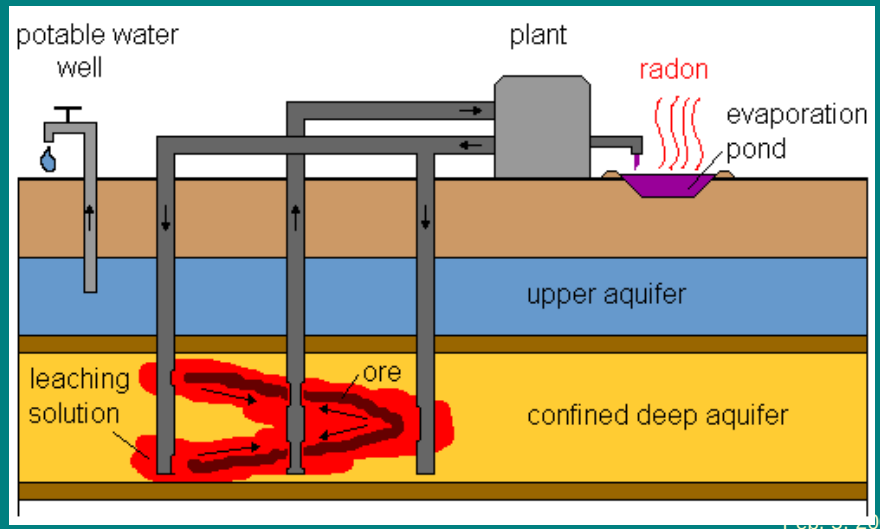
CRUMP Recommendations

- Remove all mine wastes from Northeast Church Rock Mine site, which is tribal trust land
- Extend radiation surveys to residential areas in Churchrock not assessed by CRUMP, and to other chapters in Eastern Agency
- Retest homes with high radon levels in Churchrock area
- Continue, expand air monitoring in residential areas near mines
- Replace contaminated wells with new wells that tap high-quality aquifer in Eastern Navajo Agency
- Waxman Hearings Follow-up:
- Federal Government should create and fund abandoned uranium mines cleanup program
- Provide funds for health studies approved by Navajo Nation

Hydro Resources Inc. Uranium Project

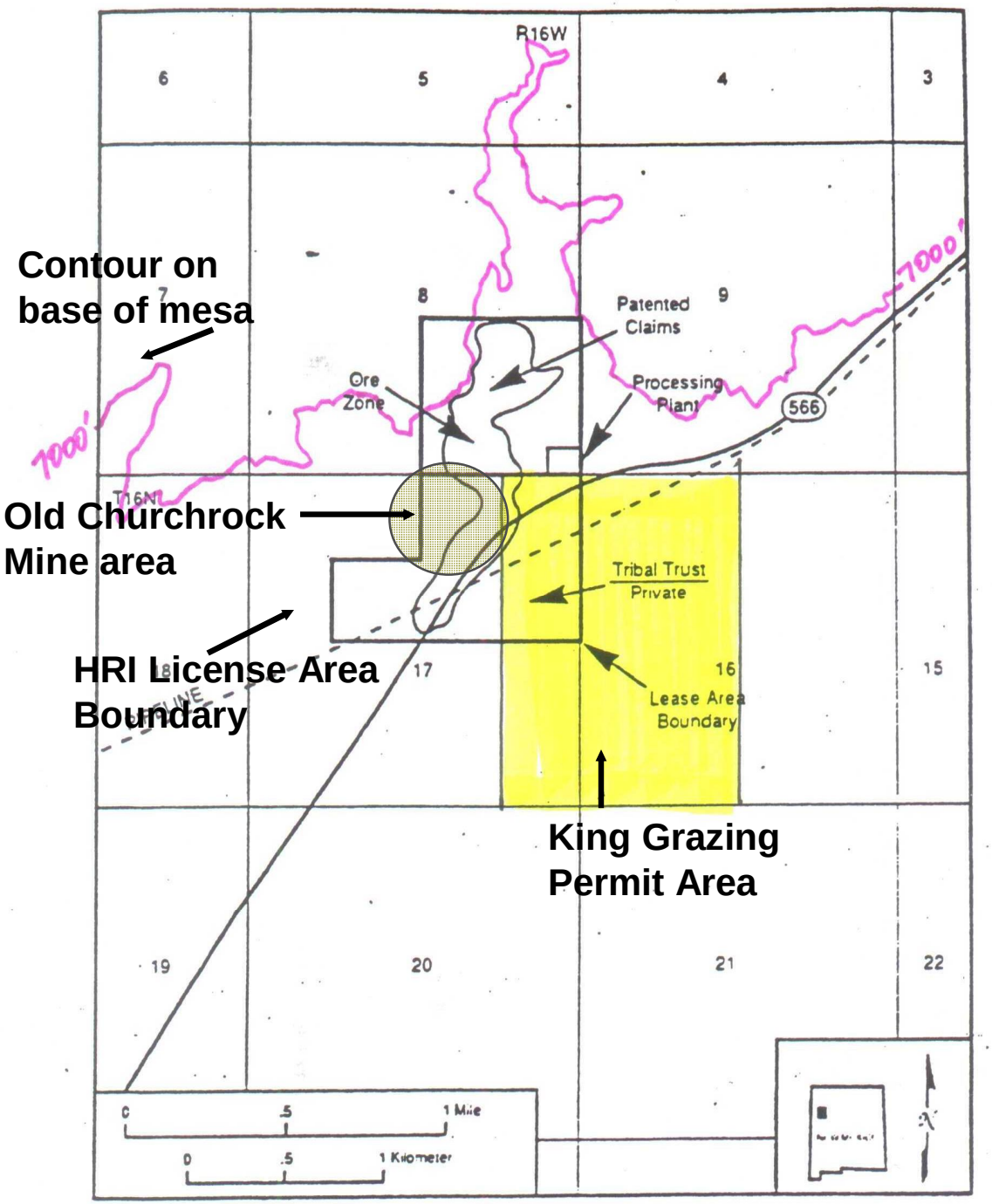
- First proposed in 1988
- 4 separate ISL mine units:
  - Churchrock Section 8
  - Churchrock Section 17
  - Unit 1 Allotted Lands
  - Crownpoint Plant
- 1995: ENDAUM, SRIC, two Pinedale residents intervened in NRC hearing on HRI's license application
- 2000, 2003: Churchrock Chapter resolutions opposing HRI mine
- 1998-2006: administrative hearing before NRC





HRI Churchrock Site

- *SE-1/4 Sec. 8*
  - *160 acres*
  - *private surface*
  - *patented mine claims, subsurface*
- *NE-1/4+ Sec. 17*
  - *~200 acres*
  - *Tribal trust surface; valid grazing permit*
  - *patented mine claims, subsurface*
- *Part of Crownpont Uranium Project*
- *Licensed by NRC '98*
- *Hearing on license, '98-'06*



Current Status of HRI Project

- ENDAUM's appeal of HRI's NRC license still pending in 10th Circuit Court of Appeals
- Navajo Nation DOJ warned HRI in letter in June 2006 that the Navajo Nation intends to "vigorously enforce" the Diné Natural Resources Act, which prohibits uranium mining and processing in "Navajo Country"
- No decision by 10th Circuit Court of Appeals on EPA's determination that Section 8 is "Indian Country"
  - Churchrock Chapter supported Indian Country designation
  - Several residents made comments by video recordings
- Uranium Resources, Inc. (URI), HRI's parent company, closed its Albuquerque office in Dec. 2008