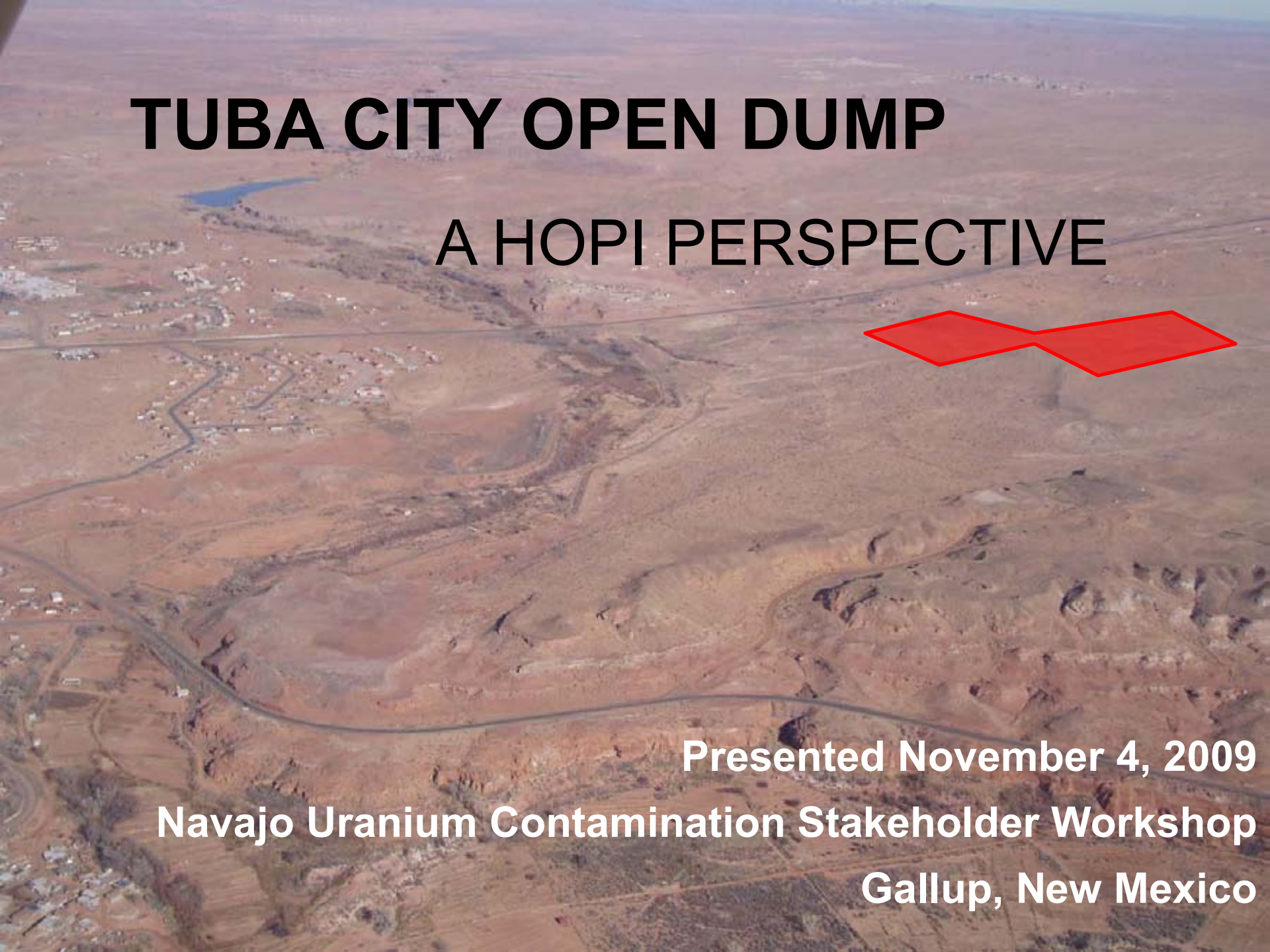


TUBA CITY OPEN DUMP

A HOPI PERSPECTIVE

Presented November 4, 2009

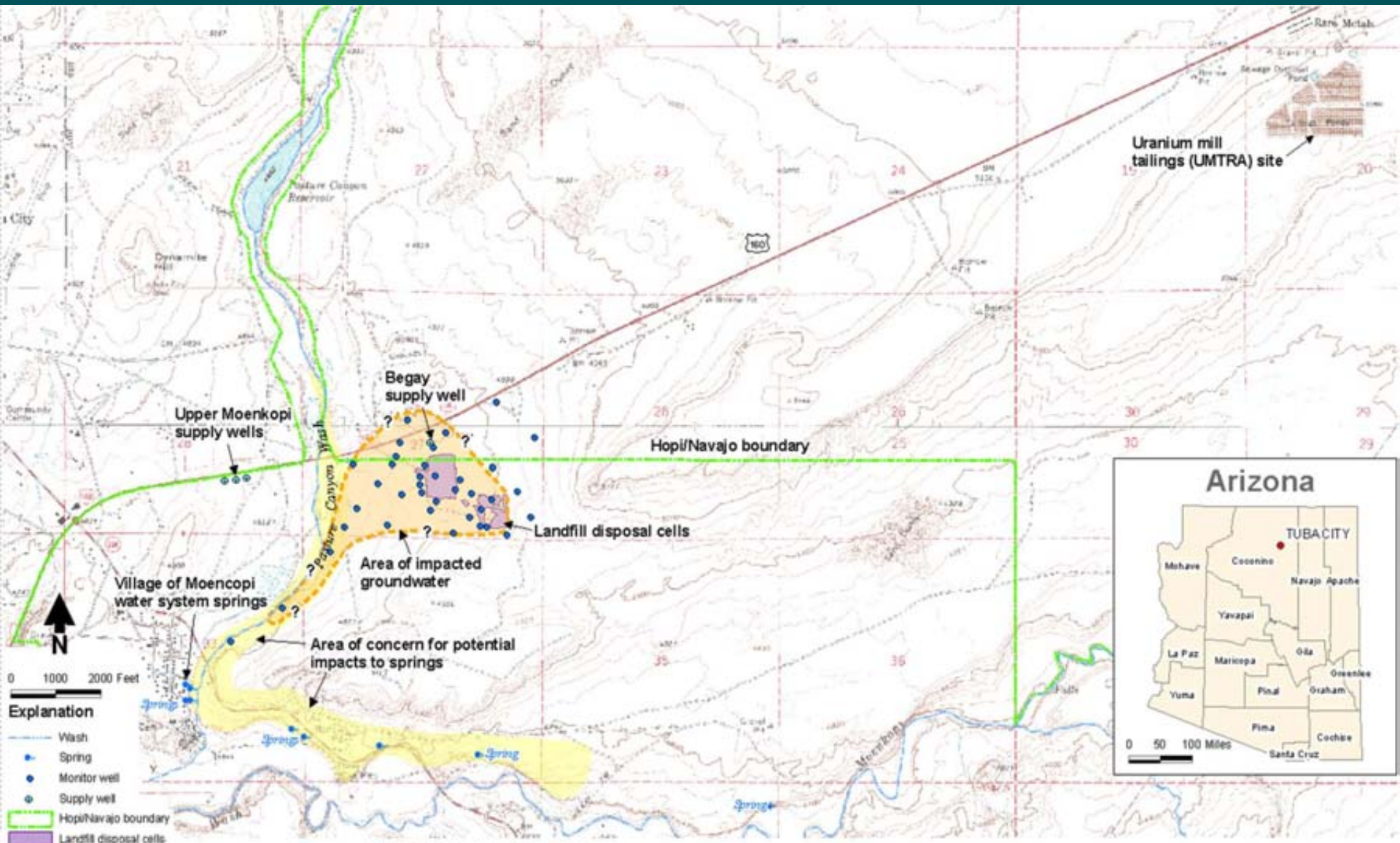
Navajo Uranium Contamination Stakeholder Workshop

Gallup, New Mexico

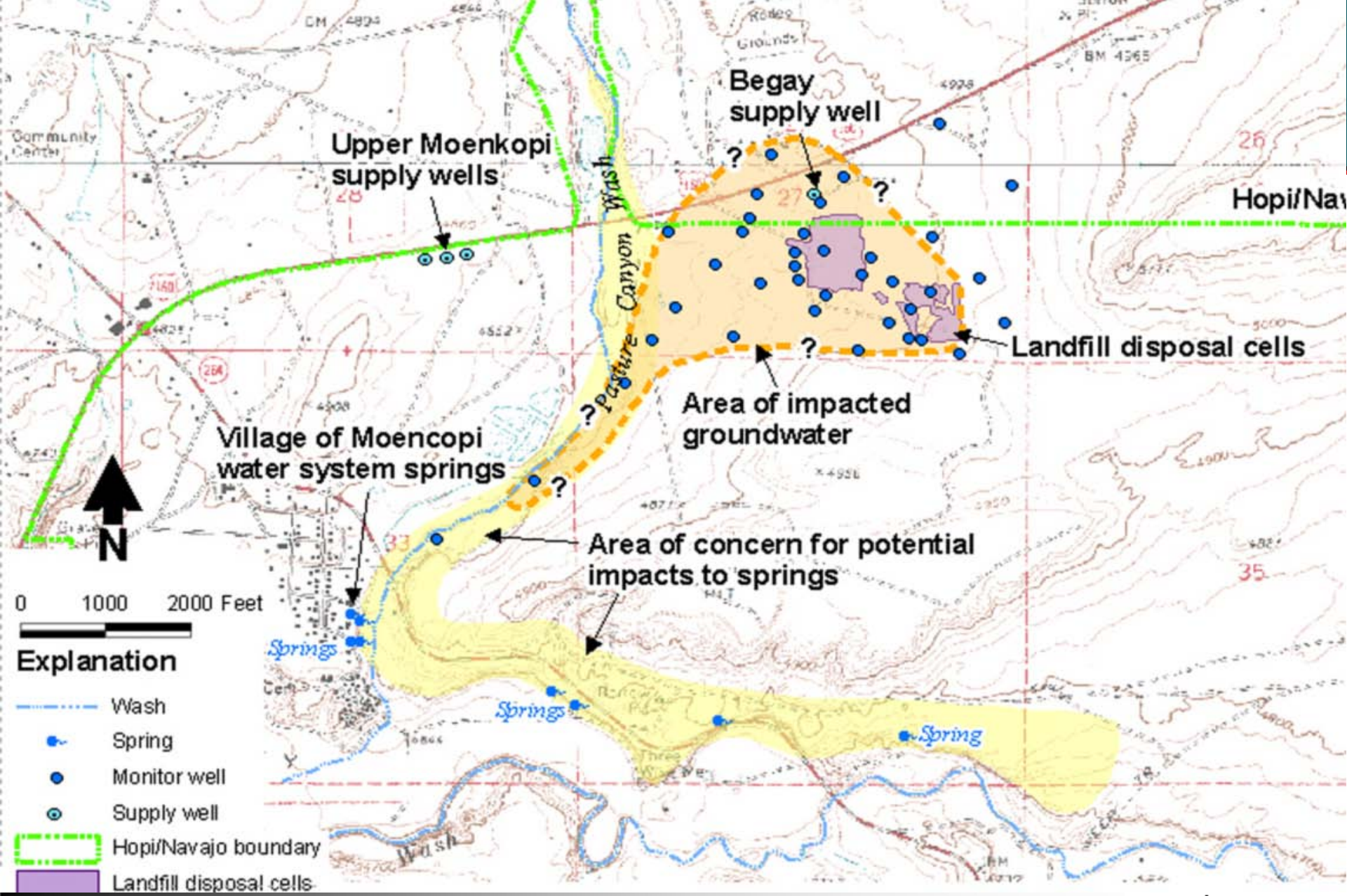
Site Background

- 1950s to1990s - Dump opened and operated by the Bureau of Indian Affairs (BIA)
  - Land withdrawn from the Navajo Reservation
  - Dumping generally unregulated and unsupervised
- 1950's to 1980's - Old waste cells (10-acres) active
- 1980's to 1997 - New waste cells (20-acres) active
- 1997 - Waste disposal ended in 1997
  - Surface debris consolidated and covered
  - New cells fenced

Site Location Map



Sources: 1. Modified from Moenkopi and Tuba City, Arizona 7.5 minute USGS topographic maps, 1969
2. Hopi/Navajo boundary based on map provided by Hopi Geographic Information Systems (boundary approximate)



Tuba City Open Dump

THE HOPI TRIBE

Aquifer is Sole Drinking Water Supply

- Dump overlies aeolian sands and Navajo Sandstone
- Drinking water supply wells for the Village of Upper Moenkopi are completed in Navajo Sandstone and underlying Kayenta Formation (N-Aquifer)
- Drinking water spring for the Village of Moencopi discharges from the N-Aquifer
- Springs provide irrigation water in areas downgradient from the landfill
- No alternate drinking water supply is readily available to serve needs of community

Groundwater Contaminant Plume

- N-aquifer water table is shallow
  - 6 to 26 below ground
  - Dump waste cells extend to the water table
- Uranium mobile in geochemical conditions
  - Groundwater is oxidizing keeping uranium ions in solution
- Contaminant Plume Migration
  - Uranium exceeds MCL 4,000 feet downgradient
  - Plume is near water supply sources (influenced by supply well capture zone)
  - Low-level organics in leachate and downgradient wells
  - Stormwater runoff from exposed waste continues

Groundwater Quality Results

Parameters exceeding the drinking water Maximum Contaminant Level (MCL) include:

Arsenic	Chloride
Lead	TDS
Selenium	Nitrate
Gross alpha	Sulfate
Vanadium	Total coliforms
Uranium	

Strontium elevated, but no MCL

Evidence of Uranium Mill Waste Dumping at TCOD

- Rare Metals Uranium Mill operated 1956 to 1967
- Testimony of residents
  - Trucks brought waste from mill day and night
  - Children played with “marbles” (mill balls)
- Striking similarity of groundwater quality impacts at TCOD and the Rare Metals Mill
- Studies by the Hopi Tribe, USGS, and BIA geochemist have all concluded that TCOD groundwater contaminants are the result of uranium mining or mill sources

Common Uranium Mill Impacts

- Typical groundwater impacts by uranium mill tailings:
  - Non-radioactive derived from ore: selenium, arsenic, molybdenum, vanadium
  - Process by-products: chloride, nitrate, sulfate
  - At TCOD:

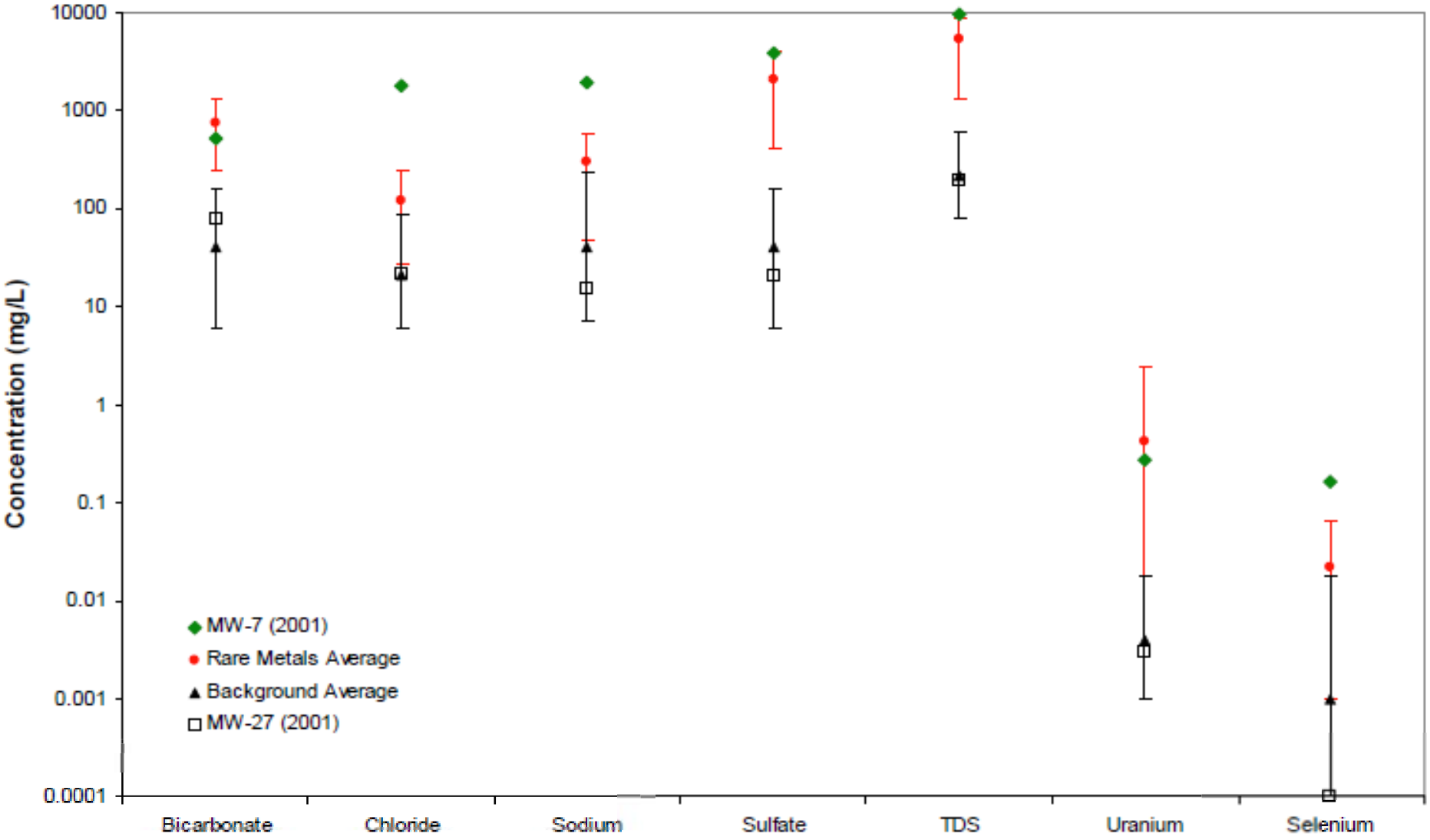
Constituent	MW-27 N-Aquifer Background	MW-7 Impacted by Leachate
Molybdenum (µg/L)	ND (<8)	24
Selenium (µg/L)	15	139
Uranium (µg/L)	8.9	232
TDS (mg/L)	690	7,100
Sulfate (mg/L)	220	2,700

TCOD and Rare Metals UMTRA Site Contaminant Concentrations

Similar Water Quality in Groundwater Contaminant Plumes		
Contaminant	**Tuba City Open Dump**	**Rare Metals Median UMTRA**
Selenium	158 µg/L	96 µg/L
Uranium	240 µg/L	404 µg/L
Sulfate	3,590 mg/L	2,257 mg/L

Source: USDOE, 1998, Environmental Assessment of Ground Water Compliance at the Tuba City Uranium Mill Tailings Site

Water Quality Comparison of TCOD Background and Plume to Rare Metals



Hopi Tribe and Villages of Upper Moenkopi and Lower Moencopi want:

- Clean closure – all waste removed from site for disposal in a permitted facility
- Groundwater cleanup
- Closure plan and site restoration in accordance with regulatory requirements
- Expedited action after non-compliance over 10 years

Recommendations for Interim Actions

- Water supply testing should be frequent until groundwater corrective action is completed
- Contaminants near Upper Moenkopi supply wells should be investigated
  - Sentinel well WP-1S has uranium twice MCL
- Groundwater remediation must occur immediately
  - Contain and treat contamination
- Moenkopi supply wells are safe; but alternatives for replacement or improvement should be evaluated
- Limited waste removal may be considered prior to full clean closure to remove all waste

Conclusions and Recommendations

- Technical evidence shows:
  - Dump is not in compliance with RCRA
  - Contaminant plume has migrated 4,000 feet
  - Plume is near water supply sources
  - Failure to contain the plume threatens springs used for drinking water and irrigation
- Immediate remedial action needed to contain the groundwater plume and treat water
- Process to select final closure method can proceed while action is taken on groundwater cleanup
- Water supply testing should continue to ensure safety

Tuba City Open Dump Closure

Questions/Discussion?

Hopi Water Resources Program

Hopi Environmental Protection Office