Current LM Sites

Sites in LM as of January 31, 2016, Requiring LTS&M

- UMTRCA Title I
- UMTRCA Title II
- CERCLA/RCRA

Site Category
- Category 1 activities typically include records-related activities and stakeholder support
- Category 2 activities typically include routine inspection (any site visit needed to verify the integrity of engineered or institutional barriers) and monitoring/maintenance, records-related activities, and stakeholder support
- Category 3 activities typically include operation and maintenance of active remedial action systems, routine inspection (any site visit needed to verify the integrity of engineered or institutional barriers) and monitoring/maintenance, records-related activities, and stakeholder support

D/P = Disposal/Processing
DR = Decommissioned Reactor

U.S. DEPARTMENT OF ENERGY Legacy Management
Summary of LM Involvement on Navajo Nation Land

- DOE has responsibility for four Navajo Nation sites
  - Mexican Hat, Utah, Disposal Site
  - Monument Valley, Arizona, Processing Site
  - Shiprock, New Mexico, Disposal Site
  - Tuba City, Arizona, Disposal Site
- DOE and the Navajo Nation work together through Cooperative Agreements
- Active groundwater remediation occurs at the Tuba City, Arizona, and Shiprock, New Mexico, sites
- Groundwater compliance strategies are reviewed annually with the Navajo Nation to track progress toward meeting cleanup standards
Tuba City, Arizona, Disposal Site

Rich Bush, LM UMTRCA Program Manager

Navajo Division of Natural Resources Summit 2016
Presentation Overview

- Frequently asked questions
- Site history
- Current operation
- Options for future site activities
- Future community engagement opportunities (meetings to gather input)
Frequently Asked Questions

- Is the water safe for my family and my animals?
- Is my family being exposed to radiation?
- How will the land be used?
- How will the options affect the water, air, and surrounding land?
Tuba City Site History

- Cold War legacy
  - Military veterans
  - Uranium mining and milling
- Tuba City operations
- Groundwater contamination at the site due to site operations
- Uranium Mill Tailings Radiation Control Act (UMTRCA) cleanup regulations
  - Relationship between the U.S. Nuclear Regulatory Commission and DOE
Tuba City Site History
Site Groundwater Impacts and Cleanup Efforts

- **1956–1966**: Process water in unlined ponds
- **1966–1989**: Contamination from ponds reaches groundwater
- **1978**: UMTRCA law
- **1983**: EPA regulations
- **1980s**: Groundwater and archaeological studies at Tuba City
- **1999**: Groundwater Compliance Action Plan
- **1988–1990**: Surface contamination consolidated
- **1990**: Disposal cell complete
- **2002–2014**: Distillation treatment
- **2014–present**: Evaporative treatment

- Mill operations
- No onsite activity
- Remedial action laws, site studies, plans
- DOE LM cleanup actions
Tuba City Disposal Cell Cross-Section

- 6-inch-thick small riprap layer
- 12-inch-thick large riprap layer
- 6-inch-thick bedding layer
- 42-inch-thick low-permeability radon barrier
- Contaminated materials
- Existing tailings surface
- Existing tailings
- 1,400 feet
- Vertical exaggeration not to scale
- 3% to 4% slope
Site Accomplishments

- Waste isolation completed
  - Disposal cell stopped exposure to radiation and eliminated risks from exposed tailings
  - Stopped contaminated pond water at the site from seeping into the ground
- Groundwater contamination at the site addressed through active cleanup
- Since 2002, treated more than 400-million gallons of water, removing 850 pounds of uranium
- Continued commitment to protect human health, animals, and the environment
  - Monitoring and treatment are ongoing
- Collaboration with Navajo and Hopi governments and communities
Groundwater Contamination Stability

Uranium plume

- Concentration change minimal
- Plume moving very slowly
- Still located mainly beneath the former processing site ponds
- 104 monitoring wells
  - Sampled twice per year (summer, winter)
- 37 extraction wells
Groundwater Flow Model

- Helps predict where groundwater will move over time
- Groundwater moving very slowly
  - Determined using 20 years of groundwater monitoring data
- Can be used to predict effects on contaminants due to pumping
  - Improve groundwater extraction strategy
Current DOE LM Activities to Address Site Groundwater Contamination

- Distillation plant is in safe standby
- Pumping from extraction wells to the evaporation pond
  - Approximate current pumping rate: 10 gallons per minute
    - Pumping from the most concentrated part of the plume
  - Pumping rate during summer months: 15 gallons per minute
- Almost as effective as the treatment plant for removing contaminants
- DOE LM considering options for addressing groundwater contamination
Developing Options

What are we trying to do?
- Reduce risks to human health and environment
  - Meet regulatory requirements
  - Consider community’s concerns
    - Moenkopi Wash important resource

How?
- Clean up contamination; or
- Implement protections

Develop options based on:
- Community input
- Experience, site knowledge, judgment, innovation
All options included long-term monitoring and measures to prevent exposure to humans and livestock.

<table>
<thead>
<tr>
<th>Options Under DOE Consideration</th>
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<tbody>
<tr>
<td><strong>Option A</strong></td>
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<tr>
<td>- No groundwater extraction</td>
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<tr>
<td>- Long-term monitoring and</td>
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<tr>
<td>institutional controls</td>
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<td>- Protections to help prevent</td>
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<td>exposure to humans and</td>
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<td>livestock</td>
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<td><strong>Option B</strong></td>
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<tr>
<td>- Groundwater extraction</td>
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<td>- Treatment (distillation)</td>
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<td><strong>Option C</strong></td>
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<tr>
<td>- Groundwater extraction</td>
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<td>- Treatment (filtration)</td>
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<td>- Return of clean water to</td>
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<td>aquifer</td>
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<tr>
<td><strong>Option D</strong></td>
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<tr>
<td>- Groundwater extraction</td>
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<tr>
<td>- Evaporation of clean water</td>
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<tr>
<td>from the pond</td>
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</table>
Long-Term Monitoring with ICs

- All options include
  - Long-term monitoring
    - Groundwater sampling and analysis
      - Compliance wells
        - Used to ensure appropriate water quality standards are met (where in use)
      - Agricultural-use wells
        - Used to meet Navajo Nation standards where livestock are present
    - Sentinel wells
      - Used to show how groundwater is moving (allows LM to see if additional action is needed)
  - ICs
    - No groundwater use on the middle terrace
    - Groundwater can be used for agricultural purposes on the lower terrace

- Authority and responsibility for ICs
ICs Considered for Tuba City

- ICs used where contaminated water is present
  - Control areas determined by sampling and modeling results
  - Navajo Nation helping DOE LM keep people and animals safe

- Examples:
  - Land use restrictions (preserve greasewood stand on middle terrace)
  - Limited use of groundwater (livestock watering on lower terrace)

- ICs successful at many sites
Proposed ICs Area
Institutional Controls

Mark Kautsky, LM Site Manager

Navajo Division of Natural Resources Summit 2016
What Are Institutional Controls (ICs)?

ICs are mechanisms used to protect human health and sensitive, environmental resources

- **Administrative controls** maintain historic documents which inform current and future stakeholders of potential hazards and risks at a legacy site
- **Physical controls and practices** that minimize the potential for human exposure to contamination
- **Environmental controls** that protect environmental resources

Site plan for the Shiprock disposal site
Why Do We Need ICs?

- No restrictions would leave contaminated groundwater accessible, which could lead to negative consequences (e.g., drilling water wells for domestic and livestock use)
  - Propose drilling restrictions through a well-permitting process
  - Limit access to contaminated soil through land-use and planning processes

Perimeter fence at Shiprock disposal cell
Examples of ICs on Tribal Lands

- Care and custody agreement with the Navajo Nation
  - Limits disposal cell access

- Grazing restriction on the Shiprock site floodplain
  - Prevents possible contamination pathway through livestock to human consumption

- Informational and restriction signs at each site
  - Provides notice of potential hazard

- Well applications for designated areas are screened with assistance from the Navajo Nation Water Code Administration
  - Prevents exposure to contaminated groundwater
Shiprock Site
Status of ICs

Layout of groundwater recovery system
Shiprock Site
Status of ICs (continued)
Participation with the Navajo Nation

Outreach

Angelita Denny, LM Site Manager

Navajo Division of Natural Resources Summit 2016
Participation with the Navajo Nation

Navajo Nation Abandoned Mine Lands/Uranium Mill Tailings Remedial Action (NN AML/UMTRA)

- Cooperative agreement for support
  - Independent oversight
  - Conducts inspections of DOE’s sites
- Collaborate on Navajo Nation outreach events
- Provides more complete information for the public

Window Rock, Arizona
Participation with the Navajo Nation

Five-Year Plan: “Federal Actions to Address Impacts of Uranium Contamination on Navajo Nation”

- Participating agencies
  - U.S. Department of Energy
  - U.S. Environmental Protection Agency
  - Bureau of Indian Affairs
  - U.S. Nuclear Regulatory Commission
  - Indian Health Service
  - Agency for Toxic Substances and Disease Registry
  - NN AML/UMTRA
  - Navajo Nation Environmental Protection Agency
  - Navajo Nation Department of Health
Participation with the Navajo Nation
Five-Year Plan Community Outreach

- DOE has significantly increased outreach with Navajo Nation
- Opportunity for dialog
- Input on concerns and options
- Community outreach liaison position established
  - Frances Totsoni
  - Office with NN AML/UMTRA in Window Rock, Arizona
Participation with the Navajo Nation
Internships and Outreach Activities

- Internships
  - Diné College
  - University of Arizona

- Recent interactions
  - NN/Hopi/DOE quarterly meetings
  - Chapter House meetings
  - Western Agency Council meeting
  - Navajo Nation Division of Natural Resource Summit
  - Fairs and public events
Participation with the Navajo Nation

Schedule for Future Interactions

- **Tuba City Public Meeting**
  April 6, 2016
  6:00/7:00 p.m. to 10:00/11:00 p.m. (Arizona Time/Daylight Savings Time)
  Moenkopi Legacy Inn, Tuba City, AZ

- **Navajo Nation Five-Year Plan Community Outreach Meeting**
  April 8, 2016
  Goulding’s Lodge, Monument Valley, UT

- **Monument Valley Uranium Issues Open House**
  April 9, 2016
  9:00 a.m. to 4:30 p.m.
  Monument Valley High School Gymnasium, Monument Valley, UT
Summary

Dr. April Gil, LM Environment Team Leader

Navajo Division of Natural Resources Summit 2016
Discussion
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