Quivira Mines Site Recommended Cleanup Alternative

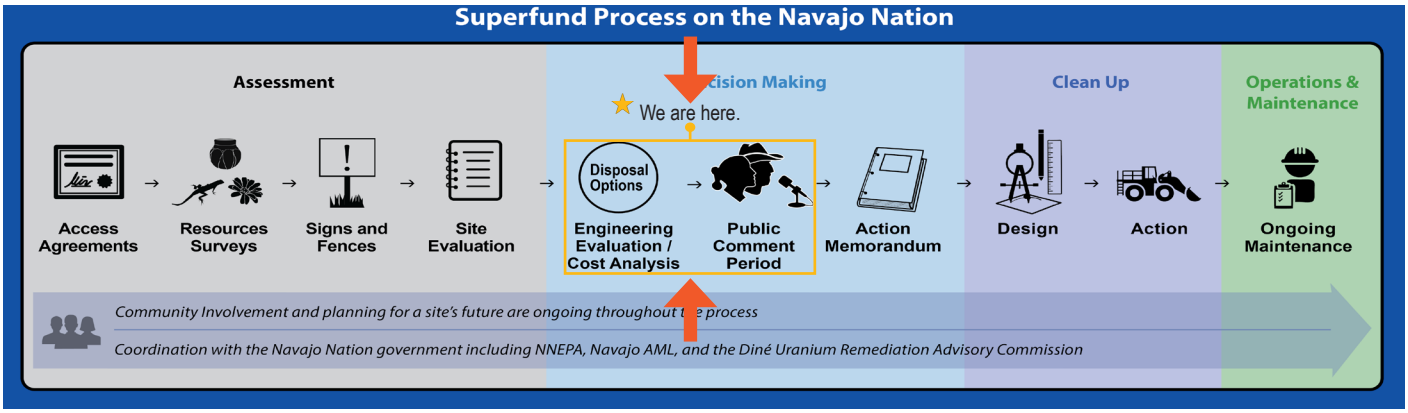
U.S. Environmental Protection Agency • Region 9 • San Francisco, CA • March 2024

The U.S. Environmental Protection Agency (U.S. EPA) and Navajo Nation EPA (NNEPA) are asking for your feedback on the recommended alternative and haul route in the Engineering Evaluation and Cost Analysis (EE/CA) for the Quivira Mines Site. A 60-day public comment period will begin March 23, 2024 and extend through May 22, 2024. A public meeting will be held on March 23, 2024 at the University of New Mexico, in Gallup.

What is in this fact sheet?

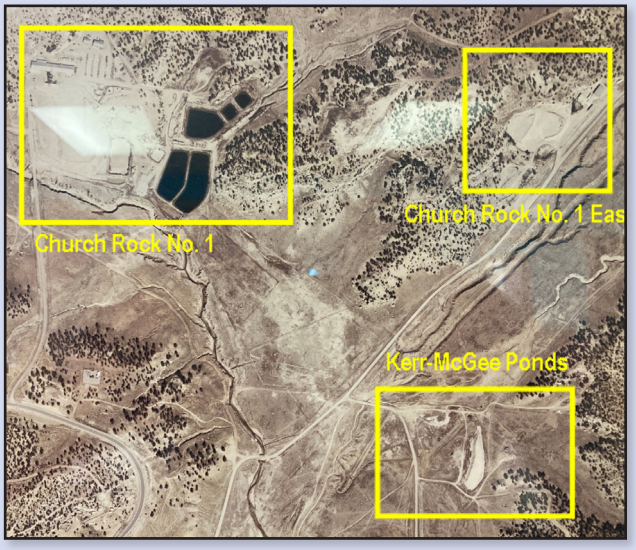
- EE/CA Process Overview
- Site Information
- Risk Assessment
- Development of Cleanup Alternatives
- Evaluation and Comparison of Cleanup Alternatives
- Community Participation
- Next Steps and Further Information

Where are we in the Cleanup Process?



What is an EE/CA?

- Summarizes information about site contamination and past cleanups.
- Identifies areas and waste volume to requiring cleanup.
- Develops cleanup alternatives that are safe for Navajo and the environment.
- Evaluates and compares effectiveness, implementability, and cost of cleanup alternatives.
- Recommends a cleanup alternative and asks for community input.



Historic Aerial Photograph of Quivira Mines Site

What is low-level mine waste and how much is there at the Quivira Mines Site?

- Low-level mine waste is the leftover sand and small rocks from the mines that contains uranium and radium that poses a risk to human health and the environment.
- Church Rock No.1 Mine (CR-1) has about 929,200 cubic yards.
- Church Rock No.1 East Mine (CR-1E) has about 49,300 cubic yards.
- Kerr McGee Ponds (KMP) have about 27,000 cubic yards.
- Total waste volume is approximately 1,005,500 cubic yards.

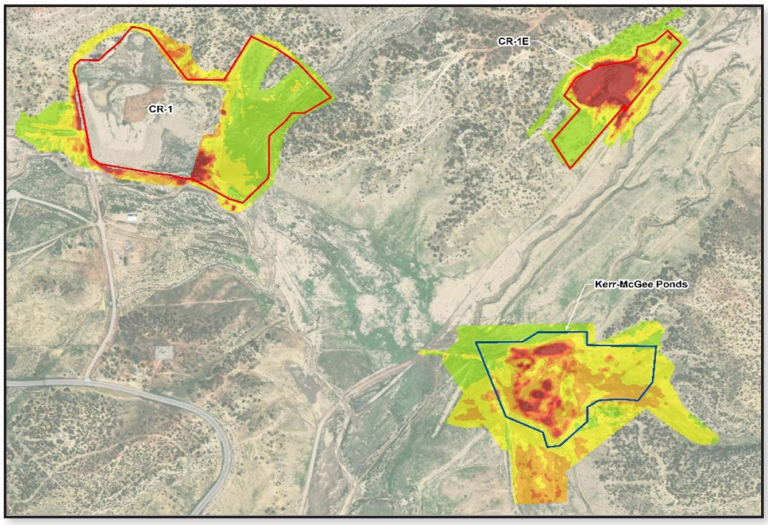
Response Actions Previously Taken at Quivira Mines

- 1980 to 1982: Quivira Mining Company reclamation of the former KMP on United Nuclear Corporation (UNC) property.
- 1985 to 1989: Quivira Mining Company reclamation of CR-1 and CR-1E included removals of mine dewatering pumps; mine equipment including hoists, compressors, headframes, and generators; buildings; and foundations.
- 2010: Rio Algom performed time-critical removal action (TCRA) which repaired fences, graded and seeded the western slopes of the CR-1 waste pile, installed sediment control structures at CR-1, and repaired mine access roads, the bridge over the arroyo, and Red Water Pond Road.
- 2012: Rio Algom performed TCRA which excavated 17,374 cubic yards of contaminated soil, placed excavated materials onto the waste rock stockpile at CR-1, reconstructed the road and shoulder area between State Road 566 and Unnamed Arroyo #2, and revegetated disturbed areas.
- 2017: U.S. EPA removed approximately 10,000 cubic yards of contaminated soil surrounding the openings of five ventilation shafts and the Arroyo Bridge abutments.
- 2023 to 2024: U.S. EPA constructed stormwater detention basin, erosional control berms and channels, surface erosion controls, and repaired erosional features.

Site Investigation

Between 2010 and 2023, field investigations performed by Rio Algom and USEPA at the Quivira Mines included the following:

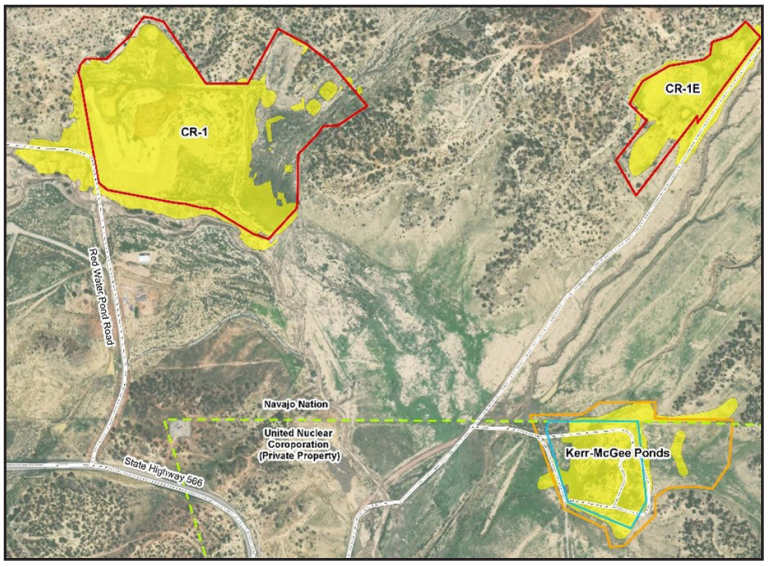
- Archaeological and biological surveys.
- Gamma scanning and soil sampling around CR-1, CR-1E, Kerr McGee Ponds and arroyos to assess cleanup extent.
- Background study to find natural levels of uranium and radium.
- Soil characteristics testing for cleanup design development.
- Long-term soil moisture study to assess how deep water migrates into soil after snowmelt and monsoon rains.
- Site inspections and maintenance of erosion controls.



Radium-226 Contamination Extent

Navajo-Specific Risk Assessment

- Identified risks for human and ecological receptors at Quivira Mines requiring a removal action to cleanup mine waste and contaminated soil.
- Radium-226 and uranium are the human health contaminants of concern; while radium-226, uranium-234, and uranium-238 are contaminants of ecological concern.
- Cleanup to background levels for residential use on the Navajo Nation.
- Cleanup soils to levels protective of workers for Kerr-McGee Ponds on United Nuclear Corporation lands.
- The proposed removal action covers 63 acres at the Quivira Mines. About 1 million cubic yards of mine waste and contaminated soil will be addressed.



Remaining Quivira Cleanup Areas

U.S. EPA evaluated cleanup alternatives based on three criteria:

Effectiveness is how well the cleanup alternative works. It must:

- Protect human health and the environment;
- Meet federal and state laws; and
- Work in the long- and short-term.

Implementability includes how easy it would be to do the cleanup alternative. To figure that out, U.S. EPA looked at:

- Methods available;
- Materials available (such as effective soil/ clay) to build;
- Work force available; and
- Getting the right permits and approval.

Cost is an estimate of how much money the cleanup alternative will need. It includes:

- Planning and design of the cleanup alternative;
- Conducting the cleanup alternative; and
- Maintaining the cleanup alternative.

Cleanup Alternatives Evaluated in EE/CA

Alternative	Alternative Name	Description
1	**No Action**	No action to address the risks would be taken at the site.
2	**Consolidate Waste, Blend into Landscape, and Cap On Site**	Excavate waste, haul to a common location, consolidate and cap the waste. An evapotranspiration (ET) cap would be placed on top of the waste to prevent direct contact and limit contaminant migration. The capped waste would be inspected and maintained regularly in perpetuity.
3	**All Waste Removed and Disposed of at Proposed Red Rocks Facility**	Excavate waste and then haul waste off site to the Red Rocks Disposal Facility near Thoreau, New Mexico for disposal. Off-Navajo Nation disposal is protective and would not require long-term onsite maintenance.
4	**All Waste Removed and Disposed of at Deer Trail, Colorado**	Excavate waste and then haul waste to the Clean Harbors landfill in Deer Trail, Colorado for disposal. Off-Navajo Nation disposal of waste is protective and would not require long-term onsite maintenance.

Other Disposal Locations Considered But Not Evaluated in EE/CA

Alternative	Reason for Exclusion
Carlsbad/WIPP	The waste isolation pilot plant (WIPP) can only receive highly radioactive radionuclides, not waste rock from uranium mining.
Fort Wingate	Disposal of non-defense waste are not allowed at defense facilities under 10 United States Code 2692.
Bureau of Land Management (BLM)	Evaluated multiple sites with BLM and state of New Mexico, but no sites were identified that required cleanup and could also accept a large volume of waste rock.
Uranium Mill Tailings Radiation Control Act (UMTRCA) Sites (former uranium mills)	Several sites were evaluated but found not to be viable options because they were closed, had insufficient capacity to receive the waste, or had groundwater contamination issues that could prohibit disposal under U.S. EPA's Off-Site Rule.
White Mesa Mill	While currently an acceptable facility under U.S. EPA's Off-Site Rule, groundwater contamination issues raised concerns for long-term facility management.

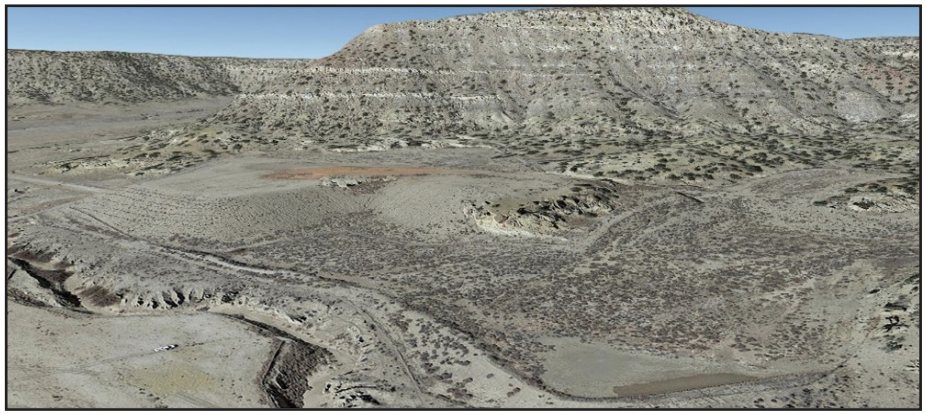
Alternative 2: Consolidate Waste, Blend into Landscape, and Cap Onsite

Details

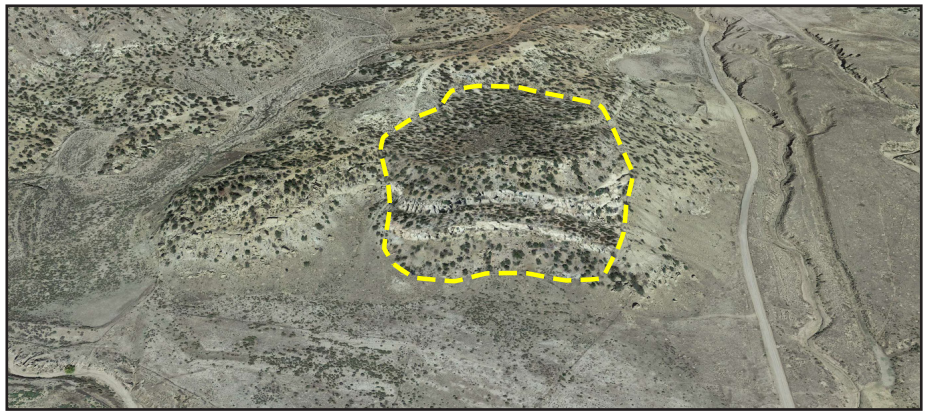
- Dig up and move waste away from current location and the community.
- Place waste in Canyon Repository and contour to match surrounding landscape.
- Protect the waste from erosion with an engineered ET cap and control drainage.
- All site excavation and construction areas will be tested to confirm cleanup goals are met.
- All site excavation and construction areas will be backfilled with local soil as needed and revegetated with native plants.
- The restored areas will be inspected each year and damage repaired as needed.
- Final land uses:
  - Residential uses at CR-1 and CR-1E
  - Continued facility worker use at KMP on UNC lands
  - Possible grazing on cap at Canyon Repository
  - No homes or crops on cap at Canyon Repository

Considerations

- Earliest to start cleanup and no lengthy permitting needed
- Design for 1 year and construction for up to 4 years
- Fewer truck trips with off-highway haul truck and only hauling between excavation and disposal areas
- Least time experiencing construction traffic, noise, and dust
- Least chance of traffic accidents
- Less highway traffic and emissions
- Least amount of water used
- Short-term impact to other Navajo communities
- Waste stays at Quivira Mines near current location under a protective cap
- Project will create job opportunities, such as truck drivers, equipment operators, traffic controllers
- Water for construction and dust control will be obtained from a local source with community approval or brought in from Gallup or another nearby area.
- U.S. EPA will monitor air quality before, during, and after construction to make sure the protective measures are working and community is safe.



Existing Conditions - CR-1



Proposed Canyon Repository

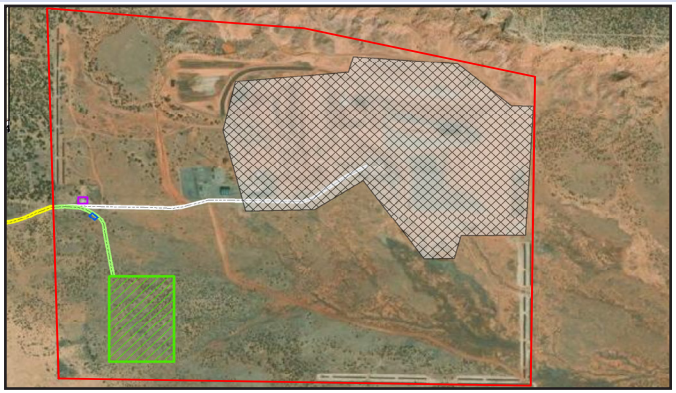
Recommended Alternative 3: All Waste Removed and Disposed of at Proposed Red Rocks Facility

Details

- The disposal cell at the Red Rocks Facility requires design and permitting by the state of New Mexico. This process is expected to take 3-5 years.
- Once the disposal cell is designed, permitted, and constructed 1 million cubic yards of rock and sand containing low levels of radium and uranium from the Quivira Mines will be excavated and disposed of at the Facility.
- U.S. EPA has evaluated multiple haul routes to transport waste to the facility. The recommended 44-mile haul route is Highway 566 to I-40 through Thoreau to the Red Rocks Facility.
- All excavation and construction areas will be tested to confirm cleanup gaols are met.
- All excavation and construction areas will be backfilled with local soil as needed and revegetated with native plants.
- Restored areas will be inspected each year and damage will be repaired as needed.
- Final land uses:
  - Residential uses at CR-1 and CR-1E
  - Continued facility worker use at KMP on UNC lands

Considerations

- Under this alternative all waste is removed from the community and Navajo Nation.
- Once work begins, excavation and transport of waste will take up to 4.5 years and up to 76,710 truckloads.
- Rail transport and trucking via Highway 566 to I-40 and Pinedale Road to Highway 371 were evaluated (Page 7 and 8). Alternate truck access routes near Thoreau were also evaluated.
- Project will create job opportunities, such as truck drivers, equipment operators, traffic controllers, and jobs at the Red Rocks Facility.
- Water for construction and dust control will be obtained from a local source with community approval or brought in from Gallup or another nearby area.
- U.S. EPA will monitor air quality before, during, and after construction to make sure the protective measures are working and community is safe.
- U.S. EPA will work with local chapters to ensure transportation hazards to traffic, pedestrians, and communities are minimized.
- Other stakeholders will have input during the State permitting public comment period for the disposal cell at the Red Rocks Facility:
  - Navajo Communities
  - State of New Mexico
  - Northwest New Mexico Regional Solid Waste Authority (Red Rocks Facility)



Proposed Disposal Cell at the Red Rocks Disposal Facility

Recommended Haul Route to Red Rocks Disposal Facility

Alternative 4: All Waste Removed and Disposed of at Deer Trail in Colorado

Details

- Transport 1 million cubic yards of mine waste from the Quivira Mines to Clean Harbors Facility in Deer Trail Colorado for disposal.
- Recommended 625-mile haul route is Highway 566 from Quivira Mines to I-40 and I-25 to Deer Trail Disposal Facility.
- All excavation and construction areas will be tested to confirm cleanup goals are met.
- All excavation and construction areas will be backfilled with local soil as needed and revegetated with native plants.
- Restored areas will be inspected each year and damage will be repaired as needed.
- Final land uses:
  - Residential uses at CR-1 and CR-1E
  - Continued facility worker use at KMP on UNC lands

Considerations

- All waste is removed from Navajo Nation and community
- 76,710 truckloads (16.5 cubic yard trucks) over 17 years of construction, long time experiencing construction traffic, noise, and dust
- Rail transport and trucking via Highway 566 to I-40 and Pinedale Road to Highway 371 were evaluated (Page 7 and 8).
- Highest chance of highway accidents and deaths.
- Largest water use.
- Most vehicle emissions and fuel consumption.
- Project will create job opportunities, such as truck drivers, equipment operators, traffic controllers.
- Water for construction and dust control will be obtained from a local source with community approval or brought in from Gallup or another nearby area.
- U.S. EPA will monitor air quality before, during, and after construction to make sure the protective measures are working and community is safe.
- U.S. EPA will work with local chapters to ensure transportation hazards to traffic, pedestrians, and communities are minimized.

Proposed Haul Route to Deer Trail Disposal Facility

Haul Truck being loaded

Truck Haul Route Evaluation

Truck Transport Route	Rationale for Retaining Route or Screening Out Route During EE/CA Development
Recommended Route 1 **Highway 566 to I-40, exiting at Thoreau, then Highway 371 to Red Rocks Facility.**	• Route is the safest because the majority of travel is on a 4-lane interstate highway with higher safety and design standards, including better sight lines and smoother curves. • Route does not require crossing the main rail lines along I-40 corridor. • Route does not require constructing new roads to access the Red Rocks Disposal Facility.
Alternate Route 2 **Highway 566 to Pinedale Road, then south on Highway 371 to Red Rocks Facility.**	• Route is less safe because all travel is on 2-lane county roads with limited sight lines and blinds curves. • Potential for additional haul traffic and accidents from cleanup at other uranium mines along Pinedale Road; would substantially increase truck traffic count on road. • Passes through more communities (Pinedale, Mariano, and Smith Lake). • Route does not require crossing the main rail lines along I-40 corridor. • Route does not require constructing new roads to access the Red Rocks Disposal Facility.
Screened Out Route 3 **Highway 566 to I-40, exiting at Prewitt, then Highway 19 to Power Plant facility, and a new eastern access road to Red Rocks Disposal Facility.**	• Route requires crossing the main rail lines along I-40 corridor which creates more hazards for trucks and trains. • Route hauls the waste directly adjacent to the school in Prewitt. • Would require access agreements from Escalante Power (and potential State permit modifications for the facility). • Requires designing, constructing, and maintaining a new haul road across private land west of the Power Plant facility to the Red Rocks Disposal Facility. • Increases round trip distance by 16 miles in comparison to the recommended route.
Screened Out Route 4 **Highway 566 to I-40, exiting at Thoreau, then frontage road along I-40, and a new northern access road to Red Rocks Disposal Facility.**	• Route requires crossing the main rail lines along I-40 corridor which creates more hazards for trucks and trains. • BNSF Railway informed U.S. EPA that a new at grade crossing would not be approved since there is a safer crossing in Thoreau fewer than 5 miles away, and the rail lines are main routes and very busy. • Would require access agreements from private landowners south of the Red Rocks Disposal Facility. • Requires designing, constructing, and maintaining a new haul road across private land west of the Power Plant facility to the Red Rocks Disposal Facility. • Increases round trip distance by 4 miles in comparison to recommended route.

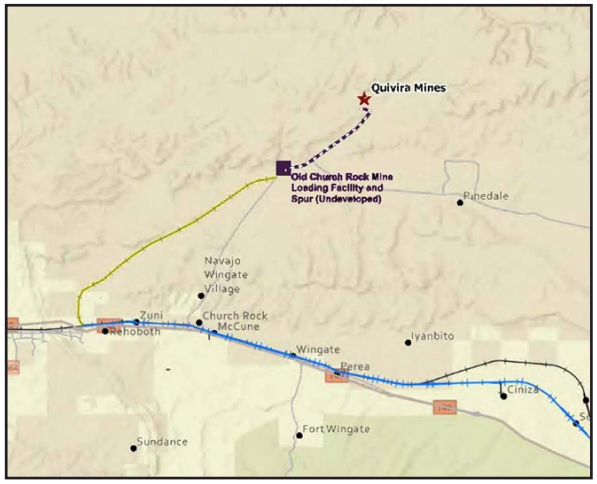
Alternate Route 2

Screened Out Truck Route 3

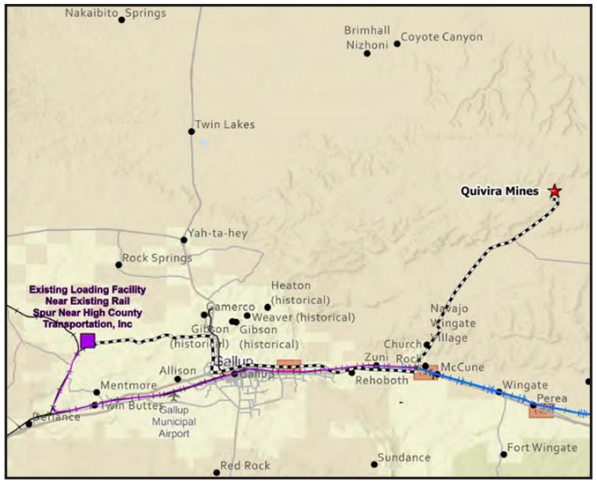
Screened Out Truck Route 4

Rail Haul Route Evaluation

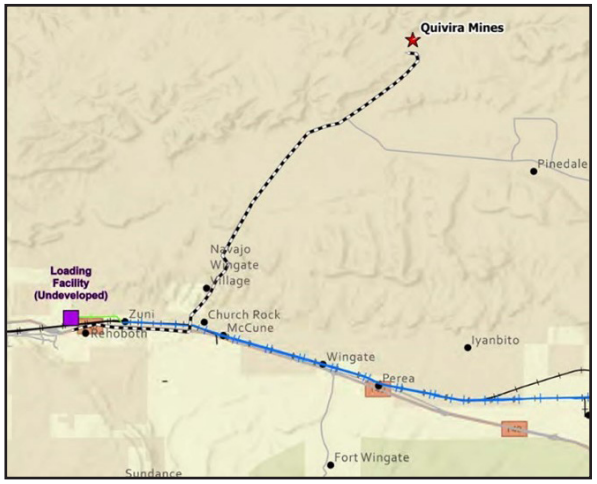
Rail Transport Option	Rationale for No Further Consideration During EE/CA Development (Screening Out)
Option 1 **Construct rail spur from I-40 corridor to Old Church Rock Mine.** **Truck waste from Quivira Mines to spur.**	• Significant challenges in obtaining right-of-ways through private and Navajo lands. • Increased risk associated with handling and transporting waste at two additional waste transfer locations at rail spur ends. • More than 10 years of planning and permitting would be required for the new rail spur. • Construction costs are expected to exceed $10 million to support the duration of the cleanup project. • Significant increase in cleanup duration due to shipment scheduling on to the main Burlington Northern Santa Fe (BNSF) Railway rail line between Church Rock and Baca/Prewitt spur and additional waste loading and off-loading required. • Transport from the Escalante Generating Station to the Red Rocks Disposal Facility property would also require rail spur extension or truck transport for final 1 mile.
Option 2 **Truck waste 30 miles from Quivira Mines to existing rail spur northwest of Gallup.**	• Increased risk associated with handling and transporting waste at two additional waste transfer locations at rail spur ends. • Trucking to rail spurs is similar mileage to directly trucking the waste to the Red Rocks Disposal Facility. • The route would transport waste through an area much more densely populated than trucking alone directly to the Red Rocks Disposal Facility. • Significant increase in cleanup duration due to shipment scheduling on to the main BNSF rail line between Church Rock and Baca/Prewitt spur and additional waste loading and off-loading.
Option 3 **Develop loading facility adjacent to main rail lines along I-40 corridor.**	• Involves constructing a new transfer facility along the main transit lines in the Church Rock area east of Gallup, which BNSF Railroad has stated is not a viable option. • Increased risk associated with two additional waste transfer locations at rail spur ends. • Trucking to rail loading facility is already one-third of the distance to the Red Rocks Disposal Facility. • Option 1 rationale regarding rights-of-way, two transfer locations at rail spur ends, and significant increase in cleanup duration due to shipment scheduling on the main BNSF rail line between Church Rock and Baca/Prewitt spur and additional waste loading and off-loading.



Rail Option 1

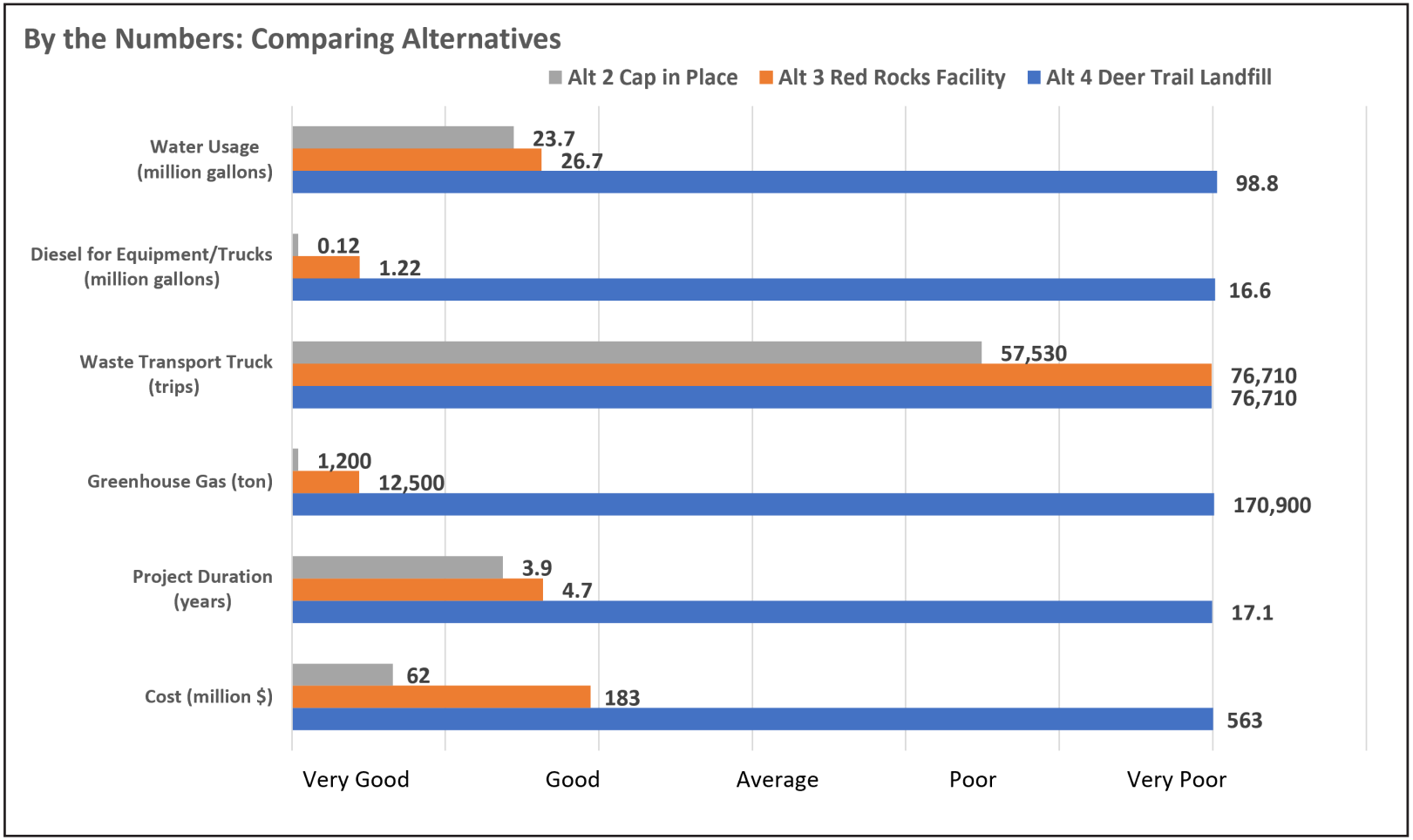


Rail Option 2



Rail Option 3

Comparing Alternatives



	Alternative	Attainment of Threshold Criteria	Effectiveness	Implementability	Cost Rating (Million)
1	**No Action**	Not Protective	Short-Term: Average Long-Term: Very Poor	Tech: Very Good Admin: Very Good	$0
2	**Consolidate Waste, Blend into Landscape, and Cap On Site**	Protective	Short-Term: Average Long-Term: Good	Tech: Good Admin: Good	$61.6
3	**All Waste Removed and Disposed of at Proposed Red Rocks Facility**	Protective	Short-Term: Average Long-Term: Very Good	Tech: Very Good Admin: Average	$182.5
4	**All Waste Removed and Disposed of at Deer Trail, Colorado**	Protective	Short-Term: Very Poor Long-Term: Very Good	Tech: Very Good Admin: Good	$563

Community Involvement

U.S. EPA has worked closely with the surrounding communities to develop and evaluate cleanup alternatives for the Quivira Mines Site, which has included the following:

- Monthly meetings with Red Water Pond and Pipeline Canyon Communities from Fall 2021 to present.
- **10/18/2022**. Presented EE/CA alternatives to Red Water Pond and Pipeline Canyon Communities.
- **8/6 and 8/7/2023.** Presented the Red Rocks Disposal Facility alternative and preferred and alternate haul routes to the Thoreau Community and conducted a Red Rocks Disposal Facility tour.
- **8/20/2023.** Presentation of the EE/CA alternatives for Quivira and Section 32/33 mine sites to the Navajo Nation Resource Development Committee in government-to-government consultation
- **9/21/2023.** Presented the Red Rocks Disposal Facility alternative and preferred and alternate haul routes to the Church Rock Community.
- **11/8 and 11/9/2023.** Presented Red Rocks Disposal Facility alternative and preferred and alternate haul routes in presentation and posters to the Casamero Lake community.
- **12/14/2023.** Open Houses at Thoreau and Baca Prewitt Chapters – Presented posters of the Red Rocks Disposal Facility alternative and preferred and alternate haul routes. Listened to community concerns about haul routes.
- **1/22 to 1/26/2024.** Presented at six Eastern Chapters the Red Rocks Disposal Facility alternative and recommended and alternate haul routes. Listened to community concerns about haul routes.

Next Steps in U.S. EPA Cleanup Process

- Publish a final EE/CA for the Quivira Mines Site and receive input from community during a 60-day comment period from March 23rd to May 22nd, 2024.
- Review input received from the community, Navajo Nation representatives, and other stakeholders and, if appropriate, refine and/or modify the recommended cleanup alternative and haul routes accordingly.
- Following the 60-day comment period, U.S. EPA will respond to comments and meet with Navajo Nation representatives before issuing a final cleanup decision in an Action Memorandum, which will initiate implementation of the cleanup.
- U.S. EPA will continue to engage with the community on the haul routes and other design considerations throughout the design, permitting process, and construction.

Information Repository

- Required by Superfund and maintained by U.S. EPA online and in a place the public can easily access printed or digital copies of:
  - EE/CA and supporting documents
  - Factsheets
  - Investigation and prior action reports
- Online: https://www.epa.gov/navajo-nation-uranium-cleanup/quivira-mines
- Hard Copies:

  Navajo Nation Community Outreach Center:

  Highway 264 & Indian Route 12, Suite 10

  Window Rock, Arizona 86515

How Can You Learn More?

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Ways to provide input:

- During the public meeting
- Email
- Phone to U.S. EPA or NNEPA
- USPS Mail:
  U.S. Environmental Protection Agency
  2255 N. Gemini Drive
  Flagstaff, Arizona 86001
  Attn: Navajo AUM Quivira
- Toll-Free Voicemail: (833) 484-4384