UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS, TX 75202-2733

July 20, 2012

Mr. Keith McConnell
United States Nuclear Regulatory Commission
Deputy Director, Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
11545 Rockville Pike
Rockville, MD 20852

RE: Final Surface Soil Operable Unit Proposed Plan for the United Nuclear Corporation Superfund Site (NMD030443303)

Dear Mr. McConnell:

Please find included with this letter the Final Surface Soil Operable Unit Proposed Plan for the United Nuclear Corporation Superfund Site (NMD030443303). This Final Proposed Plan was released to the public for review on July 20, 2012. The public comment period begins on July 20, 2012 and ends on September 21, 2012.

Thank you for your continued interest and involvement with this project. We look forward to working with you through the decision process.

Sincerely,

Katrina Higgins-Coltrain
Remedial Project Manager
LA/NM/OK Section

EPA Seeks Comment on the Surface Soil Proposed Plan for the United Nuclear Corporation Superfund Site

United Nuclear Corporation
McKinley County, New Mexico **July 2012**

United States Environmental Protection Agency

This fact sheet will tell you about:

- Surface Soil Operable Unit Proposed Plan
- Detailed Components and Summary of the Preferred Alternative
- Community Participation and Public Meetings
- Site Location
- Site History
- For More Information
- On the Web

Introduction

The U.S. environmental Protection Agency (EPA) welcomes public comment on the Surface Soil Operable Unit Proposed Plan (Proposed Plan) for the United Nuclear Corporation Superfund (UNC) Site. The comment period begins on July 20, 2012, and ends on September 21, 2012. The Preferred Alternative includes disposal of approximately 1,000,000 cubic yards of mine waste from the Northeast Church Rock Mine (NECR) Site within the existing tailings cells at the UNC Site (Figure 1).

The EPA is evaluating disposal options at the UNC Site in support of the Non-Time-Critical Removal Action Memorandum for the NECR Site that EPA signed in 2011. In the Non-Time-Critical Removal Action Memorandum, EPA decided to permanently dispose of approximately 1,000,000 cubic yards of mine waste from the NECR Site at the UNC Site. EPA's 2011 cleanup decision for the NECR Site requires two additional decisions and associated public comment periods for the UNC Site--one decision from EPA and one decision from the U.S. Nuclear Regulatory Commission (NRC).

Step 1: EPA will need to issue an appropriate decision document that selects disposal of mine waste from the NECR Site within the existing tailings cells at the UNC Site. This decision document would be developed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) process and include review of State and community acceptance. This Proposed Plan begins EPA's process to fulfill step one.

Step 2: The NRC will need to amend United Nuclear Corporation's license to allow disposal of mine waste from the NECR Site within the existing tailings cells at the UNC Site. The license amendment process will begin when United Nuclear Corporation submits for NRC review and evaluation a request for an amendment of its NRC license to dispose of mine waste from the NECR Site within the existing tailings cells at the UNC Site. This license amendment will be presented to the public for review and comment. Based on a review of public comments, NRC's agreement to amend the United Nuclear Corporation's license to allow this disposal will be necessary to fulfill step two.

These two steps will need to be completed before cleanup of the NECR Site begins. As part of Step 1, EPA welcomes public comment on the Proposed Plan and the Preferred Alternative that includes disposal of approximately 1,000,000 cubic yards of mine waste from the NECR Site onto the existing tailings cells at the UNC Site.

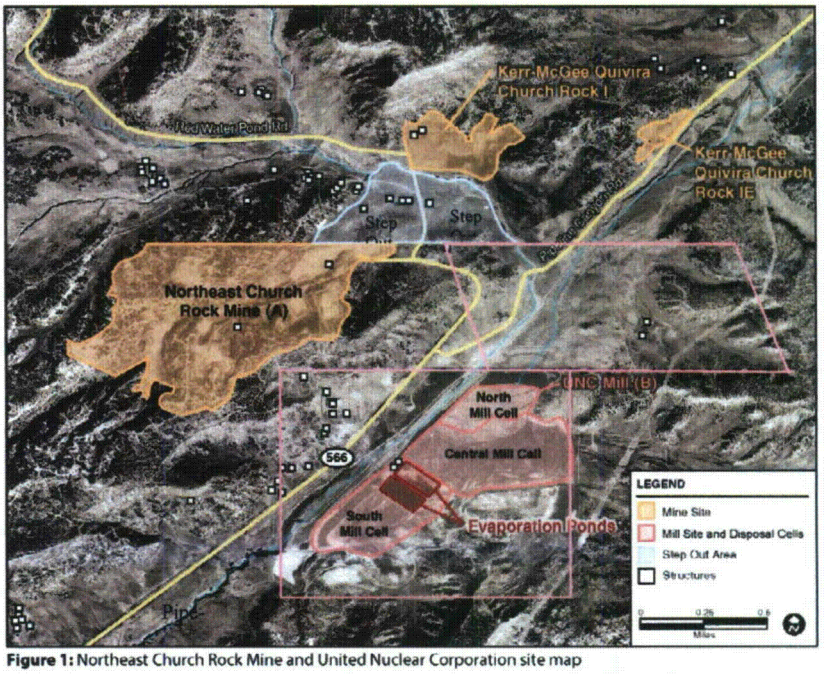

Figure 1: Northeast Church Rock Mine and United Nuclear Corporation site map

Surface Soil Operable Unit Proposed Plan

A total of two remedial alternatives are being considered for the UNC Site related to disposal of mine waste from the NECR Site within the existing tailings cells. Alternative 1 is a No Action Alternative and Alternative 2 is On-site Disposal at the UNC Site within the Tailings Disposal Area.

The Preferred Alternative for the UNC Site is Alternative 2: On-site Disposal at the UNC Site within the Tailings Disposal Area. Under this alternative, mine waste from the NECR and the tailings located within the Tailings Disposal Area at the UNC Site will be contained on the UNC Site for perpetuity. After all cleanup actions are completed, it is expected that ownership of the UNC Site would be transferred to the Department of Energy's (DOE's) Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management. Under this DOE program, the UNC Site would be monitored, maintained and managed under the DOE to provide for continued containment and protectiveness.

This fact sheet provides you with an overview of the Proposed Plan for UNC Site, and only summarizes the key aspects of the Preferred Alternative. This fact sheet does not present information related to other alternatives evaluated.

The Final Surface Soil OU Proposed Plan is located in the information repositories and provides details related to the selection of the Preferred Alternative, the components of the Preferred Alternative, and the evaluation of the Preferred Alternative.

Detailed Components and Summary of the Preferred Alternative

The Preferred Alternative includes the following components:

- Site Controls and Security: During cleanup, access to the site will be restricted.
- Site preparation activities include identifying utilities and existing structures in the construction area.
- Trained and experienced labor will be used to transport and manage the mine waste. Graduates trained and certified under the EPA Superfund Jobs Training Initiative will also be eligible for hiring for identified positions.
- Transportation of all mine waste will be monitored

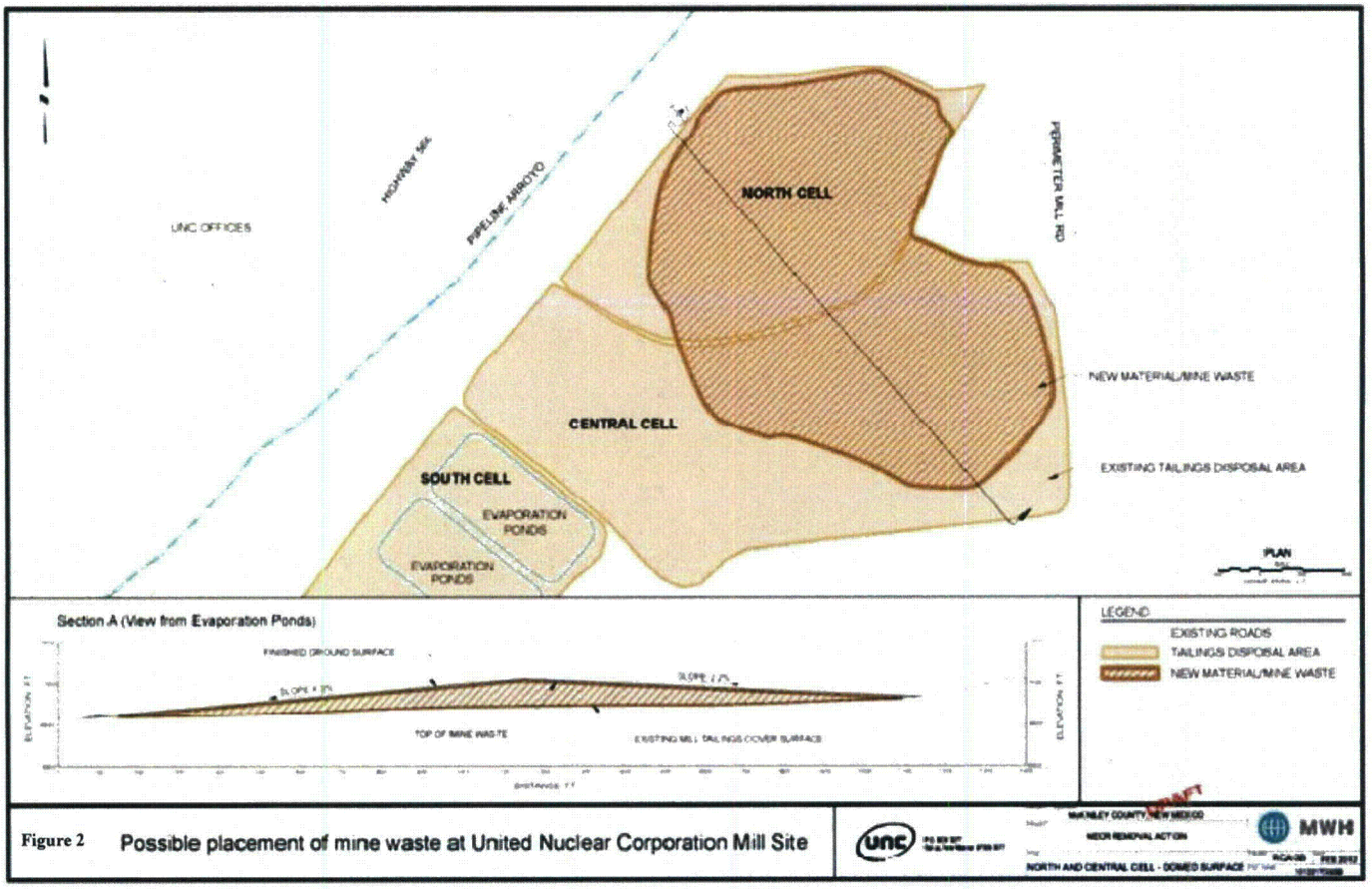

Figure 2 Possible placement of mine waste at United Nuclear Corporation Mill Site

CONCEPTUAL ONLY - NOT FOR CONSTRUCTION PURPOSES (MODIFIED BY EPA FOR PROPOSED PLAN)

so that dust is limited, and any mine waste spills are cleaned up.

- Temporary on-site facilities will be provided for project management, project controls, and decontamination of personnel and equipment.
- Natural and cultural resources will be surveyed by a Navajo Nation archeologist. Local residents will be consulted as well as the State and Tribal Historic Preservation Officer.
- Perimeter air monitoring stations will be positioned and operated to monitor emissions during site activities.
- Stormwater and Erosion Control: These controls will be used to manage off-site migration of mine waste and protect construction actions.
- Waste Volume: Approximately 1,000,000 cubic yards of mine waste will be excavated from the NECR Site, disposed within the existing tailings cells at the UNC Site, and capped.
- Team Coordination: Close coordination with United Nuclear Corporation, NRC, Department of Energy, EPA Region 9, Navajo Nation EPA, the community, and the State of New Mexico will be required to create an acceptable design that incorporates the NECR mine waste into the existing UNC tailings cells and complies with Federal and State regulations.
- Five-Year Reviews: The Preferred Alternative involves permanent disposal of mine waste from the NECR Site within the UNC Site tailings cells. Because the mine waste remains on the UNC Site, reuse of the UNC Site will be restricted, and EPA will be required to conduct Five-Year Reviews of the cleanup actions.
- Operation and Maintenance: The capped area will require Operation and Maintenance (O&M) activities as necessary, including cap inspections and maintenance for continued cap stability, erosion protection, and containment.
- Site Reuse Restrictions: Because the mine waste and tailings will remain on the UNC Site, these areas will be restricted from residential, industrial, or grazing reuse. Also, unauthorized access will be restricted.
- Cap Design Criteria: Although the final design may vary, the major elements of the structure are not expected to be significantly different than those presented here. Erosion modeling will be used to assist with design so that the potential for erosion is limited.

The cap will be designed and constructed to

- Last at least 200 years with minimal maintenance and be effective up to one thousand years.
- Provide assurance that radioactive air emissions remain protective;
- Protect the mine waste from erosion, reduce the potential for water infiltration and leaching, provide durability, and contain the mine waste.
- Ensure stability and minimize the effects of erosion, root intrusion, and animal destruction
- Promote vegetation growth and support native varieties; and,
- Include a low permeability layer (liner) between the NECR mine waste and the tailings currently disposed within the tailings cells to further limit water migration.

For cost estimating purposes, the Preferred Alternative assumes that NECR mine waste would be added to the North and Central Cells at the UNC Site. A new cap would be constructed over the mine waste once it is added to the cells, which would add additional height and protection against infiltration. Figure 2 provides an example of a generalized conceptual drawing showing one possible outcome for the tailings cells after placement of the NECR mine waste. Final design specifications, mine waste placement, and the disposal configuration will be completed during remedial design. EPA will inform and involve the community throughout the design and construction process.

Summary of Remedial Alternatives and Estimated Cost

Alternative and Description	Estimated Capital Cost	Estimated Annual O&M	Estimated Present Worth Cost	Estimated Construction Timeframe
Alternative 1: No Action Alternative	$0.00	Not Applicable	Not Applicable	Not Applicable
Alternative 2: On-site Disposal within the Tailings Disposal Area	$40,337,281	$1,227,767	$41,565,048	4 Years

The Preferred Alternative was evaluated against the nine evaluation criteria and is selected because it is expected to be protective of human health and the environment, complying with regulations, and utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. Additionally, as summarized in the NECR Site Non-Time-Critical Removal Action Memorandum, on-site disposal of the NECR Site mine waste at the NECR Site was rejected by the Navajo Nation and the community while off-site disposal at a regulated facility was found to be cost prohibitive and less cost effective than disposal at the UNC Site.

The Preferred Alternative will adequately protect human health and the environment and comply with regulations by eliminating, reducing and controlling exposures to human and ecological receptors through disposal and containment of mine waste within the tailings cells at the UNC Site and the enforcement of UNC Site use restrictions. The Preferred Alternative supports the future reuse options of residential and grazing for the NECR Site and will prevent exposure to the mine waste and tailings through the use of engineering controls (*e.g.,* capping the mine waste and tailings and fencing), by monitoring migration of contaminants at the UNC Site, by enforcement of site access restrictions, and by the performance of site O&M and Five-Year Reviews. The UNC Site will be restricted from uses, including residential, industrial, and grazing uses.

Unauthorized access will be prohibited expect for long-term care and maintenance of the tailings cells by personnel working under DOE's Office of Legacy Management, Long-Term Surveillance and Maintenance Program. Under this DOE program, the UNC Site would be maintained and managed under the DOE to provide for continued containment and protectiveness.

The Preferred Alternative is expected to achieve substantial long-term effectiveness and permanence through containment of the mine waste. The Preferred Alternative construction and transportation work is anticipated not to pose any unacceptable short-term risks to on-site workers, the community, or the environment due to the use of construction practices that control contaminant migration (e.g., dust suppression actions or stormwater/erosion controls). No impacts to air, water, or soil are expected from transportation and disposal actions. The Preferred Alternative can be constructed using common construction practices and commercially available equipment and services.

Under the Preferred Alternative, NECR mine waste disposal within the tailings cells at the UNC Site will reduce the mine waste footprint by creating one disposal location that will require long-term maintenance and management for continued protection of human health and the environment. Consolidation of similar mine waste is consistent with the current UNC disposal action, can be managed using the same remediation technology as the UNC tailings, is not expected to cause or promote adverse affects due to loading, is protective of human health and the environment, and is expected to be maintained by DOE in the long-term.

Although, ground water is not a component of the Proposed Plan, ground water monitoring and remediation of

Dates to Remember

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July 20, 2012 – September 21, 2012
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Public Meeting:
The EPA will hold two public meetings to explain the Surface Soil Operable Unit Proposed Plan. Oral and written comments will also be accepted at the meeting.

August 29, 2012
Pinedale Chapter House
1149 Mile Marker 5
Church Rock, New Mexico 87311
Meeting Starts: 6:00 pm.

August 30, 2012
Octavia Fellin Public Library
115 West Hill Avenue
Gallup, New Mexico 87310
Meeting Starts: 6:00 pm.

These meetings are being held in a fully accessible facility. Should you have questions about this facility's compliance with the Americans with Disabilities Act, please contact Jason McKinney, EPA Region 6 Community Involvement Coordinator at 214.665.8132 or 1.800.533.3508 (toll free).

The Surface Soil Operable Unit Proposed Plan is also located on the internet at:
http://www.epa.gov/region6/6sf/newmexico/united_nuclear/nm_united_nuclear_proposed_plan.pdf

The Administrative Record File is available for viewing at:
Octavia Fellin Public Library
115 West Hill Avenue, Gallup, NM 87310
505.863.1291
Hours: 9:00 am to 8:00 pm Monday thru Thursday
10:00 am to 6:00 pm Friday
9:00 am to 6:00pm Saturday

Navajo Nation Superfund Office
Highway 264/43 Crest Road
St. Michaels, Arizona 86511
928.871.6859

the contaminant plumes is ongoing and will continue under the 1988 Record of Decision (ROD). The Preferred Alternative is not expected to interfere or affect the current ground water remediation efforts. Mine waste disposal will be designed and construction to provide for continued protection against contaminant migration into the ground water in support of ongoing ground water remediation efforts. The actions called for by the 1988 ROD include monitoring and reporting to document potential contaminant migration and to ensure compliance with ground water remediation goals established under the 1988 ROD and any amendments to that ROD.

Community Participation

EPA, in consultation with NMED, will consider the Preferred Alternative as well as other alternatives presented in the Proposed Plan. The final remedy for the UNC Site surface soil will be selected after reviewing and considering all information submitted during the 60-day public comment period. EPA, in consultation with NMED, may modify the Preferred Alternative based on new information or community comments, including comments of Navajo tribal members and the Navajo Nation Environmental Protection Agency. Therefore, the public is encouraged to review and comment on the Proposed Plan.

The EPA and NMED provide information regarding the cleanup of the UNC Site to the public through public meetings, announcements published in the *Gallup Independent* and *Navajo Times,* and the Administrative Record file for the Site.

The Administrative Record file for the UNC Site includes documents and reports used to support the preparation of the Proposed Plan. The Administrative Record file is available at both information repository locations.

The **public comment period for this Proposed Plan is July 20, 2012, through September 21, 2012.** All written comments should be addressed to: Katrina Higgins-Coltrain, Remedial Project Manager, U.S. EPA Region 6 (6SF-RL), 1445 Ross Avenue, Dallas, Texas 75202 – email Coltrain.katrina@epa.gov or Jason McKinney, Community Involvement Coordinator, U.S. EPA Region 6, 1445 Ross Avenue, Dallas, TX 75202 – email mckinney.jason@epa.gov

Site Location

The UNC Site is a non-operating uranium mill site located approximately 17 miles northeast of Gallup, New Mexico, in McKinley County (Figure 1). The UNC Site is generally comprised of the former ore processing mill facilities and a tailings waste disposal area, which cover about 25 and 100 acres, respectively. The site is owned by United Nuclear, who also owns the land located northeast of the UNC Site tailings cells bounded on the north by the Navajo Nation Indian Reservation. United Nuclear Corporation is now an indirect subsidiary of General Electric Corporation. EPA expects UNC and GE (collectively "UNC/GE") to conduct the removal and disposal of contaminated mine waste and soils under an agreement with EPA. The area around the UNC Site is sparsely populated and includes Indian tribal trust land and Indian allotted land. To the north of the UNC Site is another former uranium mine identified as Northeast Church Rock Quivira Mine Site. This is a non-NPL site that is being addressed by EPA under a separate action.

The NECR Site is a non-operating uranium mine approximately 125 acres in size, located just northwest of the UNC Site, less than one mile away. The site is located on lands held by the United States in trust for the Navajo Nation.

EPA is working with eleven households in the immediate vicinity of the NECR Site, which includes over 72 people. Several Navajo families have stated they collect herbs and plants from the NECR Site and surrounding area for ceremonial purposes. Apart from the residential areas, the primary land use in the area around the NECR Site and the UNC Site is grazing for sheep, cattle, and horses.

Site History

The UNC Site includes a historic uranium mill that was licensed to operate by the State of New Mexico in May 1977. The mill operated from 1977 to 1982, and processed ore primarily from two of United Nuclear Corporation's nearby mines: Northeast Church Rock and Old Church Rock. Uranium ore was processed at the facility using a combination of crushing, grinding, and acid-leach solvent extraction methods. The milling operation produced acidic slurry of ground rock and fluid (tailing) that was pumped into the tailings area which consists of three cells. An estimated 3.5 million tons of tailings were disposed in the tailings impoundments (EPA, 1988a).

EPA placed the UNC Site onto the National Priorities List (NPL) of Superfund sites in 1983 [48 Fed. Reg. 40658 (Sept. 8, 1983)] because contaminated liquids had seeped from the tailings at the UNC Site and contaminated the underlying ground water, and because there were toxic emissions to surface water and air (EPA, 1988b). Acidic liquids had seeped from the tailings located in the unlined disposal cells into the underlying alluvium deposits (referred to as the Southwest Alluvium) and also into two deeper zones (Zones 1 and 3) of the Upper Gallup Sandstone Formation, contaminating the ground water with

heavy metals, radionuclides such as uranium and radium, and other chemical constituents.

In 1988, EPA and NRC signed a Memorandum of Understanding (MOU) regarding the UNC Site [53 Fed. Reg. 37887 (September 28, 1988)]. The EPA and the NRC have overlapping authority in connection with the UNC Site, and the MOU was developed to help assure that remedial actions occur in a timely and effective manner.

EPA issued a Ground Water Operable Unit Record of Decision (ROD) in September 1988 selecting a remedy for the contaminated ground water that included extraction of the ground water and treatment by evaporation. Under the oversight of EPA, United Nuclear Corporation constructed the remedy in 1989 and continues to address ground water contamination under the 1988 ROD. Ground water monitoring and extraction wells are located at the boundary and downgradient of the Tailings Disposal Area. Ground water monitoring and remediation of the contaminant plumes are ongoing.

United Nuclear Corporation submitted a final reclamation plan to NRC which was approved in March 1991. Between 1988 and 1996, United Nuclear Corporation cleaned up the tailings disposal area including decommissioning of the mill facility, remediation of radium contaminated soil, capping of the tailings cells, installation of extraction wells, and construction of evaporation ponds and an evaporation system. All of these activities were completed under NRC oversight, and maintenance of the soil cleanup action continues.

For More Information

Katrina Higgins-Coltrain
EPA Region 6 Remedial Project Manager
Tel: 214.665.8143 or 1.800.533.3508 (toll free)
Coltrain.katrina@epa.gov

Jason T. McKinney
EPA Region 6 Community Involvement Coordinator
Tel: 214.665.8132 or 1.800.533.3508 (toll free)
Mckinney.jason@epa.gov

Earle Dixon
Project Manager
New Mexico Environment Department
Tel: 505.827.2890
Earle.dixon@state.nm.us

For press inquiries, please call the EPA Press Office at 214.665.2200.

Information Repositories are available at:

Octavia Fellin Public Library
115 West Hill Avenue, Gallup, NM 87310
Tel: 505.863.1291

Navajo Nation Superfund Office
Highway 264/43 Crest Road
St. Michaels, AZ 86511
Tel: 928.871.6859

On the Web

On the internet, the Proposed Plan can be found at:

http://www.epa.gov/region6/6sf/newmexico/united_nuclear/nm_united_nuclear_proposed_plan.pdf

Information about U.S. EPA Region 6 and the Superfund Program can be found at:

http://www.epa.gov/region6/6sf/6sf.htm

Call U.S. EPA at 1.800.533.3508 (toll free) to receive a Spanish translation of this fact sheet.

Para recibir una traducción en español de esta Hoja de Datos, comunicarse con la Agencia de Protección del Medio Ambiente de los EEUU (la EPA) al número de teléfono 1.800.533.3508 (llamada gratis).

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Surface Soil Operable Unit Proposed Plan for the UNC Site is important to the EPA and NMED. Comments provided by the public are valuable in helping the EPA and NMED select a final cleanup remedy for the Site. You may use the space below to write your comments, then fold and mail to Katrina Higgins-Coltrain, Remedial Project Manager, U.S. EPA Region 6 (6SF-RL), 1445 Ross Avenue, Dallas, Texas 75202. Comments must be postmarked by September 21, 2012. If you have any questions about the comment period, please contact Katrina Higgins-Coltrain at 214.665.8143 or through EPA's toll-free number at 1.800.533.3508, Jason McKinney at 214.665.8132 or through EPA's toll-free number at 1.800.533.3508, or Earle Dixon, NMED, at 505.827.2890. Those with electronic communications capabilities may submit their comments to the NMED or EPA via Internet at the following e-mail addresses: Coltrain.Katrina@epa.gov, mckinney.jason@epa.gov, or earle.dixon@state.nm.us. The form also may be faxed to 214.665.6660.

Name_____

Address_____

City_____

State_____ Zip _____

United States
Environmental Protection
Agency

Region 6
1445 Ross Ave. (6SF-VO)
Dallas, TX 75202

United Nuclear Corporation Superfund Site
Surface Soil Operable Unit Proposed Plan
Gallup, New Mexico
July 20, 2012

U.S. EPA Region 6
Superfund Program
Dallas, Texas

U. S. Environmental Protection Agency announces the Surface Soil Operable Unit Proposed Plan

This Surface Soil Operable Unit (OU) Proposed Plan identifies the Preferred Alternative for permanent disposal of low level threat mine waste from the Northeast Church Rock Mine Site (NECR Site) within the Tailings Disposal Area located on the United Nuclear Corporation Superfund Site (UNC Site; Figures 1 and 4). This document is issued by the U.S. Environmental Protection Agency (EPA), the lead agency for site activities, after review by the New Mexico Environment Department (NMED), the support agency for site activities. This Surface Soil OU Proposed Plan describes the process used to evaluate remedial alternatives regarding disposal of the low level threat mine waste from the NECR Site at the UNC Site. This Surface Soil OU Proposed Plan deals only with a limited aspect of the surface soil OU remedy at the UNC Site—the disposal of low level mine waste from the NECR Site within the Tailings Disposal Area of the UNC Site and is taken as an intermediate step prior to final remedial action for the surface soil OU at the UNC Site (see Scope and Role of the Response Action for further discussion). For the purposes of this Surface Soil OU Proposed Plan, the term mine waste refers to NECR Site soil that is contaminated with hazardous substances that are either radioactive or heavy metals.

The EPA is evaluating disposal alternatives at the UNC Site in support of the Non-Time-Critical Removal Action Memorandum for the NECR Site signed September 29, 2011, (hereafter referred to as the 2011 Non-Time-Critical Removal Action Memorandum; EPA, 2011b). In the 2011 Non-Time-Critical Removal Action Memorandum, EPA decided to permanently dispose of approximately 1,000,000 cubic yards of contaminated mine waste from the NECR Site at the UNC Site, if two things happened: Step one: EPA issues an appropriate decision document consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300) (NCP) process, including assessment of State and community acceptance, where EPA selects disposal of mine waste from the NECR Site within the Tailings Disposal Area of the UNC Site as a surface soil OU remedy for the UNC Site, and Step two: the U.S. Nuclear Regulatory

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	9:00 am to 6:00pm	Saturday

Navajo Nation Superfund Office
Highway 264/43 Crest road
St. Michaels, Arizona 86511
928.871.6859

Commission (NRC) agrees to amend United Nuclear Corporation's license to allow this disposal.

This Surface Soil OU Proposed Plan is part of the NCP process (Figure 2) that will lead to EPA's selection of the remedy for the surface soil OU at the UNC Site with respect to the disposal of the low level threat mine waste from the NECR Site at the UNC Site. The remedy will be selected in accordance with the NCP; therefore, EPA will select an alternative only after consideration of the public's comments. This Surface Soil OU Proposed

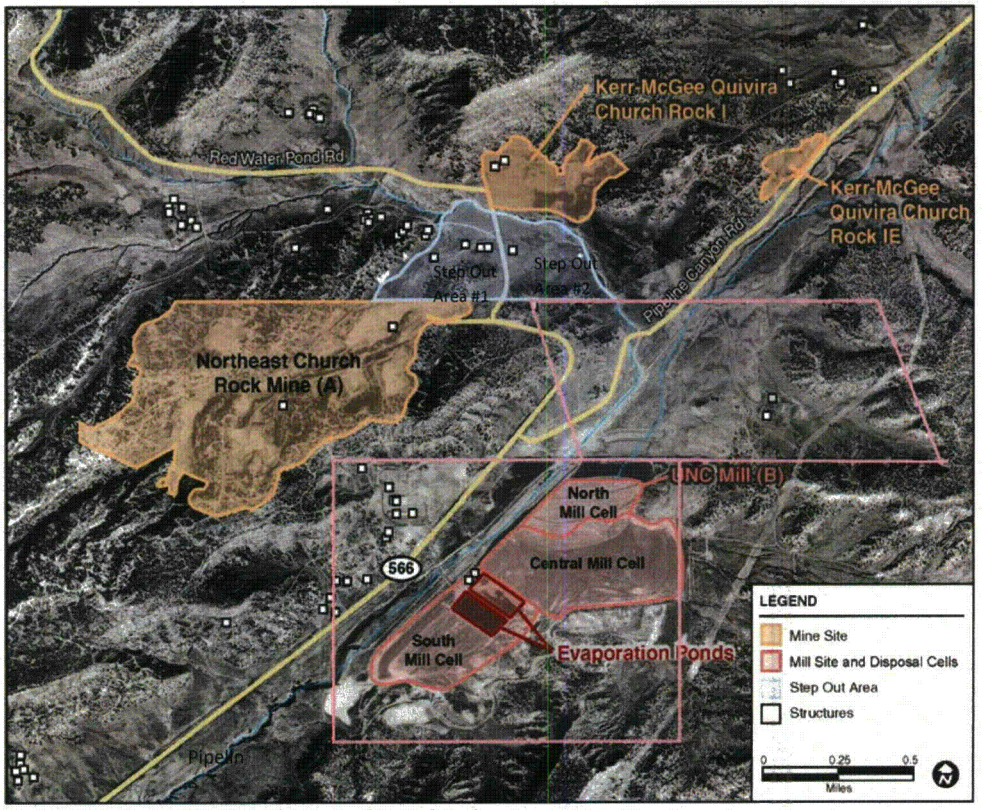
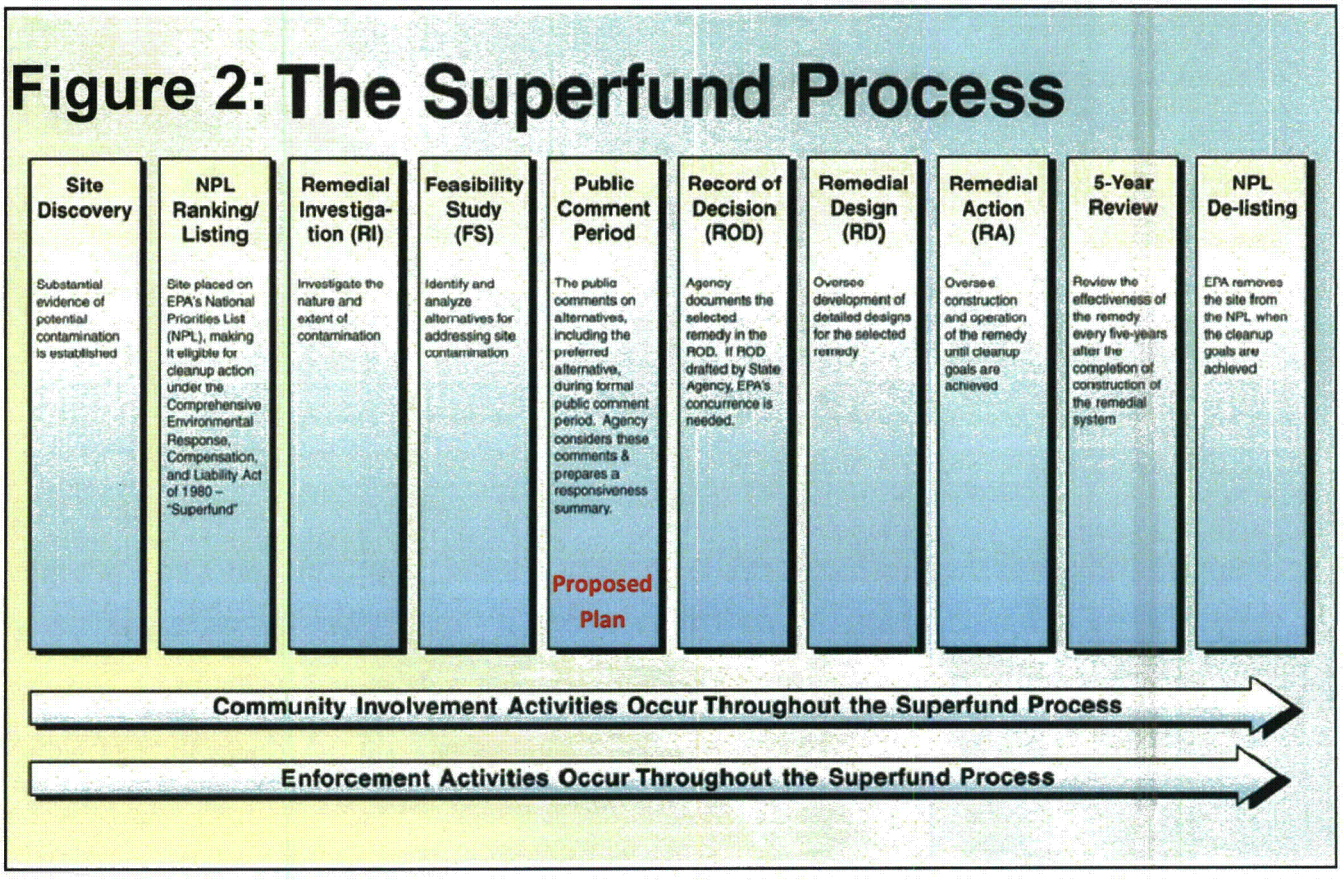
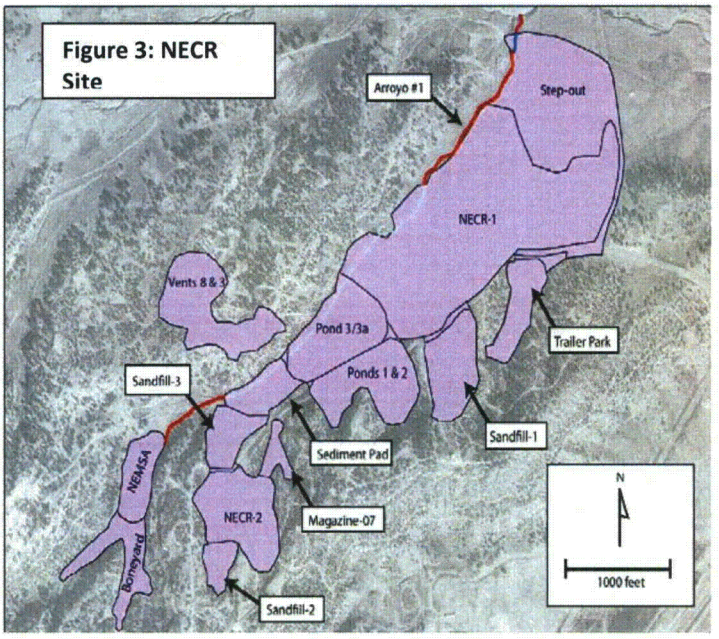


Figure 1: Northeast Church Rock Mine and United Nuclear Corporation site map



Plan begins EPA's process to fulfill step one as outlined in the 2011 Non-Time-Critical Removal Action Memorandum (see previous paragraph).

The NECR Site Consolidation Areas (Figure 3) and the UNC Site Tailings Disposal Area (Figure 4) will be treated as one for the purpose of remediation. Section 104(d)(4) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. § 9604(d)(4), allows EPA broad discretion to treat noncontiguous facilities[1] as one site for the purpose of taking response actions. The only limitations prescribed by the statute are that the facilities be reasonably related "on the basis of geography" or "on the basis of the threat, or potential threat to the public health or welfare or the environment." Once the decision is made to treat two or more facilities as one site, wastes from the several facilities could be managed in a coordinated fashion at one of the facilities and still be an "on-site" action, within the permit waiver of CERCLA section 121(e)(1), 42 U.S.C. § 9621(e)(1) [See 55 Fed. Reg. 8666, 8690 (March 8, 1990)]. Because of the similarity of threat posed by the mine waste in the areas on the NECR Site where mine waste has been deposited and consolidated (Consolidation Areas) and the threat posed by the tailings in the covered pits and landfills that make up the UNC Site Tailings Disposal Area, and because of the relative proximity of these facilities (less than 1 mile; Figure 1), EPA proposes to use its authority under CERCLA Section 104(d)(4) to temporarily combine the NECR Site Consolidation Areas and the UNC Site Tailings



Disposal Area. The combination of these two areas, the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area, is temporary and for mine waste disposal purposes only, because once all the mine waste from the NECR Site Consolidation Areas has been transferred to the UNC Site Tailings Disposal Area, these facilities (*i.e.*, the Consolidation Areas and the Tailings Disposal Area) will no longer be combined within the meaning of Section 104(d)(4). Also, at no time will any of the NECR Site, including the Consolidation Areas be part of the UNC Site for National Priorities List (NPL) purposes.[2]

This temporary combination of the two facilities will facilitate the implementation of the Preferred Alternative for the surface soil OU remedial action at the UNC Site described in this Surface Soil OU Proposed Plan, and it will facilitate implementation of the selected removal action for the NECR Site identified in the 2011 Non-Time-Critical Removal Action Memorandum (EPA, 2011b). By combining the

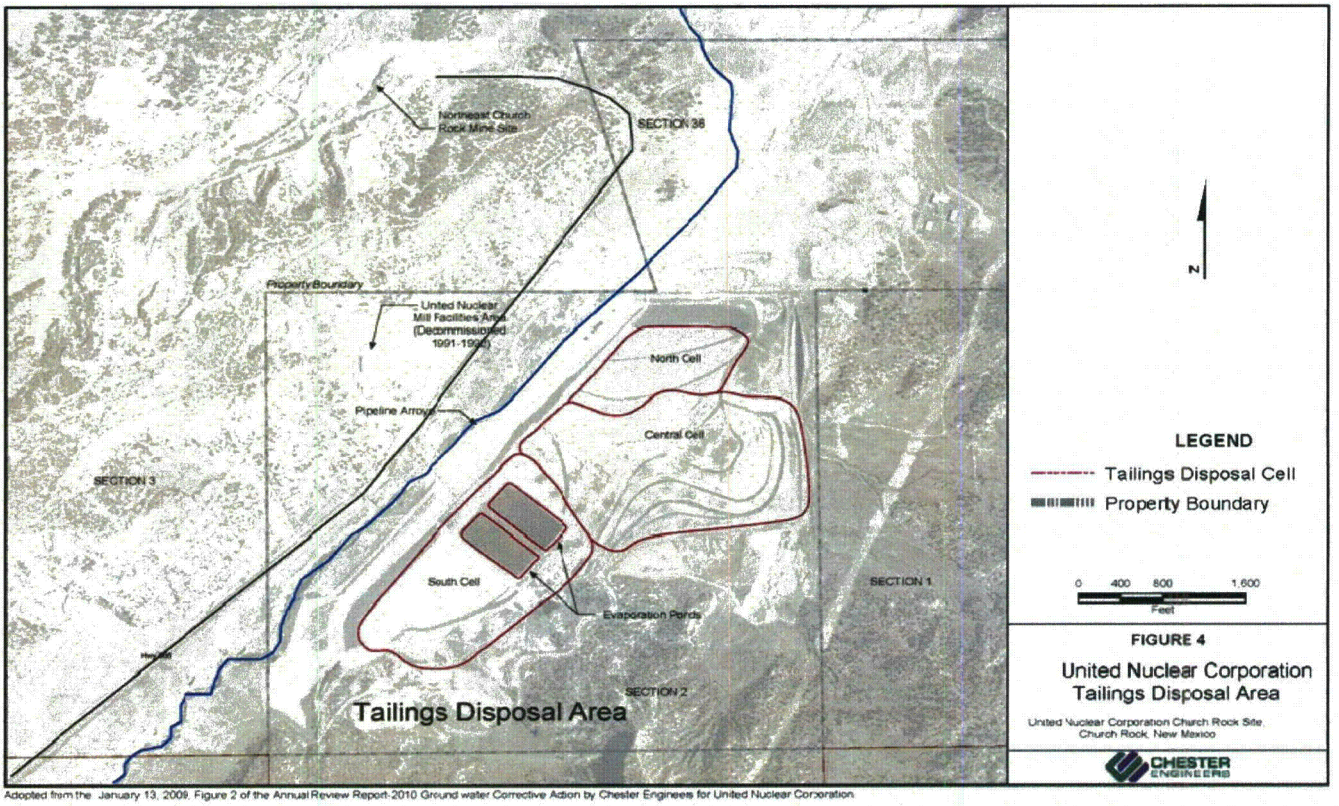
[1] Under CERCLA, the term "facility" means (A) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, landfill, storage container, motor vehicle, rolling stock, or aircraft, or
(B) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located; but does not include any consumer product in consumer use or any vessel.

[2] The NPL is "primarily . . . an informational and management tool . . . the listing process itself is not intended to define or reflect the boundaries of. . . facilities or releases." 54 Fed. Reg. 41017-18 (1989)

Consolidation Areas and the Tailings Disposal Area, the Preferred Alternative can be implemented without State, Federal or local permits as provided in CERCLA section 121(e), 42 U.S.C. § 9621(e). In addition, combination of the Consolidation Areas and the Tailings Disposal Area means that the action transferring mine waste from the Consolidation Areas to the Tailings Disposal Area will be an on-site action that need not meet the requirements of the procedures for planning and implementing off-site response actions codified at 40 CFR § 300.440 (the "Off-site Rule"). In short, treating the non-contiguous NECR and UNC Sites as one for the purpose of disposing NECR mine waste at the UNC Site "would be in the best interests of achieving sound and expeditious environmental cleanups." 55 Fed. Reg. 8666, 8691 (1990).

NRC License Amendment. Currently, United Nuclear Corporation is addressing source material and implementing on-site surface reclamation actions at the UNC Site under the direction of the NRC, pursuant to United Nuclear Corporation's NRC license. Disposal of mine waste from the NECR Site within the Tailings Disposal Area at the UNC Site will require acceptance by the NRC and is contingent on an amendment of United Nuclear Corporation's NRC license to allow for disposal. NRC's agreement to amend the United Nuclear Corporation's license to allow this disposal will be necessary to fulfill step two as outlined in the 2011 Non-Time-Critical Removal Action Memorandum (see the second paragraph of this document).

Removal Site Evaluation Report and EE/CA adopted as RI/FS. This Surface Soil OU Proposed Plan summarizes information that can be found in greater detail in the Removal Site Evaluation Report Northeast Church Rock Mine Site (MWH, 2007; RSE), the Engineering Evaluation and Cost Analysis Report Northeast Church Rock Mine Site (EPA, 2009; EE/CA), and other documents contained in the Administrative Record file for the UNC Site. The EPA has adopted the RSE and the EE/CA, including without limitation the findings of the RSE and the EE/CA, as the remedial investigation and feasibility study for the



Adopted from the January 13, 2009, Figure 2 of the Annual Review Report-2010 Ground water Corrective Action by Chester Engineers for United Nuclear Corporation

surface soil OU remedial action at the UNC Site. EPA and NMED encourage the public to review these documents to gain a more comprehensive understanding of the UNC Site, NECR Site, and Superfund activities that have been conducted.

The process of selecting a remedial action for a NPL site includes a Remedial Investigation and Feasibility Study (RI/FS). The purpose of the RI/FS is to assess site conditions and evaluate alternatives to the extent necessary to select a remedy. Developing and conducting an RI/FS generally includes the following activities: project scoping, data collection, risk assessment, treatability studies, and analysis of alternatives. As explained in the following enumerated paragraphs, the NECR EE/CA, which EPA has adopted as the RI/FS for this UNC Site surface soil OU fulfills the NCP requirements for an RI/FS and the detailed analysis of alternatives. Thus, an EE/CA serves an analogous function to the RI/FS conducted for EPA remedial actions.

1) **Remedial Investigation.** As provided in the NCP at 40 CFR § 300.430(d)(1), the purpose of the remedial investigation is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. To characterize the site, the lead agency (in this case the lead agency is EPA) shall, as appropriate, conduct field investigations, including treatability studies, and conduct a baseline risk assessment.

The NECR EE/CA addresses site characterization in Section 1.5 Source, Nature and Extent of Contamination, which includes the following sub-sections which describe field investigations and studies of the NECR Site mine waste—the waste that will be brought to the UNC Site under EPA's preferred alternative:

- 1.5.1 Source: Radium and Uranium Laden Mine Wastes
- 1.5.2 Areas of Concern
- 1.5.3 Soil Contamination

It is appropriate to use the information gathered for the NECR EE/CA to characterize the release that will be addressed at the UNC Site because the mine waste characterized in the EE/CA is the mine waste that will be brought to the UNC Site.

Section 1.5 also includes subsection 1.5.5 Human Health Risk Evaluation which describes the risk posed by the mine waste that is to be brought to the UNC Site under EPA's preferred alternative. If EPA were to undertake a baseline human health risk assessment (BHHRA) for the UNC Site as it exists today, based on previous cleanup activities and ongoing monitoring data, EPA anticipates that there would be no significant risk. Consequently, a BHHRA for the UNC Site would not provide useful information. On the other hand, the human health risk evaluation undertaken at the NECR Site as part of the EE/CA provides pertinent BHHRA information because it describes the risk posed by the mine waste that EPA proposes to bring to the UNC Site if no action were to be taken to encapsulate or otherwise protect the public from that mine waste. Accordingly, it is more appropriate for EPA to rely on the Human Health Risk Evaluation undertaken for the NECR EE/CA than it would be for EPA to undertake a BHHRA at the UNC Site.

2) **Feasibility Study.** As provided in the NCP at 40 CFR § 300.430(e), the primary objective of the feasibility study is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected. The lead agency (the lead agency is EPA) may develop a feasibility study to address a specific site problem or the entire site. The development and evaluation of alternatives shall reflect the scope and complexity of the remedial action under consideration and the site problems being addressed. Development

of alternatives shall be fully integrated with the site characterization activities of the remedial investigation. The lead agency shall include an alternatives screening step, when needed, to select a reasonable number of alternatives for detailed analysis.

For the UNC Site surface soil OU, the disposal of the NECR mine waste at the UNC Site was among the alternatives evaluated under the screening criteria identified by the NCP at 40 CFR § 300.430(e)(7) (*i.e.,* effectiveness, implementability, and cost) in EPA's 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site. That is, as appropriate, and to the extent sufficient information was available, the short and long-term aspects of the criteria of effectiveness, implementability, and cost were used to guide the development of the alternatives considered for the disposal of the NECR Site mine waste; thus, the NECR Site 2011 Non-Time-Critical Removal Action Memorandum effectively applied the remedial action screening criteria identified by the NCP at 40 CFR § 300.430(e)(7) to the alternatives considered. Those alternatives included the alternative that EPA proposes as its preferred alternative for the surface soil OU at the UNC Site. The evaluation (*i.e.,* the screening) of the various alternatives is described in the NECR EE/CA at section 4.0 Analysis of Alternatives. In subsections 4.3, 4.4, 4.5, 4.6, and 4.7, the screening criteria of effectiveness, implementability, and cost are applied to each of the alternatives considered. In NECR Site EE/CA subsection 4.7, consolidation of the NECR Site mine waste in disposal cells on the UNC Site was evaluated for effectiveness, implementability and cost—the three criteria that the NCP prescribes for screening of remedial action alternatives under 40 CFR § 300.430(e)(7).

3) **Detailed analysis of alternatives.** As part of the NCP remedy selection process, a detailed analysis shall be conducted on the limited number of alternatives that represent viable approaches to remedial action after evaluation in the screening stage. The lead and support agencies (at the UNC Site, EPA and NMED are the lead and support agencies, respectively) must identify their applicable or relevant and appropriate requirements (ARARs) related to specific actions in a timely manner and no later than the early stages of the comparative analysis. The lead and support agencies may also, as appropriate, identify other pertinent advisories, criteria, or guidance (hereinafter this material is referred to as TBC for "to be considered") in a timely manner. This has been done for the UNC Site, and the ARARs and TBCs are listed in Table 1.

The part of the remedy selection process known as the detailed analysis consists of an assessment of individual alternatives against each of nine evaluation criteria and a comparative analysis that focuses upon the relative performance of each alternative against those criteria. The nine evaluation criteria are as follows:

Threshold Criteria
1. Overall protection of human health and the environment
2. Compliance with ARARs

Primary Balancing Criteria
3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility or volume
5. Short-term effectiveness
6. Implementability
7. Cost

Modifying Criteria
8. State acceptance
9. Community acceptance

In the NECR Site EE/CA, these nine criteria were used to evaluate the various alternatives for disposing of the NECR mine waste. The disposal of NECR Site mine waste within disposal cells in the Tailings Disposal Area at the UNC Site was one of the alternatives evaluated under the nine criteria. The parts of the NECR Site EE/CA in which the alternatives were evaluated under the nine evaluation criteria can be found in the EE/CA at section 5.0

Comparative Analysis of Removal Action Alternatives and its subsections.

After going through this remedy development and selection process in the NECR Site EE/CA, which in this particular case, as explained above, has all the elements of the NCP remedial action remedy selection process, EPA selected disposal of the NECR mine waste in the disposal cells in the Tailings Disposal Area at the UNC Site. As explained in the 2011 Non-Time-Critical Removal Action Memorandum, however, that disposal is contingent upon "issuance of an appropriate decision document by EPA Region 6 consistent with the NCP, 40 CFR Part 300." As provided in the NCP at 40 CFR 300.430(e)(6), EPA must consider at least a no-action alternative as part of the process of selecting a remedy at an NPL site. Although a no-action alternative was considered for the NECR Site, the EE/CA did not consider a no-action alternative for the UNC Site. Accordingly, this Proposed Plan describes the NCP-consistent analysis that EPA has undertaken with respect to those two remedies: 1) no action to dispose of NECR mine waste at the UNC Site, and 2) disposal of the NECR mine waste within the disposal cells at the Tailings Disposal Area at the UNC Site.

Public Comment. EPA is issuing this Surface Soil OU Proposed Plan as part of its public participation responsibilities under Section 300.430(f)(2) of the NCP. EPA, in consultation with NMED, will consider the preferred alternative as well as other alternatives presented in this Surface Soil OU Proposed Plan and will select the final remedy for the surface soil OU remedial action at the UNC Site after reviewing and considering all information submitted during the 60-day public comment period. EPA, in consultation with NMED, may modify the response action presented in this Surface Soil OU Proposed Plan based on new information or community comments including comments of Navajo tribal members and the Navajo Nation Environmental Protection Agency (NNEPA). Therefore, the public is encouraged to review and comment on this Surface Soil OU Proposed Plan.

SITE BACKGROUND

Location

The UNC Site is a non-operating uranium mill located approximately 17 miles northeast of Gallup, New Mexico, in McKinley County (Figure 1). The UNC Site is generally comprised of the former ore processing mill facilities and a byproduct material (*i.e.*, tailings) disposal area (hereinafter, Tailings Disposal Area: Figure 4), which cover about 25 and 100 acres, respectively. The UNC Site is owned by United Nuclear Corporation and is located within Section 2, Township 16 North, Range 16 West (EPA, 1988b). In addition to Section 2, United Nuclear Corporation owns the land located northeast of the UNC Site Tailings Disposal Area that is within Section 36, Township 17 North, Range 16 West and is bounded on the north by the Navajo Nation Indian Reservation (Figure 4). Sections 2 and 36 represent the Site Boundary. The area around the UNC Site is sparsely populated and includes Indian tribal trust land and Indian allotted land. To the north of the UNC Site is another former uranium mine identified as Northeast Church Rock Quivira Mine Site (Figure 1). This is a non-NPL site that is being addressed by EPA under a separate action.

The NECR Site is a non-operating uranium mine located within Sections 34 and 35 of Township 17 North, Range 16 West and Section 3 of Township 16 North, Range 16 West at the termination of State Highway 566, approximately 17 miles northeast of Gallup, New Mexico, in McKinley County (Figure 1). It is just northwest of the UNC Site less than about one mile away. The NECR Site is located within an area of approximately 125 acres, the greater part of which is located on lands held by the United States in trust for the Navajo Nation (EPA, 2011b).

According to the Red Water Pond Road Community Association, there are eleven

households or home sites in the immediate vicinity of the NECR and UNC Sites, including 48 families and 110 people (Figure 1). Approximately 25 families reside along Pipeline Road north of the UNC Site and approximately 12 families reside along State Highway 566 south of the UNC Site (EPA, 2009). Several Navajo families have stated they collect herbs and plants from the NECR Site and surrounding area for ceremonial purposes. Apart from the residential areas, the primary land use in the area around the NECR Site and the UNC Site is grazing for sheep, cattle, and horses. The nearest ground water well is located 1.7 miles northeast of the perimeter of the UNC Site and four known operating wells are located within a four mile radius of the UNC Site (EPA, 1988b).

Operation

The NECR Site is a historic uranium mine that was operated by United Nuclear Corporation. Following extensive uranium mineral exploration in the 1950s and 1960s, mining development began at the NECR Site in 1967 and ended in 1982. From approximately 1969 to 1986, large quantities of ground water were pumped from the NECR mine and from the Quivira mines to dewater the underground mine workings (EPA, 2011b). This mine water was discharged to the local arroyo (known as Pipeline Arroyo), which runs across the UNC Site (Figures 1 and 4). A portion of the mine discharge water infiltrated into the subsurface and significantly re-saturated the near-surface alluvium and Zone 1 and Zone 3 of the Upper Gallup Sandstone Formation, creating an artificially high water table beneath the UNC Site (EPA, 2008).

The UNC Site includes a historic uranium mill that was licensed to operate by the State of New Mexico in May 1977. The mill operated from 1977 to 1982, and processed ore primarily from two of United Nuclear Corporation's nearby mines: Northeast Church Rock and Old Church Rock. Uranium ore was processed at the facility using a combination of crushing, grinding, and acid-leach solvent extraction methods. The milling operation produced acidic slurry of ground rock and fluid (tailing) that was pumped into the Tailings Disposal Area which consists of three cells (Figure 4). An estimated 3.5 million tons of tailings were disposed in the tailings impoundments (EPA, 1988a).

Previous Actions

History of EPA involvement at the UNC Site

EPA placed the UNC Site onto the National Priorities List (NPL) of Superfund sites in 1983 [48 Fed. Reg. 40658 (Sept. 8, 1983)] because contaminated liquids had seeped from the tailings at the UNC Site and contaminated the underlying ground water, and because there were toxic emissions to surface water and air (EPA, 1988b). Acidic liquids had seeped from the tailings located in the unlined disposal cells into the underlying alluvium deposits (referred to as the Southwest Alluvium) and also into two deeper zones (Zones 1 and 3) of the Upper Gallup Sandstone Formation, contaminating the ground water with heavy metals, radionuclides such as uranium and radium, and other chemical constituents.

In 1986, the NRC assumed responsibility for the licensing and regulating of uranium mills within the State of New Mexico at the request of the Governor.

In 1988, EPA and NRC signed a Memorandum of Understanding (MOU) regarding the UNC Site [53 Fed. Reg. 37887 (September 28, 1988)]. The EPA and the NRC have overlapping authority in connection with the UNC Site, and the MOU was developed to help assure that remedial actions occur in a timely and effective manner. As stated in the MOU, NRC assumed the role of lead regulatory agency for the byproduct material disposal area (*i.e.*, the Tailings Disposal Area) reclamation and closure activities with EPA monitoring all such activities and providing review and comments directly to NRC while EPA developed and implemented its own site action requirements for ground water contamination outside of the Tailings Disposal Area in accordance with

CERCLA and the NCP. NRC's actions at the UNC Site are taken pursuant to the Source Materials License SUA-1475 (License) and the Uranium Mill Tailings Radiation Control Act of 1978, 42 U.S.C. §7901 *et seq*. As stated in the MOU, EPA may take remedial actions on the UNC Site in order to fulfill its regulatory requirements. In keeping with the MOU, EPA has consulted with the NRC prior to issuing this Surface Soil OU Proposed Plan.

After the UNC Site was listed on the NPL, EPA conducted a ground water Remedial Investigation and a Feasibility Study from 1984 through 1988. Based on the remedial investigation findings, ground water in the Southwest Alluvium, Zone 1, and Zone 3 had been contaminated by acidic tailings seepage. EPA issued a Ground Water Operable Unit Record of Decision (ROD) in September 1988 selecting a remedy for the contaminated ground water that included extraction of the ground water and treatment by evaporation. Extraction wells were completed in the Southwest Alluvium, Zone 1, and Zone 3 downgradient of the Tailings Disposal Area. The remedy selected in the 1988 ROD also included ground water monitoring in the Southwest Alluvium, Zone 1, and Zone 3. EPA identified United Nuclear Corporation as a potentially responsible party (PRP) under CERCLA. EPA issued a CERCLA Unilateral Administrative Order (UAO; Docket No. CERCLA 6-11-89) to United Nuclear Corporation, calling for United Nuclear Corporation to implement the remedy as selected in the ROD. The PRP constructed the remedy in 1989, and continues to address ground water contamination under the 1988 ROD. Ground water monitoring and extraction wells are located at the boundary and downgradient of the Tailings Disposal Area. Ground water monitoring and remediation of the contaminant plumes are ongoing and are being conducted by United Nuclear Corporation under the 1988 ROD. Ground water is not a component of this Surface Soil OU Proposed Plan, which addresses only the proposed disposal of the NECR Site low level threat mine waste at the UNC Site.

History of the NRC and NMED actions at the UNC Site

United Nuclear Corporation undertook the following actions under its NRC License (EPA, 2008). On July 16, 1979, the dam at the south tailings disposal cell at the UNC Site failed sending tons of radioactive tailings waste and approximately ninety-three million gallons of contaminated liquid into the Rio Puerco. The flood left behind radioactive contaminants as well as hazardous heavy metal contamination, and contaminated the Rio Puerco. United Nuclear Corporation repaired the dam shortly after its failure, and cleanup of the resultant spill was conducted according to criteria imposed by state and federal agencies at that time.

Under the direction of NMED, initial corrective actions to address ground water concerns began with tailings seepage investigations and neutralization of the acidic tailings. These actions were performed from 1979 through 1982. Tailings neutralization included the addition of ammonia and lime to the tailings. The NMED also required that United Nuclear Corporation remediate ground water in Zones 1 and 3. This remediation began in 1982 and consisted of installing and operating wells to extract tailings seepage, neutralizing the extracted water, and discharging the neutralized water into the tailings disposal cells (EPA, 1988b).

In 1986, the NRC assumed responsibility for the licensing and regulating of uranium mills within the State of New Mexico. United Nuclear Corporation submitted a draft reclamation plan to NRC in 1987 and the final plan was approved in March 1991 (Canonie, 1991). The NRC required decommissioning of the mill facility, remediation of radium 226 (Ra-226) contaminated soil, capping of the tailings cells, installation of extraction wells, and construction of evaporation ponds and an evaporation system. Some of the key actions that were

completed included final remediation of windblown tailings from Sections 2 and 36 in 1989 (United Nuclear Corporation, 1989), final remediation of windblown tailings from Section 1 in 1990 (United Nuclear Corporation, 1990), mill decommissioning in 1992 (United Nuclear Corporation, 1993), final reclamation of the North Cell in 1993 (Canonie, 1995), final reclamation of the Central Cell in 1994 (Canonie, 1995), and final reclamation of the South Cell in 1995 (Smith Environmental, 1996a). Construction of surface water control structures around the perimeter of the Tailings Disposal Area was completed in 1996 (Smith Environmental, 1997). As stated in this 1996 report, the final remaining reclamation actions include backfilling of the evaporation ponds, capping of the evaporation pond area, and completion of the final drainage swales at the Tailings Disposal Area. The evaporation ponds are currently used and are a part of the ongoing ground water cleanup. Therefore, these final reclamation actions will be completed after remedial actions related to this surface soil OU proposed action are completed and the evaporation ponds are no longer necessary for ground water cleanup.

History of EPA involvement at the NECR Site

United Nuclear Corporation undertook closure activities between 1986 and 1988 under the NRC Source Materials license for the UNC Site including the closure of the ion exchange plant, removal of sludge from the mine water treatment ponds, and closure of the tailings sand backfill areas. Radionuclide contaminated soil and tailings sand from the NECR Site were disposed at the UNC Site in conjunction with UNC mill decommissioning and reclamation activities. The NRC certified these closure actions in 1989 and released the license areas of the mine for unrestricted use (NRC, 1989).

The NECR Site is not on the NPL, and is currently subject to EPA removal actions (Figure 1). Consultations with the Navajo Nation and the State of New Mexico in 2005 resulted in EPA taking the lead on the NECR Site. NNEPA sent a letter to EPA dated March 22, 2005, formally requesting that EPA become the lead agency, and EPA issued a letter formally accepting NECR Site lead on November 7, 2005 (EPA, 2011b).

EPA ordered a Removal Site Evaluation (RSE) investigation, three time-critical removal actions and one non-time-critical removal action related to the NECR Site in the past five years. United Nuclear Corporation was identified as the PRP, and performed the investigation and these removals with EPA, as described below (EPA, 2011b).

In September 2006, EPA entered into an Administrative Order on Consent (AOC) with United Nuclear Corporation. United Nuclear Corporation performed a RSE at the NECR Site and a Supplemental RSE, under oversight by EPA and NNEPA. The RSE report and the Supplemental RSE report were issued in October 2007 (MWH, 2007) and February 2008 (MWH, 2008), respectively.

On April 18, 2007, EPA issued the NECR Site Residential Action Memorandum, which called for the cleanup of contamination in residential areas located near the NECR mine. On May 4, 2007, EPA issued a unilateral administrative order (UAO) to the United Nuclear Corporation. The UAO required United Nuclear Corporation to perform the cleanup described in the NECR Site Residential Action Memorandum. Under the terms of the UAO, United Nuclear Corporation was required to transport and dispose of contaminated soil that had been excavated from the residential areas by EPA. EPA also conducted the sampling to determine the areas that needed to be addressed. Using the EPA-established soil cleanup goal of 2.24 picocuries[3] per gram (pCi/g) Ra-226, removals

[3] Throughout this Surface Soil OU Proposed Plan, the term picocurie is used to indicate the radiation associated with the contaminants present. Radioactive elements are unstable and become other elements known as "daughters" by giving off

were conducted for half-acre areas around four home sites consistent with the Multi-Agency Radiation Survey and Site Investigation Manual guidance and procedures (EPA, 2011b).

The RSE and Supplemental RSE reports identified conditions that indicated an additional removal action (*i.e.*, in addition to the NECR Site Residential Removal Action) will be necessary to reduce or eliminate threats to human health and the environment. Based on this finding, the EPA issued an Engineering Evaluation and Cost Analysis (EE/CA) Report on May 30, 2009 (EPA, 2009). An EE/CA identifies the objectives of the removal action and analyzes the effectiveness, implementability, and cost of various alternatives that may satisfy these objectives. The EE/CA for the NECR Site evaluated removal action alternatives for the NECR Site considering the nature of the contamination, potential risks to human health and the environment, and whether the alternatives were protective considering future land use plans. The EE/CA for the NECR Site identified the removal action objectives, described five removal action alternatives, and assessed the effectiveness, implementability, and cost of each of the five alternatives.

EPA signed the NECR Step-Out Area Interim Removal Action Memorandum on July 23, 2009. Under a July 24, 2009, Administrative Order on Consent (AOC) issued by EPA, United Nuclear Corporation and General Electric (UNC/GE) agreed to undertake the removal action with EPA oversight. The 2009 removal action used 2.24 pCi/g Ra-226 as a cleanup goal. This was the same cleanup goal selected for the 2007 NECR Site Residential Removal Action. The work under the AOC included demolition of existing mine buildings and associated concrete slabs located within the NECR-1[4] footprint; excavation and placement onto the NECR-1 pile of approximately 109,800 cubic yards of soil from the Interim Removal Step Out Area[5] (Figure 1-Step Out Area #1), including approximately 33,000 cubic yards from the on-site arroyo known as the Unnamed Arroyo (Figure 3); excavation and stockpiling of approximately 4,000 cubic yards of contaminated soil; backfilling and restoration of depressions, culverts, and roads with new imported materials; characterization of Red Water Pond Road from Highway 566 to the bridge by the Northeast Church Rock Quivira Mine Site (Figure 1); and fencing, seeding and other restoration activities (EPA, 2011b).

In response to additional supplemental RSE work conducted in the spring of 2011, EPA signed the NECR Time-Critical Removal Action Memorandum for the Drainage East of Red Water Pond Road (Step Out Area #2) on September 26, 2011 (Figure 1-Step Out Area #2). It is anticipated that UNC/GE will enter into an agreement with EPA to undertake the removal action with EPA oversight. In accordance with the NECR Time-Critical Removal Action Memorandum, the removal action will use the same cleanup goal of 2.24 pCi/g Ra-226 that was used during the 2007 and 2009 Removal Actions. The work will include excavation and placement onto the NECR Site

radiation. When one atom of an element becomes its daughter, this is known as "decay". The curie (symbol Ci) is a unit of radioactivity, defined as 1 Ci = 3.7×10^{10} or 37,000,000,000 decays per second. This is roughly the activity of 1 gram of the radium isotope 226Ra, a substance studied by the pioneers of radiology, Marie and Pierre Curie, for whom the unit was named. Pico here means one trillionth. A picocurie (pCi) is one trillionth of the decays per second expected from a gram of the radium isotope 226Ra. This turns out to be about 2.2 decays per minute.

[4] NECR 1 and 2 pads were concrete slab areas that held the ore (including low-grade ore) that was mined from the NECR Mine. The stockpiled ore was then transported from NECR 1 and 2 pads to the UNC Mill for processing. Former mining facility buildings were also located in the NECR 1 area until they were demolished in 2009. However, the material resulting from the demolition remains on the NECR Site.

[5] The part of the NECR Site that is located to the north and east of NECR Site and identified as Step Out Area #1 on Figure 1.

of approximately 30,000 cubic yards of soil from the area east of Red Water Pond Road.

During all previously mentioned removal actions and in close coordination with EPA Community Involvement Coordinators, UNC/GE arranged for temporary housing for three households for approximately five months. EPA also temporarily moved residents from six additional households for approximately two months.

EPA provided a 90-day public comment period for the NECR EE/CA and received numerous written public comments. During the comment period, EPA held one public meeting (June 23, 2009) and two public hearings (July 7, 2009 and August 25, 2009). All public meetings, hearings, and dates of the comment period and its extension were advertised in the *Gallup Independent* and the *Navajo Times*. After the official public comment period ended, EPA continued community involvement efforts during the following 24 months to listen and respond to community, stakeholder and Navajo Nation concerns. During this time frame, EPA conducted ten additional community events, including meetings, site tours, and workshops.

Over this extended 24 month period, EPA performed additional data analyses based on community comments and concerns received. EPA performed additional evaluations on 11 alternate disposal locations that could potentially be used for disposal of the NECR Site mine waste (EPA, 2011a). These alternate locations included licensed facilities, current Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA) Sites with similar mine waste disposal, and locations where new licensed facilities potentially could be built (EPA, 2011a). As EPA reviewed the possible locations where the NECR Site mine waste could be disposed, EPA looked at the condition of the location in question, and EPA researched the legal and regulatory standards that would impact whether additional disposal could occur at the location in question. After consideration of the administrative, legal and cost challenges presented by each of the 11 alternate locations reviewed, the UNC Site was identified as the most suitable (EPA, 2011a). In addition, as explained in the EE/CA and summarized in the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site (EPA, 2011b), on-site disposal of the NECR Site mine waste at the NECR Site was rejected by the Navajo Nation and the community[6].

The EPA and the other regulatory agencies involved in the NECR cleanup share the community's concerns that the design of the NECR disposal cells at the UNC Site be robust enough to protect against any migration of contamination to the surrounding land, air, surface water, or ground water. As a result, various locations, other than the Tailings Disposal Area and within the boundary of the UNC Site, were evaluated to determine if these locations could be used for disposal. Two areas on the UNC Site were identified as potentially large enough to accommodate the volume of mine waste expected to be excavated from the NECR Site. One location considered is found just to the northeast of the Tailings Disposal Area's North Cell (Figure 4). Disposal in this location would not be acceptable as it would require the plugging and abandonment of all wells associated with the ongoing ground water remedial action. The second location considered lies within the decommissioned UNC Mill Facility (Figure 4). EPA found the UNC Mill Facility area to be too small to accommodate the estimated volume of the NECR Site mine waste that must be disposed there (EPA, 2010). In such a small area, disposal and capping activities would have required a slope too steep to maintain for proper mine waste containment. The UNC Mill Facility location also presented

[6] In EPA's Action Memorandum for the Non-Time Critical Removal Action at the NECR Site (September 2011), EPA rejected any disposal on the NECR Site because of the objections of the Navajo Nation and the local community.

additional challenges for long-term protectiveness given its proximity to Hwy 566.

In response to concerns raised by the community, EPA reviewed documents related to the construction of the Tailings Disposal Area, in order to determine the load effect that the additional mine waste from the NECR Site would have on the tailings already disposed in the Tailings Disposal Area. Further, at the request of EPA, United Nuclear Corporation developed computer models that simulated what would happen to the tailings in the Tailings Disposal Area under various scenarios (Dwyer, 2011). The models showed that, due to evapotranspiration, vertical drainage and the lack of water recharge, excess free water no longer existed within the tailings now located in the Tailings Disposal Area. The modeling indicated that the remaining water in the tailings now located in the Tailings Disposal Area is within the water storage capacity of the tailings and will be held within the pore spaces. Any reduction in the tailings' soil porosity due to the loading or weight of the additional NECR mine waste is not expected to create excess or new free water that could be "squeezed" out. Based on conservative evaluations of the tailings profiles and model sensitivity analyses, adding the mine waste from the NECR Site to the tailings in the Tailings Disposal Area at the UNC Site is not expected to result in the release of additional tailings liquid into the ground water or surrounding soil. Based on these conclusions, disposal of the NECR Site mine waste at the UNC Site Tailings Disposal Area is not expected to interfere with or affect the ongoing remediation efforts regarding tailings or ground water at the UNC Site. EPA recognizes the limitations of the simulations and model results. During remedial design, additional data will be collected and evaluated to further refine, support, and verify these conclusions.

EPA also reviewed the Mill Decommission Report (UNC, 1993) and the Borrow Pit No. 2 Final Reclamation Report (Smith, 1996b). These reports documented the placement of the debris (*e.g.*, concrete, steel, and wood) within the Tailings Disposal Area. Based on this documentation, it appears that the debris was placed in the Tailings Disposal Area in layers, flattened, mixed and covered with soil, and compacted resulting in a stable cell that has had negligible settling over the almost 20 years since disposal. Consequently, it is expected that the additional weight that the mine waste from the NECR Site will add to the tailings that are presently in the UNC Site Tailings Disposal Area will have negligible consequences on the stability of the tailings cells (EPA, 2011b). Placement of mine waste within the Tailings Disposal Area will be designed and constructed in such a manner that promotes material stability and reduces the potential for future subsidence.

Following this extensive EE/CA public involvement process, EPA signed the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site on September 29, 2011. EPA responded to all public, State, and Navajo Nation comments in a Responsiveness Summary provided as Attachment III to the 2011 Non-Time-Critical Removal Action Memorandum (EPA, 2011b). The removal action described in the 2011 Non-Time-Critical Removal Action Memorandum calls for the excavation of mine waste from the NECR Site and placement of the mine waste at a location or a facility that EPA determines to be acceptable for the receipt of CERCLA waste under applicable laws. Using the information gained during the public involvement process and presented in the Responsiveness Summary, the location selected for disposal in the 2011 Non-Time-Critical Removal Action Memorandum, is the nearby UNC Site. Disposal at the UNC Site, however, is contingent upon both issuance of an appropriate decision document for the UNC Site consistent with the NCP, 40 CFR Part 300 (Step 1), and modification of the license issued by the NRC for the UNC Site (Step 2).

SITE CHARACTERISTICS

UNC Site

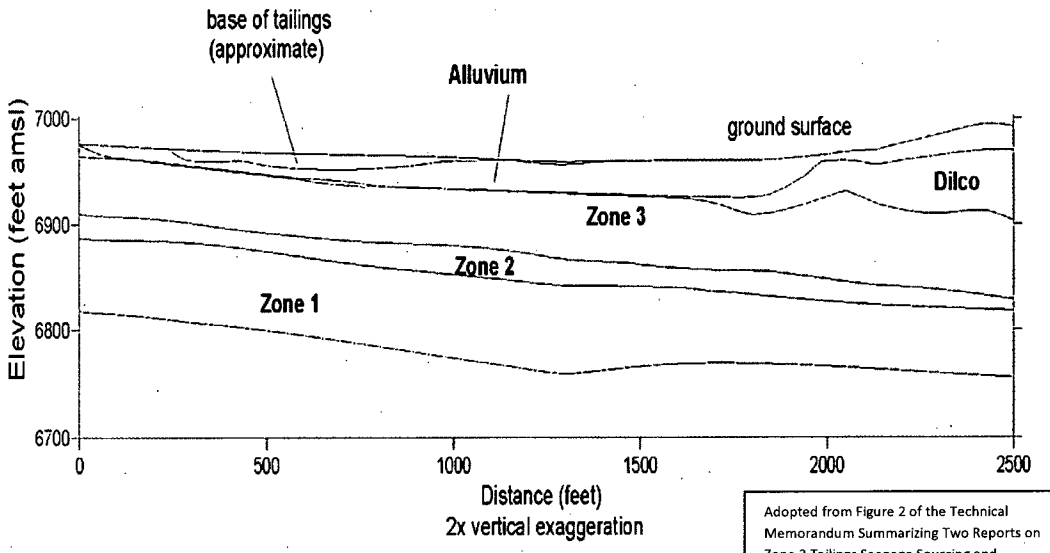
At the UNC Site, there are two agencies with overlapping jurisdiction—EPA and NRC. As stated in the MOU, NRC assumed the role of lead regulatory agency for the Tailings Disposal Area reclamation and closure activities with EPA monitoring all such activities and providing review and comments directly to NRC while EPA developed and implemented its own site action requirements for ground water contamination outside of the Tailings Disposal Area in accordance with CERCLA and the NCP.

Ground Water

The Remedial Investigation Report (EPA, 1988a) discussed ground water contaminant sources and migration pathways at the UNC Site. Two major sources of recharge to the UNC Site aquifers were identified: infiltration of surface water within Pipeline Arroyo during mine water discharge and tailings seepage water from the active Tailings Disposal Area (Figure 4). To a lesser extent, direct precipitation supplies recharge water to the aquifers.

The UNC Site is underlain by three aquifers. From the geologically youngest to the oldest, these units are referred to as: (1) Southwest Alluvium (unconsolidated materials along Pipeline Arroyo, having a maximum thickness of approximately 150 feet (ft) and a maximum width of approximately 4,000 ft); (2) Zone 3 (uppermost stratigraphic unit of the Upper Gallup Sandstone, having a thickness of 70 to 90 ft in the area of the Tailings Disposal Area); and (3) Zone 1 (lowest stratigraphic unit of the Upper Gallup Sandstone, having a thickness of 80 to 90 ft in the area of the Tailings Disposal Area). In some areas, Zones 1 and 3 are in contact with the alluvium at the Tailing Disposal Area. Zone 1 and Zone 3 are separated by Zone 2. Zone 2 is a unit of coal and shale approximately 15 to 20 ft thick which acts as an aquiclude, strongly inhibiting vertical water migration from Zone 3 to Zone 1 (EPA, 2008; Figure 5).

From approximately 1969 to 1986, the large quantities of ground water pumped from the NECR and Quivira mines to dewater the underground mine workings (EPA, 2011b) was discharged to Pipeline Arroyo, which runs across the UNC Site (Figures 1 and 4). A portion of the mine discharge water, estimated at up to 250 gallons per minute (EPA, 1988a), infiltrated into the subsurface and significantly re-saturated the Southwest Alluvium, Zone 3, and Zone 1 creating an artificially high water table beneath the UNC Site (EPA, 2008).



Adopted from Figure 2 of the Technical Memorandum Summarizing Two Reports on Zone 3 Tailings Seepage Sourcing and Groundwater Recharge, with Information Update United Nuclear Corporation's Church Rock Tailings Site, Gallup, New Mexico by Chester Engineers for United Nuclear Corporation.

FIGURE 5
Northwest-looking view across the North Cell

In addition to mine water infiltration through Pipeline Arroyo, tailings seepage water from the active Tailings Disposal Area infiltrated and contaminated all three aquifers. Seepage of tailings liquids entered the Southwest Alluvium from the three Tailings Disposal Area cells to varying degrees. The mechanism responsible for this transport is gravity flow of water through the tailings into the Southwest Alluvium. Where the Southwest Alluvium is absent, tailings seepage has entered Zone 3 in the northeastern portion of the North Cell where Zone 3 contacts the tailings and Zone 1 in the eastern portion of the Central Cell where Zone 1 contacts the tailings (EPA, 1988b).

By 1986, all mine dewatering activity had ceased. With the cessation of mine dewatering, ground water recharge from this surface water source through Pipeline Arroyo no longer occurs (except during precipitation events). Water levels in all three aquifers have continued to decline. Current ground water levels in the Southwest Alluvium, Zone 3, and Zone 1 are below the bases of the Tailings Disposal Area cells. Water level data from October 2002 show as much as 40 to 70 ft of unsaturated alluvium separating the tailings deposits from the ground water present in the Southwest Alluvium (USFilter, 2004). Water level data from October 2003 show at least 60 ft of unsaturated material separates the bottom of the tailings from the ground water found in Zone 3 (USFilter, 2004). Water level data from October 2012 show as much as 17 to 29 ft of unsaturated material separating the tailings deposits from the ground water present in Zone 1 (Chester, 2012). Presently, these conditions remain unchanged and without a substantial rise in the water table, contact between the ground water and the tailings will not occur (Chester, 2011).

In short, since mine dewatering ceased upgradient of the Tailings Disposal Area, and since the tailings cells were reclaimed, the ground water table lies as much as 17 to 70 ft below the disposal cells in the Tailings Disposal Area. This is important because it means that mine waste from the NECR Site can be stored in the cells at the Tailings Disposal Area without direct contact with the ground water. In addition, modeling of the tailings showed that, due to evapotranspiration, vertical drainage and the lack of water recharge, excess free water no longer exists within the tailings now located in the Tailings Disposal Area (Dwyer, 2011). The remaining water in the tailings now located in the Tailings Disposal Area is within the water storage capacity of the tailings and will be held within the pore spaces. Any reduction in the tailings' soil porosity due to the loading or weight of the additional NECR mine waste will not create excess or new free water that could be "squeezed" out. Based on conservative evaluations of the tailings profiles and model sensitivity analyses, adding the mine waste from the NECR Site to the tailings in the Tailings Disposal Area at the UNC Site is not expected to result in the release of additional tailings liquid into the ground water or surrounding soil. Based on these conclusions, disposal of the NECR Site mine waste at the UNC Site Tailings Disposal Area is not expected to interfere with or affect the ongoing remediation efforts regarding tailings or ground water at the UNC Site. EPA recognizes the limitations of the simulations and model results. During remedial design, additional data will be collected and evaluated to further refine, support, and verify these conclusions.

Extraction and evaporation of contaminated ground water to remove contamination was selected as the ground water remedy for the UNC Site and documented in the 1988 EPA ROD. Ground water monitoring and extraction wells are located at the boundary and downgradient of the Tailings Disposal Area. Ground water monitoring and remediation of the contaminant plumes are being conducted by United Nuclear Corporation, are ongoing, and will continue under the 1988 ROD as a separate remedial action. Ground water is not a component of this Surface Soil OU Proposed Plan, which addresses only the proposed disposal of the NECR Site low level threat mine

waste at the UNC Site. Mine waste disposal within the Tailings Disposal Area is not expected to interfere or affect the current ground water remediation efforts. Mine waste disposal will be designed and constructed to provide for continued protection against contaminant migration into the ground water (see Summary of Remedial Alternatives section) in support of ongoing ground water remediation efforts.

Tailings Disposal

The UNC mill was designed to process 4,000 tons of ore per day. The UNC mill used a conventional crushing, grinding, and acid leach solvent extraction method to extract uranium. The average ore grade processed at the mill was approximately 0.12 percent U_3O_8 (EPA, 1988). The crushing, grinding, and milling processes produced tailings that were an acidic waste of ground ore and fluid. An estimated 3.5 million tons of tailings were disposed in the unlined impoundments (EPA, 1988) located within the Tailings Disposal Area.

During the development of the Tailings Reclamation Plan (Canonie, 1991), United Nuclear Corporation's contractor, Canonie Environmental Services Corp. (Canonie), conducted extensive field investigations to develop a comprehensive reclamation plan. Based on characterization data collected from the uranium ore in 1976, the mineral composition of the ore host rocks was determined to consist of 78 to79 percent quartz, 2 to 3 percent calcite, and 18 to 20 percent kaolinite and feldspars. Accordingly, the tailings would be expected to approximately reflect these coarse to fine ratios of about 80 percent coarse tailings (quartz/calcite) and 20 percent fine tailings (kaolinite/feldspars: Canonie, 1991).

The coarse tailings typically produce lower radon emissions than the fine grained fraction. Field investigation data collected in 1986 showed the coarse tailings to have a range of 108 to 227 pCi/g radium with an average radium content of 154 pCi/g. Data for the fine-grained tailings showed a range of 285 to 1099 pCi/g radium with an average radium content of 547 pCi/g. From 1993 through 1995 and in accordance with the Tailings Reclamation Plan, United Nuclear Corporation's contractors performed reclamation action for the Tailings Disposal Area. During reclamation actions, the tailings were regraded so that coarse tailings or other material (*i.e.,* windblown tailings) covered the fine-grained tailings to provide a minimum seven-foot thickness of coarse tailings over the fine-grained tailings. The purpose was to minimize radon emissions from the tailings and reduce the amount and thickness of soil that would be needed to cover the Tailings Disposal Area, including the coarse tailings which were placed on top of the fine tailings. The tailings disposal cell caps were constructed using 18 to 24 inches compacted soil which was overlain with 3 inches of rock mulch. The final layer consisted of compacted soil.

NECR Site

The NECR Site consists of two mine shafts, two uranium ore waste piles, and several mine vent holes. Operations at the NECR Mine left uranium protore (low grade ore), waste rock, and overburden after the mine was shutdown. The mine wastes consists of uranium-bearing waste rock that produces uranium daughter products during decay[7], in particular radium. The decay process releases alpha, beta, and gamma radiation. Radium can be found in air and soil and produces airborne radon gas. For the purposes of this Surface Soil OU Proposed Plan, the term mine waste refers to NECR Site

[7] In nuclear science, the decay chain refers to the radioactive decay of different discrete radioactive isotopes. Decay occurs when these isotopes emit particles. Most radioactive isotopes do not decay directly to a stable state, but rather undergo a series of decays until eventually a stable isotope is reached. Decay stages are referred to by their relationship to previous or subsequent stages. A parent isotope is one that undergoes decay to form a daughter isotope. The daughter isotope may be stable or it may decay to form a daughter isotope of its own. The intermediate stages often emit more radioactivity than the original isotope. One of uranium's daughter products is the more radioactive Ra-226.

soil that is contaminated with hazardous substances that are either radioactive or heavy metals.

During the 2006 RSE field investigation of the NECR Site, United Nuclear Corporation performed scan and static gamma surveying and surface [<0.5 feet below ground surface (ft bgs)] and subsurface (>0.5 ft bgs) soil sampling. The results of the gamma radiation surveys and soil sampling indicated that surface and subsurface soil contain high concentrations of Ra-226 and uranium. For surface soil, Ra-226 values ranged from 0.8 to 875 pCi/g and uranium values ranged from 0.7 to 3,970 milligrams per kilogram (mg/kg). For subsurface soil, Ra-226 values ranged from 0.6 to 438 pCi/g and uranium values ranged from 0.7 to 760 mg/kg.

Soil sample results indicated that other stable metals such as molybdenum, selenium and vanadium were present. The sampling results showed that concentration levels of these metals were either below human health screening levels[8] or appeared to be within the concentration range observed in the background area and do not appear to be associated with mining or milling operations. Exceptions to this occurred at only one operational area, NECR-1, where selenium was detected at a concentration above background but below the human health screening level. There were four detections of molybdenum concentrations above background (an undetectable concentration of molybdenum was defined as "non-detect" for background) but below the human health screening level at NECR-1.

Arsenic was also detected in surface soil at concentrations ranging from non-detect to 14.9 mg/kg, and it was detected in the subsurface soil at concentrations ranging from non-detect (<0.5) to 13.9 mg/kg. All sampling results found arsenic soil concentrations to be at levels below screening levels that EPA uses to determine whether there would be a human health risk associated with residential use of the area tested due to the toxicity of arsenic that is not associated with arsenic's carcinogenic properties.[9]

Based on the results from the gamma radiation surveys and soil sampling conducted by United Nuclear Corporation, there is an estimated 871,000 cubic yards of mine waste at the NECR Site that is to be addressed. The following former operational areas were identified in the 2011 Non-Time-Critical Removal Action Memorandum as areas of concern for mine waste contamination at the NECR Site and are referred to collectively as the Consolidation Areas in this Surface Soil OU Proposed Plan (Figure 3; EPA, 2011b):

- *NECR 1 and NECR 2.* NECR 1 and 2 pads were concrete slab areas that held the ore (including low-grade ore) that was mined from the NECR Mine. The stockpiled ore was then transported from NECR 1 and 2 pads to the UNC Mill for processing. Former mining facility buildings were also located in the NECR 1 area until they were demolished in 2009. However, the material resulting from the demolition remains on the NECR Site.
- *NECR-1 "Step-Out Area".* The part of the NECR Site that is located to the north and east of NECR-1 is identified as the step-out area. The Step-Out Area includes the former trailer park, former fuel storage area,

[8] Soil screening is a tool developed by EPA to help standardize and accelerate the evaluation and cleanup of contaminated soils where future residential land use is anticipated. Soil screening levels are contaminant concentrations which EPA uses to identify areas needing further investigation. That is, if EPA finds contaminant concentrations that exceed screening levels in part of a contaminated site, EPA will take a closer look at that area, conducting more sampling to determine whether there are contaminants in that part of the site that should be remediated.

[9] Arsenic is both a systemic toxin and a carcinogen. The screening level used here looked at the risk to human health posed by arsenic as a systemic toxin.

sediment pond, ion exchange plant, and other areas containing mine waste.

- *Sandfills 1, 2 & 3.* During closure of the UNC Mill, the sandfill areas were used as temporary staging grounds for tailings material that had been processed through the UNC Mill Site facility. The material was staged in the sandfill areas until disposed of in the mine stopes.[10]
- *Ponds 1, 2, 3 and 3a, plus surrounding areas affected by mine wastes, including Unnamed Arroyo #1.* The ponds held stormwater and water pumped from the NECR Site mine during dewatering. The water was subsequently treated in the ponds prior to discharge (under NPDES[11] permit) to the Unnamed Arroyo (Arroyo #1).
- *Sediment Pad.* The sediment pad was a holding area for sediments that were regularly removed from the ponds. The sediment was held at the Sediment Pad until transferred to the UNC Mill facility.
- *Former Magazine Area.* Storage area for blasting materials for the mining operation.
- *Vents 3 and 8 combined areas.* The vents were for the underground mining operation.
- *Boneyard.* Refuse and discarded equipment from the NECR Mine were stored here.
- *Non-Economic Material Storage Area.* This area was for storage of the mine overburden and low-grade ore (unmarketable materials).

Note: The approximate 871,000 cubic yards is part of the overall estimated 1,000,000 cubic yards of NECR mine waste.

Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP §300.430(a)(l)(iii)(A)). In general, principal threat wastes (PTWs) are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. As presented in the 2011 Non-Time-Critical Removal Action Memorandum, all wastes containing either 200 pCi/g or more of Ra-226 and/or 500 milligrams per kilogram (mg/kg) or more of total uranium present a significant risk to human health should exposure occur; therefore, based on the toxic nature of these wastes, they are considered PTW. The PTWs on the NECR Site are primarily associated with Ponds 1, 2, and 3, and the estimated volume is approximately 10,000 cubic yards (EPA, 2011b). Under the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site (September 2011), the PTW at the NECR Site would be reprocessed to reclaim metals and radionuclides. If reprocessing technologies are not technically feasible, or are not available within a reasonable

What is a "PRINCIPAL THREAT"?

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, surface water or air, or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, Non-Aqueous Phase Liquids (NAPLs) in groundwater may be viewed as source material. Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained, or would present a significant risk to human health or the environment should exposure occur. The decision to treat these wastes is made on a site-specific basis through a detailed analysis of the alternatives using the nine remedy selection criteria. This analysis provides a basis for making a statutory finding that the remedy employs treatment as a principal element.

[10] A stope is an open space left behind when wanted ore is removed from an underground mine leaving behind an open space known as a stope.
[11] National Pollution Discharge Elimination System, part of the Clean Water Act.

time frame as determined by the On-scene Coordinator handling the removal action at the NECR Site, then the PTW will be disposed in a facility, other than the UNC Site, that has been determined by EPA to be acceptable under the Off-site Rule, 40 CFR § 300.440. No PTW from the NECR Site will be sent to the UNC Site. This Surface Soil OU Proposed Plan for the UNC Site addresses only whether the low level threat mine waste from the NECR Site will be disposed at the UNC Site as a surface soil OU remedial action; accordingly, this Surface Soil OU Proposed Plan is not concerned with the PTW from the NECR Site. The waste acceptance criteria for mine waste that will be disposed at the UNC Site Tailings Disposal Area are 200 pCi/g or less of Ra-226 and/or 500 mg/kg or less of uranium.

Similarity of Mine Waste found at the NECR Site to Tailings found at the UNC Site

United Nuclear Corporation operated both the NECR Mine and the UNC Mill. Mining development began at the NECR Mine in 1967. In 1977, the UNC Mill began receiving and processing ore from the NECR Mine. Uranium ore was processed at the UNC Mill using a combination of crushing, grinding, and acid-leach solvent extraction methods that produced acidic slurry of ground rock and fluid (tailing) that was pumped into the Tailings Disposal Area at the UNC Site. Operations at the NECR Mine left uranium protore (low grade ore), waste rock, and overburden spread throughout the NECR Site after the mine was shutdown. The mine wastes at the NECR Site consist of uranium-bearing waste rock that produces uranium daughter products during decay, in particular radium.

On January 29, 1979, the New Mexico Environmental Improvement Division authorized United Nuclear Corporation's use of coarse sand tailings from the UNC Mill for backfilling excavated mine stopes at the NECR Mine. The tailings sands were stockpiled at three locations prior to use as backfill in the stopes. Rainfall runoff from the stockpile areas was routed to four mine dewatering ponds, where it was treated in an ion exchange circuit prior to discharge into the nearby arroyo. Pond sediments were periodically dredged and stored on a muck pad located near the ponds, prior to being transported to the UNC Mill for processing and disposal within the Tailings Disposal Area (NRC, 1989).

In 1988, under oversight of the NRC, United Nuclear Corporation cleaned up the three stockpile areas, the four ponds, and the muck pad that were contaminated by uranium byproduct (*i.e.,* tailings) material[12]. Because operations at the NECR Mine left non-byproduct mine waste [uranium protore (low grade ore), waste rock, and overburden] throughout the NECR mine area, it was difficult for United Nuclear Corporation to determine whether areas were contaminated as a result of uranium tailings material or whether the contamination was indicative of the presence of non-byproduct mine waste. This was particularly true in areas where mine waste or naturally radioactive rock outcropings masked uranium tailings material contamination (NRC, 1989).

Identification of uranium tailings material could not be determined by measuring the radium content or using surface gamma surveys. Because the milling process was over 90% efficient at removing uranium, uranium would be expected to be essentially absent from the uranium tailings material while the radium remained present. United Nuclear Corporation used a uranium to radium ratio to distinguish uranium tailings material from non-byproduct mine waste (NRC, 1989). Consequently, whenever this ratio was found in soil, United Nuclear Corporation excavated the contaminated soil until concentrations of radium

[12] Uranium byproduct material means the tailings or wastes produced by the extraction or concentration of uranium from any ore processed primarily for its source material content. *See* 40 CFR 192.31.

at the bottom of the excavated area met the cleanup level of 5 pCi/g Ra-226 above background concentrations (NRC, 1989). United Nuclear Corporation transported all soil contaminated with uranium tailings material from the NECR Site to the UNC Site for disposal within the Tailings Disposal Area (NRC, 1989).

Data for the primary contaminant of concern, radium, are similar for the mine waste located at the NECR Site and the tailings located at the UNC Site. The data provided for the mine waste at the NECR Site indicate that radium concentrations range from 0.8 to 875 pCi/g for surface soil and from 0.6 to 438 pCi/g for subsurface soil. The average radium content of the mine waste at the NECR Site is 30.4 pCi/g. The data provided for the tailings at the UNC Site indicate that radium concentrations range from 108 to 227 pCi/g with an average radium content of 154 pCi/g for coarse tailings and range from 285 to 1099 pCi/g with an average radium content of 547 pCi/g for fine-grained tailings. As defined in the 2011 Non-Time-Critical Removal Action Memorandum, all mine waste that exceeds 200 pCi/g Ra-226 is considered a principal threat waste and will not be disposed on the UNC Site. Consequently, Ra-226 concentrations in any mine waste that would be taken from the NECR Site to the Tailings Disposal Area at the UNC Site will be lower than the Ra-226 concentrations present in the tailings now disposed within the Tailings Disposal Area.

The mine waste from NECR Site and tailings from the UNC Site are similar because contamination is derived from the same uranium source material. Specifically, uranium tailings sand was stockpiled and then used as backfill in the stopes at the NECR Site. As explained above, in 1988, the uranium tailings sand that had been disposed on the surface of the NECR Site was excavated under NRC oversight and disposed within the Tailings Disposal Area at the UNC Site. Consequently, the concentrations of radium, the primary contaminant of concern, in the contamination that remains at the NECR Site, which is being addressed under the 2011 Non-Time Critical Removal Action for the NECR Site, are within the same general range as the concentrations of radium in the uranium tailings material disposed at the UNC Site. In addition, no mine waste exceeding 200 pCi/g Ra-226 will be disposed at the UNC Site within the Tailings Disposal Area.

SCOPE AND ROLE OF THE RESPONSE ACTION

Because of the similarity of threat posed by the mine waste in the areas on the NECR Site where mine waste has been deposited and consolidated (Consolidation Areas) and the threat posed by the tailings in the covered pits and landfills that make up the UNC Site Tailings Disposal Area, as well as the relative proximity of these facilities (less than 1 mile; Figure 1), EPA proposes to use its authority under CERCLA Section 104(d)(4) to temporarily combine the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area for the purpose of remediation. The combination of these two areas, the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area, is temporary and for mine waste disposal purposes only.

The combination of the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area would be temporary, because once all the mine waste from the NECR Site Consolidation Areas has been transferred to the UNC Site Tailings Disposal Area, these facilities (*i.e.*, the Consolidation Areas and the Tailings Disposal Area) will no longer be combined within the meaning of Section 104(d)(4). Also, at no time will any of the NECR Site, including the Consolidation Areas be part of the UNC Site for NPL purposes. The UNC Site will continue to be the NPL site, and it will not include the NECR Site. For example, the NECR mine and surrounding area that make up the NECR Site will not be considered when construction completion, close-out, and delisting of the UNC Site from the NPL are considered.

In accordance with EPA's 2011 Non-Time-Critical Removal Action Memorandum, the NECR Site removal action will be undertaken pursuant to Section 104(a)(1) of CERCLA, 42 U.S.C. § 9604(a)(1), and Section 300.415 of the NCP, 40 CFR § 300.415 to mitigate threats to human health and the environment posed by the presence of hazardous substances at the NECR Site. The UNC Site remedial action will be undertaken pursuant to Section 104(a)(1) of CERCLA, 42 U.S.C. § 9604(a)(1), with the remedy selected pursuant to the remedy selection process described in the NCP at 40 CFR § 300.430. After EPA has evaluated comments submitted regarding this Surface Soil OU Proposed Plan, EPA's remedy selection will be documented in the Surface Soil OU Record of Decision (ROD). EPA's response to public comments will be documented in a Responsiveness Summary that is part of the ROD.

This proposed remedial action, referred to as the surface soil OU proposed remedial action, will be taken as an intermediate step prior to final remedial action for the surface soil OU at the UNC Site. From 1992 to 1995, surface reclamation actions for the Tailings Disposal Area were completed under the oversight of the NRC and resulted in the consolidation and capping of the uranium byproduct material (*i.e.*, tailings). Because of the similarity of the threat posed by the mine waste in the areas on the NECR Site where mine waste has been deposited and consolidated (Consolidation Areas) and the threat posed by the tailings located in the UNC Site Tailings Disposal Area, it is appropriate to manage these wastes from the NECR Site and UNC Site together. The mine waste from the NECR Site can be collocated, disposed, and managed together with the tailings in the UNC Site Tailings Disposal Area to address potential health risks. Collocation of the NECR Site mine wastes with the UNC Site tailings will be consistent with and supplemental to the Tailings Disposal Area reclamation actions. The NECR Site mine waste will be consolidated and disposed on top of the tailings within the Tailing Disposal Area followed by capping of the mine waste and tailings. Once the NECR Site mine waste has been disposed in the UNC Site Tailings Disposal Area and all the mine waste and tailings are capped, final reclamations actions, including backfilling of the evaporation ponds, capping of the evaporation pond area, and construction of the final drainage swales at the Tailings Disposal Area, will be completed.

This surface soil OU remedial action at the UNC Site will be consistent with and supplemental to actions that will be necessary for NPL site completion and for deletion of the site from the NPL under CERCLA. This surface soil OU remedial action will address disposal of approximately 1,000,000 cubic yards of mine waste. This includes approximately 871,000 cubic yards from the removal action described in the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site, 109,800 cubic yards from a removal action at the NECR Site that predates the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site, and an estimated 30,000 cubic yards to be excavated as part of a separate time-critical removal action at the NECR Site. The estimated 1,000,000 cubic yards of mine waste from the NECR Site is approximately 1.35 million tons[13]. It is estimated that approximately 3.5 million tons of tailings have been disposed within the Tailings Disposal Area at the UNC Site. The 1.35 million tons of mine waste from the NECR Site represents an approximate volume increase within the Tailings Disposal Area of 38%.

This surface soil OU remedial action does not include approximately 10,000 cubic yards of PTW addressed in the 2011 Non-Time-Critical

13 The estimated volume of mine waste at the NECR site being considered for disposal at the UNC Site within the Tailings Disposal Area is approximately 1 million cubic yards. A conversion factor of 1.35 cubic yards per tons was used to convert the volume from cubic yards to tons.

Removal Action Memorandum for the NECR Site. The waste acceptance criteria for mine waste that will be disposed at the UNC Site Tailings Disposal Area are 200 pCi/g or less of Ra-226 and/or 500 mg/kg or less of uranium.

This surface soil OU remedial action at the UNC Site is independent of the ground water remedial actions that are undertaken by United Nuclear Corporation under the EPA's 1988 ROD for the UNC Site. Ground water monitoring and extraction wells are located at the boundary and downgradient of the Tailings Disposal Area. Ground water monitoring and remediation of the contaminant plumes is ongoing and will continue under the 1988 ROD as a separate remedial action. Ground water is not a component of this Surface Soil OU Proposed Plan, which addresses only the proposed disposal of the NECR Site low level threat mine waste at the UNC Site. Mine waste disposal within the Tailings Disposal Area is not expected to interfere or affect the current ground water remediation efforts. Mine waste disposal will be designed and constructed to provide for continued protection against contaminant migration into the ground water (see Summary of Remedial Alternatives section) in support of ongoing ground water remediation efforts.

The Surface Soil OU preferred alternative proposes the permanent disposal of mine waste from the NECR Site Consolidation Areas within the Tailings Disposal Area at the UNC Site. Accordingly, EPA will issue a final Record of Decision consistent with CERCLA and the NCP for all portions of the UNC Site, including those areas being addressed by the NRC before the UNC Site is deleted from the NPL. All mine waste from the NECR Consolidation Areas and the tailings located within the Tailings Disposal Area at the UNC Site, will be contained on the UNC Site for perpetuity. It is expected that there would be a transfer of the UNC Site to the Department of Energy's (DOE's) Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management. Under this DOE program, the UNC Site would be maintained and managed under the DOE to provide for continued containment and protectiveness.

NRC License Amendment, Step Two: In that the UNC Site is under EPA and NRC jurisdiction and as outlined in the 2011 Non-Time Critical Removal Action Memorandum, disposal of mine waste from the NECR Site within the Tailings Disposal Area at the UNC Site is contingent on two actions.

Step one: EPA issues an appropriate decision document consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300) (NCP) process, including assessment of State and community acceptance, where EPA selects disposal of mine waste from the NECR Site within the Tailings Disposal Area of the UNC Site as a surface soil OU remedy for the UNC Site. This Surface Soil OU Proposed Plan begins EPA's process to fulfill step one.

Step two: Disposal of mine waste from the NECR Site within the Tailings Disposal Area at the UNC Site will require acceptance by the NRC and is contingent on an amendment of United Nuclear Corporation's NRC license to allow for disposal. The license amendment process will begin when United Nuclear Corporation submits for NRC review and evaluation a request for an amendment of its NRC license to accommodate disposal of mine waste from the NECR Site within the Tailings Disposal Area at the UNC Site. NRC's agreement to amend the United Nuclear Corporation's license to allow this disposal will be necessary to fulfill step two.

SUMMARY OF SITE RISKS

At a Superfund site, where EPA is responding to contamination, the NCP calls for a site-specific baseline human health risk assessment (HHRA) to be conducted, as appropriate, as part of the remedial investigation (Section 300.430(d)(1)). The NCP states that the baseline risk assessment should characterize the current and potential

threats to human health and the environment that may be posed by contaminants (Section 300.430(d)(4)). The results of the baseline human health risk assessment will help establish acceptable exposure levels for use in developing remedial alternatives.

What is Risk and How is it Calculated?

A CERCLA human health risk assessment estimates the "baseline risk." This is an estimate of the likelihood of health problems occurring if no cleanup action were taken at a site. To estimate the baseline risk at a CERCLA site, EPA identifies a four-step process:

Step 1: Identify Chemicals of Concern
Step 2: Estimate Exposure
Step 3: Assess Potential Health Effects
Step 4: Characterize Site Risk

In **Step 1**, the risk assessor compiles all the chemical data for a site to identify what chemicals were detected in each medium (i.e. soil and groundwater). Chemicals that are detected frequently at high concentrations, or are considered highly toxic, are considered "chemicals of concern" and are evaluated in the risk assessment.

In **Step 2**, the risk assessor considers the different ways that people might be exposed to the contaminants identified in Step 1, the concentrations that people might be exposed to, and the potential frequency and duration of exposure. Using this information, the risk assessor calculates a "reasonable maximum exposure" (RME) scenario, which portrays the highest level of human exposure that could reasonably be expected to occur.

In **Step 3**, the risk assessor compiles toxicity information on each chemical, including numeric values for assessing cancer and noncancer adverse health affects. The EPA identifies two types of risk: cancer risk and noncancer risk. The likelihood of any kind of cancer resulting from a CERCLA site is generally expressed as an upper bound probability; for example, a "1 in 10,000 chance." In other words, for every 10,000 people that could be exposed, one extra cancer may occur as a result of exposure to site contaminants. An extra cancer case means that one more person could get cancer than would normally be expected to from all other causes. This extra cancer risk due to the site contaminants is also referred to in this proposed plan as an excess lifetime cancer risk. For non-cancer health effects, the risk assessor calculates a "hazard index." The key concept here is that a "threshold level" measured usually as a hazard index of less than 1) exists below which noncancer health effects are no longer predicted.

In **Step 4**, the risk assessor uses the exposure information from Step 2 and toxicity information from Step 3 to calculate potential cancer and noncancer health risks. The results are compared to EPA acceptable levels of risk to determine whether site risks are great enough to potentially cause health problems for populations at or near the CERCLA site.

Since the action contemplated in this Surface Soil OU Proposed Plan is a response to contamination that was found at the NECR Site, the pertinent baseline HHRA is the one that was prepared for the NECR Site. As part of the NECR Site evaluation and under EPA supervision, United Nuclear Corporation performed a baseline HHRA, along with a conceptual site model, and a screening level human health risk assessment. The results of the baseline HHRA are specific to the NECR Site, are summarized here, and can be found in more detail in the RSE Report, the EE/CA, and the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site.

The baseline HHRA for the NECR Site focused on the potential for human health effects from exposure to contaminants at the NECR Site through external radiation from soil and sediment; incidental ingestion, direct contact, and inhalation of soil and sediment; and ingestion of homegrown produce and locally-raised meat and eggs. The populations characterized for the risk assessment included current and future off-site residents, current and future on-site maintenance worker, future on-site resident, and future livestock grazer.

The baseline HHRA for the NECR Site identified unacceptable excess lifetime cancer risk associated with Ra-226 and unacceptable excess non-cancer risk associated with uranium. Ra-226 and uranium are identified as the contaminants of concern (COCs). The excess lifetime cancer risk associated with Ra-226 was estimated at 1×10^{-2}, which means that one person out of 100 persons could be expected to develop cancer, attributable to the NECR Site, over a lifetime of exposure. The excess non-cancer risk associated with uranium was estimated as high as 24. Since 24 exceeds 1, there is a potential for adverse health effects from potential exposure.

The 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site set the NECR Site cleanup level for Ra-226 as 2.24 pCi/g and the NECR cleanup level for uranium as 230 mg/kg.

On the NECR Site, mine waste has been excavated and deposited in certain areas where it is consolidated with mine waste from other parts of the NECR Site. These areas are referred to as the Consolidation Areas. Because of the similarity between the threat posed by the mine waste now located in the Consolidation Areas on the NECR Site and the threat posed by the tailings located in the UNC Site Tailings Disposal Area, these mine wastes can be collocated, disposed, and managed together to address potential health risks. This Surface Soil OU Proposed Plan proposes collocating and disposing of the mine waste from the NECR Consolidation Areas with the tailings already on the UNC Site in the Tailings Disposal Area.

As described previously, EPA reviewed documents related to the construction of the Tailings Disposal Area, in order to determine the load effect that the additional mine waste from the NECR Site would have on the tailings already disposed in the Tailings Disposal Area as well as documentation related to current ground water conditions (see Site Background, Previous Actions, History of EPA Involvement at the NECR Site and Site Characteristics, UNC Site, Ground Water). Based on conservative evaluations of the tailings profiles and model sensitivity analyses (Dwyer, 2011) as well as review of disposal cell settlement data (UNC, 1993; Smith, 1996b), the added mine waste is not expected to result in the release of additional tailings liquid into the ground water or surrounding soil, is not expected to interfere or affect the current tailings or ground water remediation efforts that are currently ongoing, and is not expected to affect the stability of the tailings disposal cells. Current ground water elevation data show that the tailings are not in direct contact with the water table in the Southwest Alluvium, Zone 3, or Zone 1.

Based on the RSE and the EE/CA, EPA determined that actual or threatened releases from the NECR Site, if not addressed by implementing the response action outlined in the 2011 Non-Time-Critical Removal Action Memorandum may continue to present an imminent and substantial endangerment to public health and the environment. This

What are the "Contaminants of Concern"?

The EPA and NMED have identified contaminants in soil that pose the greatest potential risk to human health and the environment. Adverse affects described below are dependent on chemical concentration and exposure duration.

Radionuclides: As uranium breaks down over time, it turns into radium. Radium is a radioactive substance that occurs in two forms, which are also called isotopes, Ra-226 and Ra-228. As radium breaks down over time, it releases alpha, beta and gamma radiation. Radium may be found in air, water and soil and plants may absorb radium in the soil. Breathing in high levels of radium can cause adverse effects to the blood (anemia) and eyes (cataracts). Radium releases alpha radiation, which can have toxic health effects on the lungs. Ra-226 also has been shown to affect the teeth, causing an increase in broken teeth and cavities. Exposure to high levels of radium results in an increased incidence of bone, liver, and breast cancer. The U.S.EPA and the National Academy of Sciences, Committee on Biological Effects of Ionizing Radiation, have stated that radium is a known human carcinogen that can cause cancer (ATSDR, 1999). Inhalation of radium contaminated particulates is of particular concern. Radium emits alpha radiation, which, when inhaled, becomes a source of ionizing radiation in the lung and throat, possibly leading to toxic effects.

Radon: Radon is a naturally occurring gas that comes from radioactive uranium in soil and rocks. Radioactive materials like uranium break down and change over time. Uranium disintegrates into radium, and after more time, radium disintegrates into radon. Since radon is a gas, it moves around easily through soil and flows from the ground into the atmosphere or into homes, schools, and other buildings. Radon gas is odorless, tasteless and transparent, but it can cause health problems. Radon releases alpha particles as it continues to break down. Alpha particles can penetrate lung tissue and cause damage. Breathing in too many alpha particles can cause serious health consequences, including lung cancer. The EPA, Department of Health and Human Resources, and International Agency for Research on Cancer consider radon to be a human carcinogen (ATSDR, 2008). In colder climates where people heat their homes, the warmer air rises. This creates higher pressure upstairs and lowers pressure downstairs. This pressure difference creates a low power vacuum that can suck up radon from the soil underneath the house. This is a major reason why there are elevated levels of radon in some buildings.

determination led to the issuance of the 2011 Non-Time-Critical Removal Action Memorandum (EPA, 2011b) for the NECR Site, which calls for disposal of the NECR mine waste at the UNC Site contingent upon EPA's issuance of an appropriate decision document by EPA Region 6 consistent with the NCP. EPA has determined that the Preferred Alternative identified in this Surface Soil OU Proposed Plan, or some other remedial action alternative that addresses the contamination assessed in the baseline HHRA, is necessary to protect public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

REMEDIAL ACTION OBJECTIVES AND PRELIMINARY REMEDIATION GOALS

This section of the Surface Soil OU Proposed Plan provides the basis for evaluating the remedial alternatives presented in the section, Summary of Remedial Alternatives. When determining which remedial alternative to select at a Superfund site, the NCP requires that EPA establish remedial action objectives. Remedial action objectives are to specify contaminants of concern, media (*e.g.*, soil, water, air), potential exposure pathways, and remediation goals.

Remediation goals consist of medium-specific chemical concentrations that are protective of human health and the environment and serve as goals for the remedial action. To protect human health, EPA has set the acceptable risk range for carcinogens at Superfund Sites from 1 in 10,000 to 1 in 1,000,000 (expressed as 1×10^{-4} to 1×10^{-6}). A risk of 1 in 1,000,000 (1×10^{-6}) means that one person out of one million people could be expected to develop cancer as a result of a lifetime exposure to the site contaminants. Where the aggregate risk from COCs based on existing applicable or relevant and appropriate requirements (ARARs) exceeds $1x10^{-4}$, or where remediation goals are not determined by ARARs, EPA uses the $1x10^{-6}$ as a point of departure for establishing preliminary remediation goals. This means that a cumulative risk level of $1x10^{-6}$ is used as the starting point (or initial "protectiveness" goal) for determining the most appropriate risk level that alternatives should be designed to attain. Factors related to exposure, uncertainty and technical limitations may justify modification of initial cleanup levels that are based on the $1x10^{-6}$ risk level.

The remediation goals described in this Surface Soil OU Proposed Plan are specific to the disposal and containment of mine waste and tailings within the Tailings Disposal Area. Under Clean Air Act rulemaking establishing National Emission Standards for Hazardous Air Pollutants (NESHAPs) for NRC licensees, Department of Energy facilities, and many other

What are Remediation Goals?

Remediation Goals for Carcinogens - To protect human health, EPA has set the acceptable risk range for carcinogens at Superfund Sites from 1 in 10,000 to 1 in 1,000,000 (expressed as 1×10^{-4} to 1×10^{-6}). A carcinogen is a substance that causes cancer or is believed to cause cancer based on scientific studies. A risk of 1 in 1,000,000 (1×10^{-6}) means that one person out of one million people could be expected to develop cancer as a result of a lifetime exposure to the site contaminants. Where the aggregate risk from Contaminants of Concern (COCs) based on existing Applicable or Relevant and Appropriate Requirements (ARARs) exceeds 1×10^{-4}, or where remediation goals are not determined by ARARs, EPA uses the 1×10^{-6} as a point of departure for establishing preliminary remediation goals. This means that accumulative risk level of 1×10^{-6} is used as the starting point (or initial "protectiveness" goal) for determining the most appropriate risk level cleanup alternatives should be designed to attain. Factors related to exposure, uncertainty and technical limitations may justify modification of preliminary remediation goals levels that are based on the 1×10^{-6} risk level.

Remediation Goals for Toxic Non-Carcinogens - For toxic COCs that are not known to cause cancer, the toxicity assessment is based on the use of reference doses (RfDs) whenever available. A reference dose is the concentration of a chemical known to cause health problems. The estimated potential site-related intake of a compound is compared to the RfDs in the form of a ratio, referred to as the hazard quotient (HQ). If the HQ is less than one, no adverse health effects are expected from potential exposure. When environmental contamination involves exposure to a variety or mixture of compounds, a hazard index (HI) is used to assess the potential adverse effects for this mixture of compounds. The HI represents a sum of the hazard quotients calculated for each individual compound. HI values that approach or exceed one generally represent an unacceptable health risk that requires remediation.

kinds of sites, EPA determined that radon emissions of 20 picocuries per square meter per second (pCi/m^2s) results in a maximum individual risk of 1.8×10^{-4} and concluded that a risk level of "1.8×10^{-4} is essentially equivalent to the presumptively safe level of 1×10^{-4}." [54 Fed. Reg. at 51673 (December 15, 1989)]. The remediation goal for radon represents a 1×10^{-4} risk and is set in accordance with the established Clean Air Act NESHAP which is also consistent with Uranium Mill Tailings Radiation Control Act requirements.

The remediation goals described in this Surface Soil OU Proposed Plan are preliminary remediation goals because the actual remediation goals will be selected in EPA's Surface Soil OU Record of Decision.

Remedial Action Objectives. The RAOs for this Surface Soil OU proposed action are:

- Prevent exposure to current and future human and ecological receptors from external radiation, ingestion, dermal contact, and inhalation (*i.e.,* inhalation of associated gas or dust) of soil, mine waste, and tailings contained within the Tailings Disposal Area containing concentrations of radionuclides and their daughter products that exceed preliminary remediation goals.

- Prevent migration [on-site and off-site into soil, sediment, ground water, air (as gas or dust), and surface water] of soil, mine waste, and tailings located within the Tailings Disposal Area containing concentrations of radionuclides and their daughter products such that exposure to current and future human and ecological receptors from external radiation, ingestion, dermal contact, and inhalation (*i.e.,* inhalation of associated gas or dust) of soil, mine waste, and tailings does not exceed preliminary remediation goals.

- Prevent the migration of concentrations of contaminants located in the soil, mine waste, and tailings contained within the Tailings Disposal Area to ground water where the migration of those contaminants would result in ground water concentrations that exceed remediation goals established in EPA's 1988 ROD for the Ground Water Operable Unit (including any amendment), and, through this action, prevent human and ecological receptors from being exposed to ground water with concentrations of contaminants that exceed remediation goals established in the 1988 ROD, including any amendment.

These RAOs pertain to this surface soil OU proposed action which includes the construction (or reconstruction) of parts of the Tailings Disposal Area on the UNC Site to contain the mine waste from the NECR Site.

Preliminary Remediation Goals:

- Radionuclides and their daughter products in soil, mine waste, and tailings contained within the Tailings Disposal Area will not release radon-222 emissions from residual radioactive material to the atmosphere in exceedance of an average[14] release rate of 20 picocuries per square meter per second (pCi/m^2s) [15] [40 CFR §§ 192.02(b)(1) and 192.32(b)(1)(ii)].

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[14] This average shall apply to the entire surface of each disposal area over periods of at least one year. Radon will come from both uranium byproduct materials and from materials used to cover the uranium byproduct materials. Radon emissions from materials used as a cover should be estimated as part of developing a closure plan for each site. The standard, however, applies only to emissions from uranium byproduct materials to the atmosphere [192.32(b)(1)(ii)].

[15] Under Clean Air Act rulemaking establishing NESHAPs for NRC licensees, Department of Energy facilities, and many other kinds of sites, EPA concluded that a risk level of "1.8×10^{-4} is essentially equivalent to the presumptively safe level of 1×10^{-4}." 54 Fed. Reg. at 51673 (December 15, 1989).

- Radionuclides and their daughter products in soil, mine waste, and tailings contained within the Tailings Disposal Area will not release radon-222 emissions from residual radioactive material to the atmosphere that will increase the annual average concentration of radon -222 in air at or above any location outside the disposal site by more than one-half picocurie per liter [40 CFR § 192.02(b)(2)].

- Migration of contaminants from the Tailings Disposal Area shall not result in ground water concentrations that exceed remediation goals established in EPA's 1988 ROD for the Ground Water Operable Unit, including any amendment.

Preliminary Remediation Goals	
Contaminant of Concern	**Preliminary Remediation Goals**
Radon-220 and Radon 222	Average[1] release rate of 20 picocuries per square meter per second (pCi/m^2s)
Radon-220 and Radon 222	annual average concentration in air at or above any location outside the disposal site does not increase by more than one-half picocurie per liter

[1]This average shall apply to the entire surface of each disposal area over periods of at least one year, but short compared to 100 years. Radon will come from both uranium byproduct materials and from covering materials. Radon emissions from covering materials should be estimated as part of developing a closure plan for each site. The standard, however, applies only to emissions from uranium byproduct materials to the atmosphere [192.32(b)(1)(ii)].

Although the preliminary remediation goals in the preceding bulleted items are expressed in terms of concentrations of contaminants in the atmosphere or in terms of the concentrations of migrating contaminants from the Tailings Disposal Area that could result in ground water contamination that exceeds the remediation goals in the 1988 ROD, including any amendment, the concentrations that protect the ambient air in combination with the UNC Site use restrictions and the installation of the cap for containment will be protective with respect to migration and all exposure routes including external radiation, ingestion, dermal contact, and inhalation.

The parts of the Tailings Disposal Area that are to contain the mine waste from the NECR Site will be designed and constructed to meet the RAO's (including the Preliminary Remediation Goals) and to meet ARARs found in 40 CFR Part 192, Subparts A and D; 40 CFR Part 264 Subparts G and K; and 40 CFR Part 61 Subpart H, Subpart Q, and Subpart T (Table 1). The final list of UNC Site ARARs will be presented in the Final Surface Soil OU ROD.

Furthermore, the parts of the Tailings Disposal Area where the mine waste from the NECR Site is disposed will be closed in such a manner that they will control, minimize or eliminate, to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated run-off, or hazardous waste decomposition products to the ground or surface water or to the atmosphere and be effective for one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years. [40 CFR §§ 192.02(a), 192.32(b)(1), 264.111(a), 264.111(b), 264.228(b)(1), 264.228(b)(3), and 264.228(b)(4)].

SUMMARY OF REMEDIAL ALTERNATIVES

As described previously, EPA performed additional evaluations on 11 alternate disposal locations that could potentially be used for disposal of the NECR Site mine waste as well as various locations, other than the Tailings Disposal Area, within the boundary of the UNC Site (see Site Background, Previous Actions, History of EPA Involvement at the NECR Site). After consideration of the administrative, legal and cost challenges presented by each of the 11 alternate locations reviewed, the UNC Site was identified as the most suitable (EPA, 2011a). In addition, as explained in the EE/CA and summarized in the 2011 Non-Time-Critical Removal Action Memorandum for the NECR

Site (EPA, 2011b), on-site disposal of the NECR Site mine waste at the NECR Site was rejected by the Navajo Nation and the community[16]. The two areas on the UNC Site identified as potentially large enough to accommodate the volume of mine waste were determined to be unacceptable. One location considered would not be acceptable as it would require the plugging and abandonment of all wells associated with the ongoing ground water remedial action while the second location was determined to be too small to accommodate the volume of the NECR Site mine waste that must be disposed there (EPA, 2010).

As described previously, EPA reviewed documents related to the construction of the Tailings Disposal Area, in order to determine the load effect that the additional tailings from the NECR Site would have on the tailings already disposed in the Tailings Disposal Area as well as documentation related to current ground water conditions (see Site Background, Previous Actions, History of EPA Involvement at the NECR Site and Site Characteristics, UNC Site, Ground Water). Based on conservative evaluations of the tailings profiles and model sensitivity analyses (Dwyer, 2011) as well as review of disposal cell settlement data (UNC, 1993; Smith 1996b), the added mine waste is not expected to result in the release of additional tailings liquid into the ground water or surrounding soil, is not expected to interfere or affect the current mine waste or ground water remediation efforts that are currently ongoing, and is not expected to affect the stability of the tailings disposal cells. Current ground water elevation data show that the tailings are not in direct contact with the water table for the Southwest Alluvium, Zone 3, or Zone 1.

Given the limited availability of land within the UNC Site boundary, the only location for NECR mine waste disposal at the UNC Site, would be within the UNC Tailings Disposal Area. Based on conservative evaluations of the tailings profiles and model sensitivity analyses as well as review of disposal cell settlement data, adding the NECR mine waste to the Tailings Disposal Area is not expected to result in the release of additional tailings liquid into the ground water or into the surrounding soil. Furthermore, adding the NECR mine waste to the Tailings Disposal Area is not expected to interfere or affect the ongoing mine waste or ground water remediation efforts at the UNC Site, nor is it expected to affect the stability of the tailings disposal cells. EPA recognizes the limitations of the simulations and model results. During remedial design, additional data will be collected and evaluated to further refine, support, and verify these conclusions.

This surface soil OU remedial action at the UNC Site is independent of the ground water remedial actions that are undertaken by United Nuclear Corporation under the EPA's 1988 ROD for the UNC Site. Ground water is not a component of this Surface Soil OU Proposed Plan, which addresses only the proposed disposal of the NECR Site low level threat mine waste at the UNC Site. Ground water monitoring and extraction wells are located at the boundary and downgradient of the Tailings Disposal Area. Ground water monitoring and remediation of the contaminant plumes is ongoing and will continue under the 1988 ROD as a separate remedial action. Mine waste disposal within the Tailings Disposal Area is not expected to interfere or affect the current ground water remediation efforts. Mine waste disposal will be designed and constructed to provide for continued protection against contaminant migration into the ground water (see Summary of Remedial Alternatives section) in support of ongoing ground water remediation efforts.

A total of two remedial alternatives are being considered for the UNC Site with regards to

[16] In EPA's Action Memorandum for the Non-Time Critical Removal Action at the NECR Site (September 2011), EPA rejected any disposal on the NECR Site because of the objections of the Navajo Nation and the local community.

disposal of the mine waste from the NECR Site in the Tailings Disposal Area. These two alternatives are evaluated below in this Surface Soil OU Proposed Plan against the nine NCP criteria found at 40 CFR § 300.430(e)(9)(iii). The Preferred Alternative for the UNC Site is Alternative 2: On-site Disposal at the UNC Site within the Tailings Disposal Area.

Alternative 1: No Action Alternative
Regulations governing the Superfund program require that the "no action" alternative be evaluated to establish a baseline for comparison. Under the no action alternative, the UNC Site Tailings Disposal Area would not be used as the disposal area for the NECR Site mine waste. This would have no impact on the UNC Site in that the UNC Site would remain as it is now.

Alternative 2: On-site Disposal at the UNC Site within the Tailings Disposal Area
Alternative 2 includes the transportation, consolidation, and disposal of NECR Site mine waste at the UNC Site within the Tailings Disposal Area.

The implementation of Alternative 2 will include the following elements:

- Site Controls and Security: During response activities access will be restricted by construction of a temporary fence. Domestic livestock or unauthorized persons would not be allowed to enter.
- Site preparation activities include an underground utility survey to identify and/or verify the location of subsurface utilities in areas scheduled for consolidation and disposal; identification of heavy equipment routes; and temporary stockpiling activities. These temporary stockpiling activities refer to an area where mine waste will be placed in preparation for placement within the Tailings Disposal Area. A land survey will be completed to delineate the parts of the Tailings Disposal Area that will be used for mine waste disposal. Site construction activities necessary to prepare the site for mine waste placement will be completed. Existing structures such as culverts, catch basins, foundations, and vaults will be decontaminated where practical, disassembled for future use, demolished for removal, or included within the disposal area.
- Trained and experienced labor will be used to transport and manage the mine waste. Special certifications and health and safety training requirements to comply with Occupational Safety and Health Administration, radiation, and hazardous material handling requirements will be maintained throughout the project. Graduates trained and certified under the US EPA Superfund Jobs Training Initiative will also be eligible for hiring for identified positions.
- Transportation of all mine waste will be transported in such a manner to mitigate the production of dust, including the use of covers and/or dust suppression actions. A transportation plan will be used to identify the routes of travel, times of operation, and traffic rules. Emergency spill containment and cleanup contingencies would also be included in the transportation plan to address mine waste spills.
- Temporary on-site facilities for project management and project controls will be mobilized to the UNC Site for the duration of the project. Temporary facilities will be constructed for the decontamination of personnel and equipment and the storage of decontamination equipment (e.g., tools, salvageable equipment, passenger vehicles and heavy equipment), and mine waste.
- Natural and cultural resources will be surveyed by a Navajo Nation archeologist and the State and Tribal Historic Preservation Officer will be consulted in accordance with the National Historic Preservation Act. Local residents will be consulted as part of this process.
- Perimeter air monitoring stations will be positioned and operated to monitor

emissions during site preparation, construction, stockpiling, loading of bulk-carriers, stockpile management, consolidation, cover construction and restoration. Dust suppression controls will be implemented to maintain a safe working environment and to protect human health and the environment.

- Stormwater and Erosion Control: Disturbed areas will be graded to reduce scouring and erosion potential using gentle slopes, terraces, earthen ridges and catch drains (swales) as necessary. These controls will also be used to minimize the potential for ponded water, reduce the risk of percolation from ponded water, and divert water away from open disposal locations, construction zones, and exposed mine waste. The drainage patterns in the disturbed areas will be integrated with the existing topography and drainage patterns to the extent possible. During construction activities, stormwater controls may include stormwater control channels (header), weirs, spillways, catch basins, check dams, and sediment basins. These controls will be implemented to maintain a safe working environment, to protect human health and the environment, mitigate off-site migration of mine waste, and protect response construction actions.
- Waste Volume: Approximately 871,000 cubic yards from the removal action described in the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site, 109,800 cubic yards from a removal action at the NECR Site that predates the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site, and an estimated 30,000 cubic yards to be excavated as part of a separate time-critical removal action at the NECR Site will be interred at the Tailings Disposal Area and capped. Although the additional 109,800 and 30,000 cubic yards volume was not included in the EE/CA, the additional volume and associated cost are minimal compared to the overall volume and cost evaluated. In addition the added expense is within the EE/CA's margin of error. Based on this, the additional volume and cost are considered included and addressed under this alternative. The waste acceptance criteria for mine waste that will be disposed at the UNC Site Tailings Disposal Area are 200 pCi/g or less of Ra-226 and/or 500 mg/kg or less of uranium.
- Team Coordination: The UNC Site is under EPA and NRC jurisdiction. As outlined in the 2011 Non-Time Critical Removal Action Memorandum, disposal of mine waste from the NECR Site within the Tailings Disposal Area at the UNC Site is contingent on two actions being taken. This Surface Soil OU Proposed Plan begins EPA's process to fulfill step one: issuance of an appropriate decision document consistent with the NCP. Step two involves United Nuclear Corporation's submittal of a request for an amendment to its NRC license. The amendment, if granted by NRC, after its review and evaluation, would accommodate disposal of mine waste from the NECR Site within the Tailings Disposal Area at the UNC Site. NRC's agreement to amend the United Nuclear Corporation's license to allow this disposal will be necessary to fulfill step two as described in the 2011 Non-Time-Critical Removal Action Memorandum. Once all required actions are completed per the terms of the NRC license, it is expected that there would be a transfer of the UNC Site to the DOE's Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management. Under this DOE program, the UNC Site would be maintained and managed under the DOE to provide for continued containment and protectiveness. Close coordination with the NRC, DOE, EPA Region 9, NNEPA, the community, and the State of New Mexico will be required to create an acceptable design that incorporates the NECR mine waste into the existing UNC Tailings Disposal Area,

complies with the NRC/DOE permit requirements, and complies with EPA and State regulations.

- Cap Design Criteria: Although the final design may vary, the major elements of the structure are not expected to be significantly different than those presented here. The cap design will be based on comprehensive planning, site-specific risk analysis, and ARARs. Cap design and cost estimates for Alternative 2 are based on the following elements:
  - cap longevity designed for a minimum of 200 years with minimal maintenance and for effectiveness up to one thousand years, to the extent reasonably achievable [40 CFR §§ 192.02(a), 192.32(b)(1)(i), and 264.111(a)];
  - a sufficient clean (uncontaminated) soil layer to provide assurance that releases in the form of Radon-220 and -222 will not exceed an average release rate of 20 picocuries per meter squared per second [40 CFR §§ 192.02(b)(1) and 192.32(b)(1)(ii)], and will not increase the annual average concentration of radon-220 and -222 in air at or above any location outside the disposal site by more than one-half picocurie per liter [40 CFR § 192.02(b)(2)];
  - cap construction to protect the mine waste, reduce the potential for leachate development, and prevent contaminated runoff by limiting infiltration of precipitation and by providing erosion protection and durability [40 CFR §§ 192.32(b)(1), 264.111(a), 264.111(b) 264.228(b)(1), 264.228(b)(3), and 264.228(b)(4)];
  - cap slope, shape and drainage construction to ensure stability and minimize the effects of erosion, root intrusion, and animal destruction [40 CFR §§ 192.32(b)(1), 264.111(a), 264.111(b) 264.228(b)(1), 264.228(b)(3), and 264.228(b)(4)];
  - use of biosolids or top soil to facility vegetation growth;
  - the use of vegetation to emulate the structure, function, diversity, and dynamics of the native community to maximize resilience and sustainability;
  - erosion modeling to determine effectiveness of cap design; and,
  - a low permeability layer (liner) will be placed between the NECR mine waste and the tailings currently disposed within the Tailings Disposal area. [This layer will be constructed to eliminate the possibility that the layer will collect water and produce a "bathtub effect". This layer will be constructed of natural materials, not synthetic, to eliminate the sudden failure risk associated with punctures and rips. This layer will be compacted to meet a hydraulic conductivity[17] of no more than 1×10^{-7} centimeters per second (cm/s)].

The UNC Site currently has three tailings disposal cells containing an estimated 3.5 million tons of tailings covering approximately 100 acres. The estimated 1,000,000 cubic yards of mine waste from the NECR Site is approximately 1.35 million tons[18]. The 1.35 million tons of mine waste from the NECR Site represents an approximate volume increase within the Tailings Disposal Area of 38%.

For cost estimating purposes, the two remedial action alternatives described in this Surface Soil

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[17] Hydraulic conductivity is defined as the rate of movement of water through a porous medium. A hydraulic conductivity of 1×10^{-7} cm/s indicates that water will move at a rate of 0.0000001 centimeters over a time of one second.

18 The estimated volume of mine waste at the NECR site being considered for disposal at the UNC Site within the Tailings Disposal Area is approximately 1 million cubic yards. A conversion factor of 1.35 cubic yards per tons was used to convert the volume from cubic yards to tons.

OU Proposed Plan assume that NECR mine waste would be added to the NRC-regulated North and Central Cells at the UNC Site. A new cap would be constructed over the mine waste once it is added to the cells, which would add additional height and protection against infiltration. Figure 6 provides an example of a generalized conceptual drawing showing one possible outcome for the Tailings Disposal Area after placement of the NECR mine waste. Final design specifications, mine waste placement, and the disposal configuration will be completed during remedial design.

Under the NCP (40 CFR §300.430(f)(4)(ii)) and CERCLA, if a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action. Since under Alternative 2, NECR mine waste will be disposed on the UNC Site within the Tailings Disposal Area, five year reviews will be required. The capped area will require Operation and Maintenance (O&M) activities as necessary including cap inspections and maintenance for continued cap stability, erosion protection, and contaminant containment. In addition, although ground water is not a component of this Surface Soil OU Proposed Plan, which addresses only the proposed disposal of the NECR Site low level threat mine waste at the UNC Site, ground water monitoring and remediation of the contaminant plumes will continue under the 1988 ROD as a separate remedial action. The actions called for by the 1988 ROD include monitoring and reporting to document potential contaminant migration and to ensure compliance with ground water remediation goals established under the 1988 ROD and any amendments to that ROD.

Alternative 2 supports the future reuse options of residential and grazing for the NECR Site. Alternative 2 will achieve all RAOs for the UNC Site by preventing exposure through the use of engineering controls (*e.g.,* capping the mine waste and tailings and fencing), by

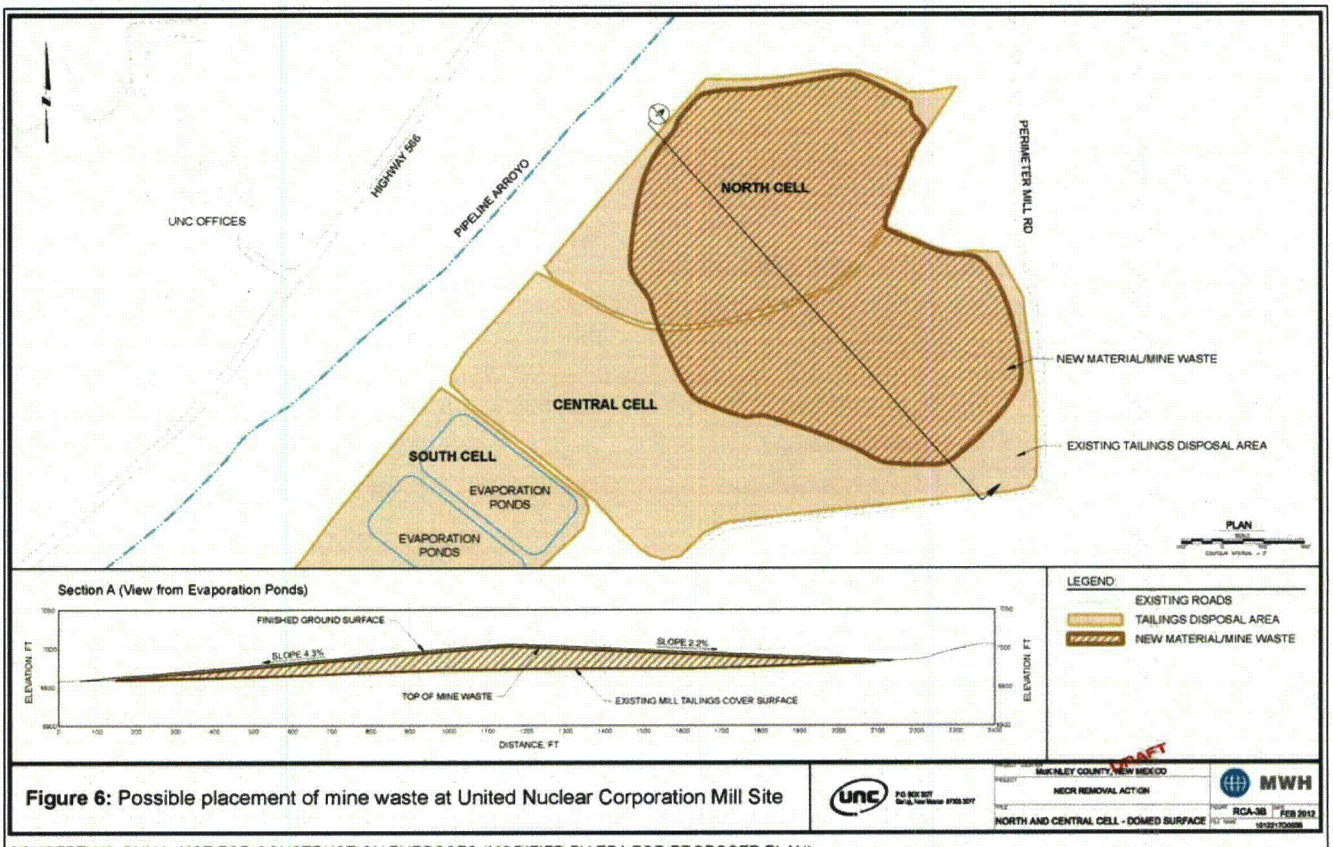


Figure 6: Possible placement of mine waste at United Nuclear Corporation Mill Site

CONCEPTUAL ONLY - NOT FOR CONSTRUCTION PURPOSES (MODIFIED BY EPA FOR PROPOSED PLAN)

monitoring migration of contaminants at the UNC Site and Tailings Disposal Area boundaries, by enforcement of institutional controls (IC) and site access restrictions, and by the performance of site O&M. Under CERCLA, the UNC Site will be restricted from uses other than long-term care of the Tailings Disposal Area. This means that residential, industrial, and grazing uses will be prohibited. It is expected that there would be a transfer of the UNC Site to the DOE's Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management. Under this DOE program, the UNC Site would be maintained and managed under the DOE to provide for continued containment and protectiveness.

Currently, United Nuclear Corporation is addressing source material and on-site surface reclamation at the UNC Site under the direction of the NRC, pursuant to United Nuclear Corporation's NRC license. Under the license, the NRC has released the mill facility and buildings for unrestricted use. Currently, the mill facility and buildings are being used by mill personnel. The NRC has, pursuant to its license, restricted use of the Tailings Disposal Area at the UNC Site. The United Nuclear Corporation's NRC license is an effective IC. Under NRC's license termination process, the site owner (in this case United Nuclear Corporation) transfers title of the site to DOE for long-term custody and care. DOE then becomes the perpetual custodian of the UNC Site under an NRC general license through the Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management (10 CFR § 40.28). This general license to DOE is perpetual [10 CFR § 40.28(b)]. Under the Legacy Management Program, DOE conducts and maintains the site to ensure remedy protectiveness. At the time that the site owner's license terminates, the UNC Site is expected to be transferred to DOE under a general license allowing no other permitted use of the UNC Site other than long-term care of the disposal area. Once the UNC Site is being managed by DOE under its general license from the NRC, the general license will serve as the IC. No other use of the UNC Site, other than long-term care, will be permitted unless the NRC grants a specific license allowing such use of the surface or subsurface [10 CFR § 40.28(d)].

The EPA will work closely with the NRC and DOE to identify the necessary and appropriate ICs as well as the process under which they will be put in place and enforced. If the NRC does not transfer all areas of the UNC Site to DOE at the time that the UNC Site owner's license is terminated, EPA will re-evaluate the need for ICs and O&M activities for these areas since DOE would not be managing these areas of the UNC Site under these circumstances.

EVALUATION OF ALTERNATIVES

1. Overall Protection of Human Health and the Environment

Alternative 1, the No Action Alternative, is protective of human health and the environment at the UNC Site to the extent that the status quo at the UNC Site is protective. As noted in the 2011 Non-Time-Critical Removal Action Memorandum, hazardous substances from the NECR Site, if not addressed, may continue to present an imminent and substantial endangerment to public health or welfare or the environment at NECR.

Alternative 2 will provide protection of human health and the environment by eliminating, reducing, and controlling risk through containment using engineering controls and restricting site use through ICs.

2. Compliance with ARARs

Alternative 1 does not change current UNC Site conditions.

Alternative 2 will be designed and implemented to meet Applicable or Relevant and Appropriate Requirements (collectively ARARs) as those terms are defined at 40 CFR § 300.5. Among the ARARs it will meet are the requirements of the National Emission Standards for Hazardous

Air Pollutants [40 CFR §§ 61.92, 61.192, 61.222(a) and (b)] and the New Mexico Administrative Code (NMAC) regulation of non-coal mining which establishes requirements for mine reclamation and close-out plans at section 19.10.5.507A,19.10.6.603.A and B, 19.10.6.603.C1 through 9, and 19.10.6.603.D through H NMAC. Construction and materials management will meet the following ARARs: the Clean Water Act National Pollution Discharge Elimination System stormwater discharge [40 CFR §§ 122.26(c)(1)(i), 122.41, 122.42(a), 122.44(a)(1) and 40 CFR § 125.3(c)(3)] and the Uranium Mill Tailings Radiation Control Act [40 CFR §§ 192.02(b)(1), 192.02(b)(2), 192.32(b)(1), 192.32(b)(1)(i), and 192.32(b)(1)(ii)].

Nine Evaluation Criteria for CERCLA Remedial Alternatives

Overall Protection of Human Health and the Environment determines whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) evaluates whether the alternative meets Federal and State environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.

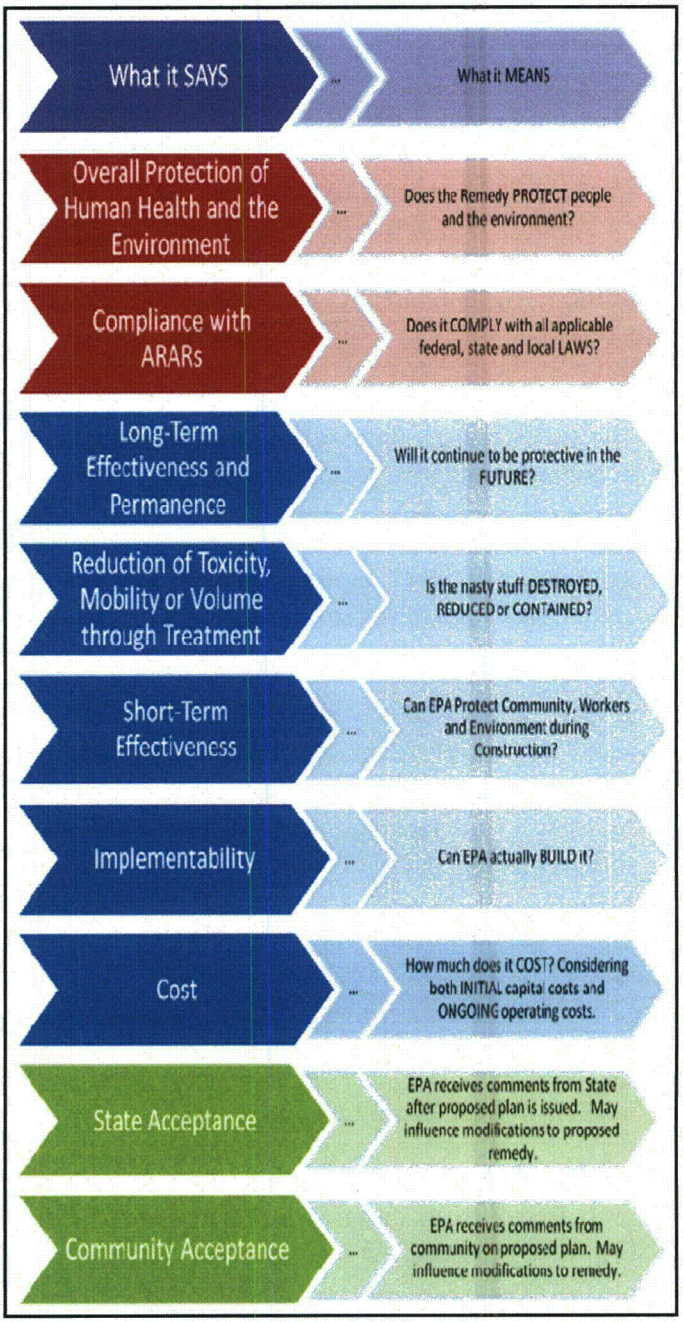
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, residents, and the environment during implementation.

Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

Cost includes estimated capital, periodic, and annual operations and maintenance (O&M) costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

State/Support Agency Acceptance considers whether the State and USEPA agree with the analyses and recommendations, as described in the RI/FS and Proposed Plan.

Community Acceptance considers whether the local community agrees with the analyses of the alternatives and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.



The UNC Site preliminary list of ARARs is provided in Table 1. The final list of ARARs will be presented in the Final Surface Soil OU ROD.

In addition to ARARs, this remedial action will meet the following laws to the extent they are pertinent: the Endangered Species Act, 16 U.S.C. §§ 1531 *et seq.*; The Native American Graves Protection and Repatriation Act, 25 U.S.C. §§ 3001 *et seq;* the National Historic Preservation Act, 16 U.S.C. §§ 470 *et seq;* Archeological Resources Protection Act of 1979, 16 U.S.C. §§ 47000-47011; and American Indian Religious Freedom Act, 42 U.S.C. §§ 1996 *et seq.*

3. Long-term Effectiveness and Permanence
Alternative 1 does not change current UNC Site conditions.

Alternative 2 will provide for long-term effectiveness and permanence through the disposal of mine waste within the Tailings Disposal Area at the UNC Site. Final disposition of the mine waste will require the construction of a cap that will contain the mine waste, prevent direct exposure, limit water infiltration, and mitigate off-site migration. Cap construction is a proven and effective technology for management of contamination by eliminating the exposure pathway; however, this technology does not reduce the magnitude of the residual risk or overall risk of the contamination that is capped. The long-term effectiveness and permanence of this alternative is dependent on future maintenance activities that ensure cap stability, integrity, and longevity as well as the enforcement of ICs restricting site use.

In response to concerns raised by the community, EPA reviewed documents related to the construction of the Tailings Disposal Area, in order to determine the load effect that the additional tailings from the NECR Site would have on the tailings already disposed in the Tailings Disposal Area. Further, at the request of EPA, United Nuclear Corporation developed computer models that simulated what would happen to the tailings in the Tailings Disposal Area under various scenarios (Dwyer, 2011). The models showed that, due to evapotranspiration, vertical drainage and the lack of water recharge, excess free water no longer existed within the tailings now located in the Tailings Disposal Area. The remaining water in the tailings now located in the Tailings Disposal Area is within the water storage capacity of the tailings and will be held within the pore spaces. Any reduction in the tailings' porosity due to the loading or weight of the additional NECR mine waste will not create excess or new free water that could be "squeezed" out. Based on conservative evaluations of the tailings profiles and model sensitivity analyses, adding the mine waste from the NECR Site to the tailings in the Tailings Disposal Area at the UNC Site is not expected to result in the release of additional tailings liquid into the ground water or surrounding soil. Based on these conclusions, disposal of the NECR Site mine waste at the UNC Site Tailings Disposal Area is not expected to interfere with or affect the ongoing remediation efforts regarding tailings or ground water at the UNC Site. EPA recognizes the limitations of the simulations and model results. During remedial design, additional data will be collected and evaluated to further refine, support, and verify these conclusions.

EPA also reviewed the Mill Decommission Report (UNC, 1993) and the Borrow Pit No. 2 Final Reclamation Report (Smith, 1996b). These reports documented the placement of the debris (*e.g.*, concrete, steel, and wood) within the Tailings Disposal Area, and described the debris. Based on this documentation, it appears that the debris was placed in the Tailings Disposal Area in layers, flattened, mixed and covered with soil, and compacted resulting in a stable cells that have had negligible settling over the almost 20 years since disposal. Consequently, it is expected that the additional weight that the mine waste from the NECR Site

will add to the tailings that are presently in the UNC Site Tailings Disposal Area will have negligible consequences on the stability of the tailings cells (EPA, 2011b). Placement of mine waste within the Tailings Disposal Area will be designed and constructed in a manner that promotes material stability and reduces the potential for future subsidence.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment
Alternative 1 does not change current UNC Site conditions

Alternative 2: The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable [NCP at 40 CFR §300.430(a)(l)(iii)(A)]. In general, PTWs are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied. No PTW from the NECR Site will be sent to the UNC Site. This Surface Soil OU Proposed Plan for the UNC Site addresses only low level threat mine waste from the NECR Site is not concerned with the PTW from the NECR Site; therefore, treatment is not a principal element of Alternative 2.

5. Short-term Effectiveness
Alternative 1 does not change current UNC Site conditions.

Alternative 2: The design process and time frame for Alternative 2 will require a detailed design for the cap structure for mine waste disposal within the Tailings Disposal Area at the UNC Site. Additional coordination, design, and preparation time related to the NRC license amendment process (Step Two) also will be required. Alternative 2 offers short-term effectiveness in terms of construction and transportation management to protect the community, site worker, and environment over the estimated four years of remedial action and construction time.

Alternative 2 involves substantial construction-related activity over an extended period of time and requires management and engineering actions to protect the community and the on-site workers. Potential risks related to transportation and disposal of mine waste and potential fugitive dust emissions may be encountered. During transportation and material handling activities, dust suppression measures will be conducted to reduce fugitive dust emissions and associated impacts to the nearby community. In addition, perimeter air monitoring stations will be positioned and operated to monitor emissions during construction activities to maintain a safe working environment and to protect human health and the environment. Potential exposure and protection procedures for workers engaged in these activities will be addressed in a health and safety plan. Workers in the controlled areas will wear the appropriate safety equipment and implement safety practices such as air monitoring and access control for authorized personnel only. Site construction activities will also include storm water management to mitigate the potential for off-site migration of mine waste during weather events. Alternative 2 provides a great degree of short-term effectiveness for the on-site worker and the local community.

Alternative 2 involves the transportation of mine waste. This activity may result in some inconvenience for and directly impact the local residents during the construction time frame and includes nuisance construction noise, increased truck traffic on local roads, potential traffic detours or re-routing, and potential accidents or spills. Mitigation efforts may include using dust suppression measures, restricting hours of

operation as necessary, and air monitoring. Bulk carriers hauling mine waste would be securely covered and weighed to document compliance with total and axle load limits. A transportation plan will be used to identify the routes of travel, times of operation, and traffic rules. Emergency spill containment and cleanup contingencies would also be included in the transportation plan to address mine waste spills. The short travel distance under Alternative 2 could potentially reduce construction time, reduce transportation incidents on public roadways, and reduce the estimated trucking emissions based on total distance traveled. Based on these factors Alternative 2 provides a great degree of short-term effectiveness to the public.

In addition, as provided in the 2011 Non-Time-Critical Action Memorandum, voluntary alternative housing options will be offered to those residents significantly impacted by disruptions associated with the removal action.

Alternative 2 provides for short-term effectiveness through the implementation of plans, processes, and procedures that will reduce the likelihood of exposure and meet RAOs within a reasonable time frame.

6. Implementability
Alternative 1 does not change current UNC Site conditions.

Alternative 2 is technically feasible and would require conventional techniques, materials or labor for transportation and disposal. The site is readily accessible, and roadway improvements can be made to optimize access for equipment, materials and labor. Disposal would be scheduled and performed in a manner to maximize work flow, minimize multiple mine waste handling actions, and ensure worker and public safety. Engineering controls for fugitive dust and site monitoring would be utilized to protect off-site areas. Stormwater and surface water controls and improvements will be developed and implemented to secure the area during extreme storm events and mitigate off-site migration.

Mine waste disposal and cap construction is a proven and effective technology that can be implemented using a variety of conventional equipment and materials. Heavy equipment needed for this project, such as scrapers, excavators, dozers, loaders, compactors, and/or bulk carriers, are commercially available. Continued maintenance, repair, optimization, and monitoring actions can be accomplished using a variety of conventional and commercially available equipment. Construction materials for the cap and site restoration activities are commercially available. In addition, working space (temporary construction office trailers), utilities (power, drinking water, and telephone), portable sanitary services, and refuse disposal are available.

Trained and experienced labor is available for work activities. Special certifications and health and safety training requirements to comply with Occupational Safety and Health Administration, radiation, and hazardous material handling requirements are available and will be maintained throughout the project.

Transportation of mine waste is required by Alternative 2 which is subject to additional considerations. Securing an adequate number of specialized transporters with sufficient trucking resources may be limited, and any delays in excavation and loading may jeopardize the availability or commitment by the transporters.

Alternative 2 is expected to require a high level of effort to administratively implement the remedial action. Implementation of this action will require administrative coordination among United Nuclear Corporation, DOE, NRC, EPA Region 9, EPA Region 6, NNEPA, the community, and the State of New Mexico. The UNC Site is under EPA and NRC jurisdiction. As outlined in the 2011 Non-Time Critical Removal Action Memorandum, disposal of mine waste from the NECR Site within the

Tailings Disposal Area at the UNC Site is contingent on two actions being taken. This Surface Soil OU Proposed Plan begins EPA's process to fulfill step one: issuance of an appropriate decision document consistent with the NCP. Step two involves United Nuclear Corporation's submittal of a request for an amendment to its NRC license. The amendment, if granted by NRC, after its review and evaluation, would accommodate disposal of mine waste from the NECR Site within the Tailings Disposal Area at the UNC Site. NRC's agreement to amend the United Nuclear Corporation's license to allow this disposal will be necessary to fulfill step two as described in the 2011 Non-Time-Critical Removal Action Memorandum.

7. Cost

Alternative 1 does not change current UNC Site conditions.

Alternative 2: An order of magnitude cost estimate was developed for Alternative 2. The cost estimate was prepared for assistance with comparing the relative costs between the various remedial alternatives and is considered accurate only to +50/-30 percent. For cost and evaluation purposes, Operation and Maintenance (O&M) activities were estimated over a 30 year period. The 30 year time frame was chosen for consistency and comparison purposes and does not limit or alter the requirements for O&M into the future. In addition, a discount factor of 7% was used to calculate the present worth of costs.

The cost of Alternative 2 ($41.5 million) includes the transportation of low level threat mine waste from the NECR site and disposal of that low level threat mine waste within the Tailings Disposal Area at the UNC Site. The estimated cost for Alternative 2 is subject to substantial cost fluctuations related to changes in fuel cost and transportation labor market rates. Alternative 2 is considered cost-effective based on an evaluation of its costs, proportional to its overall effectiveness. *See* 40 CFR § 300.430(f)(1)(ii)(D).

8. State/Support Agency Acceptance

The State of New Mexico generally supports the Preferred Alternative (NMED, 2012).

9. Community Acceptance

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the responsiveness summary in the UNC Site Surface Soil OU ROD.

SUMMARY OF THE PREFERRED REMEDIAL ALTERNATIVE

Based upon consideration of the requirements of CERCLA and the detailed analysis of alternatives using the nine CERCLA evaluation criteria the Preferred Alternative for mine waste disposal is Alternative 2: On-site Disposal at the UNC Site within the Tailings Disposal Area. The Preferred Alternative is selected because it provides protection of human health and the environment, provides a great degree of long-term effectiveness and permanence, and is considered cost effective. Additionally, as summarized in the NECR Site 2011 Non-Time-Critical Removal Action Memorandum, on-site disposal of the NECR Site mine waste at the NECR Site was rejected by the Navajo Nation and the community while off-site disposal at a regulated facility was found to be cost prohibitive and less cost effective than disposal

Summary of Remedial Alternatives and Estimated Cost

Alternative and Description	Estimated Capital Cost	Estimated Annual O&M	Estimated Present Worth Cost	Estimated Construction Timeframe
Alternative 1: No Action Alternative	$0.00	Not Applicable	Not Applicable	Not Applicable
Alternative 2: On-site Disposal within the Tailings Disposal Area	$40,337,281	$1,227,767	$41,565,048	4 Years

at the UNC Site. In addition, a post EE/CA analyses of 11 other alternate disposal locations determined that (EPA, 2011a) given the administrative, legal and cost challenges presented by each of the 11 locations, the UNC Site was identified as the most suitable (EPA, 2011a).

The Preferred Alternative will adequately protect human health and the environment and comply with ARARs by eliminating, reducing and controlling exposures to human and ecological receptors through mine waste disposal and containment of soil, mine waste, and tailings within the Tailings Disposal Area at the UNC Site and the enforcement of UNC Site use restrictions. The Preferred Alternative meets the RAOs through reduction of potential human health risk levels such that exposure to mine waste through external radiation, ingestion, direct contact and inhalation does not exceed the risk range. In addition, disposal and containment reduces potential ecological risk levels for terrestrial receptors such that the external radiation, ingestion, direct contact, and inhalation exposure pathways are incomplete. UNC Site use restrictions will prohibit the residential, industrial, or grazing use and will restrict unauthorized access.

The Preferred Alternative is expected to achieve substantial long-term effectiveness and permanence through containment of the mine waste. The Preferred Alternative is anticipated not to pose any unacceptable short-term risks to on-site workers, the community, or the environment due to the implementation of mitigation efforts to control off-site contaminant migration (e.g., dust suppression actions or stormwater/erosion controls). No cross-media impacts are expected due to transportation and disposal actions. The Preferred Alternative can be implemented using common construction practices and commercially available equipment and services. The Preferred Alternative is expected reach RAOs within a reasonable time frame.

The NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area will be treated as one for the purpose of remediation. Section 104(d)(4) of the CERCLA, 42 U.S.C. § 9604(d)(4), allows two or more noncontiguous facilities that are reasonably related on the basis of geography, or on the basis of the threat or potential threat to the public health or welfare or the environment, to be treated as one for the purpose of remediation. Because of the similarity of threat posed by the mine waste in the areas on the NECR Site where mine waste has been deposited and consolidated (Consolidation Areas) and the threat posed by the tailings in the covered pits and landfills that make up the UNC Site Tailings Disposal Area, as well as the relative proximity of these facilities (less than 1 mile) EPA proposes to use its authority under CERCLA Section 104(d)(4) to temporarily combine the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area. The combination of these two areas, the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area is temporary, and it is for waste disposal purposes only.

The facilities that would be combined under EPA's Section 104(d)(4) authority include the areal extent of contamination at the Consolidation Areas and the areal extent of contamination at the UNC Site Tailings Disposal Area and all suitable areas in very close proximity to the contamination in both areas necessary for implementation of the response action. This temporary combination of the two facilities will facilitate the implementation of the Preferred Alternative for the surface soil OU remedial action at the UNC Site described in this Surface Soil OU Proposed Plan, and it will facilitate the selected removal action for the NECR Site identified in the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site (EPA, 2011b). By combining the Consolidation Areas and the Tailings Disposal Area, the Preferred Alternative can be taken without State, Federal or local permits as provided in CERCLA section

121(e), 42 U.S.C. § 9621(e). In addition, combination of the Consolidation Areas and the Tailings Disposal Area means that the action transferring mine waste from the Consolidation Areas to the Tailings Disposal Area will be an on-site action that need not meet the requirements of the procedures for planning and implementing off-site response actions codified at 40 CFR § 300.440 (the "Off-site Rule). In short, treating the non-contiguous NECR and UNC Sites as one for the purpose of disposing NECR mine waste at the UNC Site "would be in the best interests of achieving sound and expeditious environmental cleanups." 55 Fed. Reg. 8666, 8691 (1990).

Alternative 2 supports the future reuse options of residential and grazing for the NECR Site and will achieve all RAOs for the UNC Site by preventing exposure through the use of engineering controls (*e.g.*, capping the mine waste and tailings and fencing), by monitoring migration of contaminants at the UNC Site and Tailings Disposal Area boundaries, by enforcement of institutional controls (IC) and site access restrictions, and by the performance of site O&M. Under CERCLA, the UNC Site will be restricted from uses other than long-term care of the Tailings Disposal Area, including residential, industrial, and grazing uses. Unauthorized access will be prohibited expect for Long-Term Surveillance and Maintenance Program maintenance personnel working under DOE's Office of Legacy Management. Under this DOE program, the UNC Site would be maintained and managed under the DOE to provide for continued containment and protectiveness.

Currently, United Nuclear Corporation is addressing source material and on-site surface reclamation at the UNC Site under the direction of the NRC, pursuant to United Nuclear Corporation's NRC license. Under the license, the NRC has released the mill facility and buildings for unrestricted use. Currently, the mill facility and buildings are being used by mill personnel. The NRC has, pursuant to its license, restricted use of the Tailings Disposal Area at the UNC Site. The license is an effective institutional control (IC). Under NRC's license termination process, the site owner (in this case United Nuclear Corporation) transfers title of the site to DOE for long-term custody and care. DOE then becomes the perpetual custodian of the UNC Site under an NRC general license through the Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management (10 CFR § 40.28). This general license to DOE is perpetual [10 CFR § 40.28(b)]. Under the Legacy Management Program, DOE conducts and maintains the site to ensure remedy protectiveness. At the time that the site owner's license terminates, the UNC Site is expected to be transferred to DOE under a general license allowing no other permitted use of the UNC Site other than long-term care of the disposal area. Once the UNC Site is being managed by DOE under its general license from the NRC, the general license will serve as the IC. No other use of the UNC Site, other than long-term care, will be permitted unless the NRC grants a specific license allowing such use of the surface or subsurface [10 CFR § 40.28(d)].

The EPA will work closely with the NRC and DOE to identify the necessary and appropriate ICs as well as the process under which they will be put in place and enforced. If the NRC does not transfer all areas of the UNC Site to DOE at the time that the UNC Site owner's license is terminated, EPA will reevaluate the need for ICs and O&M activities for these areas since DOE would not be managing these areas of the UNC Site under these circumstances.

Through this process, NECR mine waste will be disposed within the Tailings Disposal Area at the UNC Site reducing the mine waste footprint by creating one consolidated location requiring long-term maintenance and management for continued protection of human health and the environment. Consolidation of similar mine waste is consistent with the current UNC disposal action, can be managed using the same

remediation technology as the UNC tailings, is not expected to cause or promote adverse affects due to loading (Dwyer, 2011), is protective of human health and the environment, and is expected to be maintained by DOE in the long-term. This surface soil OU proposed action is consistent with and supports the 2011 Non-Time-Critical Removal Action Memorandum as well as the reasonably anticipated future land use of residential and grazing for the NECR Site. The Preferred Alternative will require long-term monitoring, Site inspections, and O&M to ensure the Tailings Disposal Area is appropriately managed and maintained for continued protection of human health and the environment. In addition, a remedy review will be conducted by EPA every five years as provided in 40 CFR §300.430(f)(4)(ii) to determine whether the site continues to be protection of human health and the environment.

Although, ground water is not a component of this Surface Soil OU Proposed Plan, which addresses only the proposed disposal of the NECR Site low level threat mine waste at the UNC Site, ground water monitoring and remediation of the contaminant plumes is ongoing and will continue under the 1988 ROD as a separate remedial action. Mine waste disposal within the Tailings Disposal Area is not expected to interfere or affect the current ground water remediation efforts. Mine waste disposal will be designed and construction to provide for continued protection against contaminant migration into the ground water (see Summary of Remedial Alternatives section) in support of ongoing ground water remediation efforts.

Based on the information currently available, the EPA believes the Preferred Alternative meets the threshold criteria and provides the best balance of tradeoffs between the two alternatives with respect to the balancing and modifying criteria. The Preferred Alternative is expected to satisfy the statutory requirements of CERCLA § 121(b) by being protective of human health and the environment, complying with ARARs, and utilizing permanent solutions and alternative treatment technologies to the maximum extent practicable.

In general, PTWs are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health or the environment should exposure occur. Conversely, non-principal threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. No PTW from the NECR Site will be sent to the UNC Site; therefore, this Surface Soil OU Proposed Plan for the UNC Site addresses only the low level threat mine waste from the NECR Site. The waste acceptance criteria for mine waste that will be disposed at the UNC Site Tailings Disposal Area are 200 pCi/g or less of Ra-226 and/or 500 mg/kg or less of uranium. Because no PTW from the NECR Site will be sent to the UNC Site under Alternative 2, this remedy need not meet the statutory preference for the selection of a remedy that involves treatment as a principal element. The Preferred Alternative can change in response to public comment or new information.

COMMUNITY PARTICIPATION

The EPA and NMED provide information regarding the cleanup of the UNC Site to the public through public meetings, the Administrative Record file for the Site, and announcements published in the *Gallup Independent* and *Navajo Times*. The EPA and NMED encourage the public to gain a more comprehensive understanding of the Site and the Superfund activities that have been conducted.

The dates for the public comment period; the date, location, and time of the public meeting; and, the locations of the Administrative Record files are provided on the front page of this Surface Soil OU Proposed Plan.

For further information on the United Nuclear Corporation Superfund Site, please visit the locations identified on Page 1 to view various site documentation or contact:

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Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Chemical-Specific ARARs and "to be considered" (TBC) Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Residual Radioactive Material	FEDERAL **Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended** – Regulations at 40 CFR § 192.02(b)(1) and (2) § 192.02(c) § 192.02(d) § 192.32(a)(1) and (2) § 192.32(a)(4)(ii) § 192.32(b)(1)(ii)	Protect the public and the environment from uranium mill tailings prior to closure and post-closure	Substantive requirements are relevant and appropriate to on-site disposal activities involving residual radioactive material. 40 CFR § 192.02(c) and § 192.32(a)(2) are relevant and appropriate; however, aspects of these regulations related to ground water are being addressed under the ground water operable unit record of decision remedial action.
Air	FEDERAL **Clean Air Act (CAA)** – National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 CFR § 61.92	Regulates airborne emissions of radionuclides to nearest off-site receptor during cleanup of Federal facilities and licensed U.S. NRC facilities. Emissions of radionuclides cannot exceed 10 milli-Roentgen-Equivalent-Man per year (mrem/yr).	Substantive requirements are applicable to activities during the remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Chemical-Specific ARARs and "to be considered" (TBC) Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Air	FEDERAL **Clean Air Act (CAA) –** National Emission Standards for Hazardous Air Pollutants (NESHAPs) 40 CFR § 61.192 § 61.222(a) and (b)	Regulates airborne emissions of radon from DOE facilities. A facility shall emit no more than 20 picocuries per square meter per second [pCi/(m^2 -sec) (1.9 pCi/(ft^2 -sec)] of radon-222 as an average for the entire source, into the air. Once a uranium mill tailings pile or impoundment ceases to be operational it must be disposed of and brought into compliance with this standard within two years of the effective date of the standard. If it is not physically possible for an owner or operator to complete disposal within that time, EPA shall, after consultation with the owner or operator, establish a compliance agreement which will assure that disposal will be completed as quickly as possible.	Substantive requirements applicable to activities during Long-term Stewardship after closure.
Air	FEDERAL **Clean Air Act (CAA) –** National primary and secondary ambient air quality standards 40 CFR § 50.6 § 50.7	National primary ambient air quality standards define levels of air quality with an adequate margin of safety, to protect the public health. Regulates airborne emissions of particulate matter having an aerodynamic diameter less than or equal to a nominal 10 micrometers or having an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.	Substantive requirements applicable to activities during remedial action.
Air	STATE **New Mexico Air Quality Control Act** § 20.2.3 NMAC – Ambient Air Quality Standards	Establishes ambient air quality standards, performance standards for specific sources of air pollutants, and specifies monitoring methods	Substantive requirements are applicable during remedial action.
Water	STATE **New Mexico Water Quality Act** § 20.6.2.2101 NMAC – New Mexico Water Quality Ground and Surface Water Protections	Establishes water quality standards and regulation limits on biochemical oxygen demand, chemical oxygen demand, settleable solids, fecal coliform, and pH in effluent.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Chemical-Specific ARARs and "to be considered" (TBC) Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Water	STATE **New Mexico Water Quality Act** Antidegradation Policy and Implementation Plan for Surface Water § 20.6.4.8.A(1) NMAC	Requires that existing instream water uses are maintained and protected and that no further water quality degradation occur that would interfere with or become injurious to existing uses.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.12 NMAC	Describes general requirements for compliance to meet water quality standards, including monitoring requirements. Also establishes the minimum quantification level (MQL) as the water quality standard in cases where the numeric standard is below the MQL.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13 NMAC	General Surface Water Criteria – Applicable to all surface water at all times, unless a specific standard is provided elsewhere in these regulations.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.A NMAC	General Criteria – Bottom Deposits: Requires that surface waters are free of contaminants that will settle and damage or impair benthic life or significantly alter the bottom. These requirements are applicable for any remedial action that could cause sedimentation or deposits into streams.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.B NMAC	General Criteria – Floating Solids, Oils, and Grease: Requires that surface waters are free from oils, scum, grease and other floating material.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Chemical-Specific ARARs and "to be considered" (TBC) Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.C NMAC	General Standard – Color: Prohibits the creation of any unnatural, undesirable color or one that can impair use off water by aquatic life. These requirements are applicable if any discharge would create color in receiving water.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.D NMAC	General Criteria – Organoleptic Quality: Prohibits impact of unpalatable flavor to fish or offensive odor. These requirements are applicable if any remedial alternative would create a discharge capable of such impacts	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.E NMAC	General Standard – Plant Nutrients: Prohibits the presence of plant nutrients at concentrations that will produce undesired aquatic life.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.F NMAC	General Standard – Toxic Pollutants: Requires that surface water of the state of New Mexico be free of toxic pollutants in amounts, concentrations, or combinations that affect the propagation of fish.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.G NMAC	General Standard – Radioactivity: Prohibits the radioactivity of surface water from exceeding the criteria set forth in the New Mexico Radiation Protection Regulations.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.H NMAC	General Standard – Pathogens: Requires that surface water be free of pathogens.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Chemical-Specific ARARs and "to be considered" (TBC) Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.I NMAC	General Criteria – Temperature: Prohibits the increase in temperature, as measured from above the point of discharge, by more than 2.7°C in a stream (in addition to meeting maximum temperature standards in § 20.6.4.101-899 NMAC). These requirements are applicable to any discharge to a stream/river.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.J NMAC	General Criteria – Turbidity: Prohibits reduction in light transmission such that aquatic life is impaired or there is a substantial visible contrast with the natural appearance of water. These requirements are applicable to any discharge that could increase turbidity.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.K NMAC	General Criteria – Total Dissolved Solids: Requires that total dissolved solids (TDS) attributable to other than natural causes do not damage or impair the normal growth, function or reproduction of animal, plant, or aquatic life.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.13.L NMAC	General Criteria – Dissolved Gases: Requires that surface water be free of nitrogen and other dissolved gases at levels above 110% saturation.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.
Water	STATE **New Mexico Water Quality Act** Standards for Interstate and Intrastate Surface Waters – Water Quality Criteria § 20.6.4.900 NMAC – A, C,D,F,G, H2	Establishes water quality standards that consist of designated use(s) of surface water, water quality criteria necessary to protect use(s), and an anti-degradation policy.	Substantive requirements are relevant and appropriate to protecting surface water from runoff.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Chemical-Specific ARARs and "to be considered" (TBC) Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Soil/Mine waste	FEDERAL RCRA Manifest Requirements 40 CFR Part 262 Subpart B	Cradle to grave manifesting for mine waste taken from NECR Site for disposal at UNC Site Tailings Disposal Area	The preamble to the NCP and EPA guidance calls for manifesting of transported waste when CERCLA section 104(d)(4) is used to combine sites.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Residual Radioactive Material	FEDERAL **Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended** – Regulations at 40 CFR § 192.02(a)	Protect the public and the environment from residual radioactive material.	Substantive requirements are relevant and appropriate to on-site disposal activities involving residual radioactive material.
Residual Radioactive Material	FEDERAL **Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended** – Regulations at 40 CFR § 192.32(a)(3)(i)	Protect the public and the environment from uranium mill tailings impoundments that are nonoperational through the placement of a radon barrier.	Substantive requirements are relevant and appropriate to on-site uranium mill tailings impoundments that are nonoperational.
Residual Radioactive Material	FEDERAL **Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended** – Regulations at 40 CFR § 192.32(a)(4)(i)	Protect the public and the environment from uranium mill tailings impoundments that are nonoperational through monitoring the effectiveness of the radon barrier.	Substantive requirements are relevant and appropriate to on-site uranium mill tailings impoundments that are nonoperational.
Residual Non-Radioactive Material	FEDERAL **Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended** – Regulations at 40 CFR § 192.32(b)(1) § 192.32(b)(1)(i)	Protect the public and the environment from nonradiological hazards.	Substantive requirements are relevant and appropriate to on-site surface impoundments containing radiological and nonradiological hazards.
Hazardous Wastes	FEDERAL **Resource Conservation and Recovery Act (RCRA) of 1976, as amended – Regulations at** 40 CFR § 264.111(a) § 264.111(b)	Provides for general closure performance standards for disposal of nonradiological hazards.	Substantive requirements are relevant and appropriate to on-site surface impoundments containing radiological and nonradiological hazards.
Hazardous Wastes	FEDERAL **Resource Conservation and Recovery Act (RCRA) of 1976, as amended – Regulations at** 40 CFR § 264.228(a)(2)(i) § 264.228(a)(2)(ii) § 264.228(a)(2)(iii)	Provides for closure performance standards for disposal of nonradiological hazards in surface impoundments.	Substantive requirements are relevant and appropriate to on-site surface impoundments containing radiological and nonradiological hazards.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Hazardous Wastes	FEDERAL **Resource Conservation and Recovery Act (RCRA) of 1976, as amended – Regulations at** 40 CFR § 264.228(b)(1) § 264.228(b)(3) § 264.228(b)(4)	Provides for post-closure requirements for nonradiological hazards left in surface impoundments after closure.	Substantive requirements are relevant and appropriate to on-site surface impoundments containing radiological and nonradiological hazards after closure. 40 CFR § 264.228(b)(3) is relevant and appropriate; however, aspects of this regulation related to ground water are being addressed under the ground water operable unit record of decision remedial action.
Soils	FEDERAL **Surface Mining Control and Reclamation Act of 1977 (SMCRA), as amended --** Regulations at 30 CFR § 816.95(a) and (b) § 816.111(a), (b), and (c)	Establishes a program for stabilization of surface areas and revegetation requirements	Substantive requirements are relevant and appropriate for protecting the cap against erosion.
Air	FEDERAL **Surface Mining Control and Reclamation Act of 1977 (SMCRA), as amended --** Regulations at 30 CFR § 780.15(b)	Establishes a program for fugitive dust control and monitoring.	Substantive requirements are relevant and appropriate during remedial action.
Radioactive Material	FEDERAL **License Requirements for Land Disposal of Radioactive Waste –** Regulations at 10 CFR § 61.41 § 61.44 § 61.51 § 61.52 § 61.53	Provides a variety of performance objectives and technical requirements related to land disposal.	Substantive requirements applicable to activities related to on-site disposal of radioactive materials. Aspects of these regulations related to ground water are being addressed under the ground water operable unit record of decision remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Water	FEDERAL **CWA –** Section 402, National Pollutant Discharge Elimination System (NPDES) Stormwater discharges – 40 CFR §125.3(c)(3) §125.3(d)(1), (2) and (3) §125.3(e) §125.3(f) §125.3(h)	On-site discharges from site are required to meet the substantive CWA requirements, including discharge limitations, monitoring and best management practices	Substantive requirements are applicable during site remedial action activities.
Water	FEDERAL **CWA –** Section 402, National Pollutant Discharge Elimination System (NPDES) Stormwater discharges – 40 CFR § 122.26(c)(1)(i) § 122.41 § 122.42(a) § 122.44(a)(1) § 122.44(e) § 122.44(i)(4) § 122.44(k)(2) and (k)(4)	On-site discharges from site are required to meet the substantive CWA requirements, including discharge limitations, monitoring and best management practices	Substantive requirements are relevant and appropriate if site runoff is channeled directly to a surface water body via ditch, culvert, storm sewer, or other means.
Solid Waste	STATE **New Mexico Solid Waste Act** Maximum Size, Siting Criteria, Design Criteria. § 20.9.4.9 NMAC	Establishes siting criteria for municipal, special waste, and construction and demolition waste landfills and monofills (scrap tires or asbestos waste). Special waste is defined as solid waste with unique handling, transportation or disposal requirements to assure protectiveness.	Substantive requirements are relevant and appropriate during remedial action.
Solid Waste	STATE **New Mexico Solid Waste Act** Maximum Size, Siting Criteria, Design Criteria. § 20.9.4.13.A.2 NMAC § 20.9.4.13.B NMAC § 20.9.4.13.E.1.a NMAC	Establishes design criteria for municipal landfills, special waste landfills, and monofills. Provides specific requirements for liners.	Substantive requirements are relevant and appropriate for remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Solid Waste	STATE **New Mexico Solid Waste Act** Maximum Size, Siting Criteria, Design Criteria. § 20.9.4.14.A NMAC § 20.9.4.14.B.1, B.2, and B.3 NMAC	Provides testing and quality control requirements for geosynthetic and soil liners and final covers.	Substantive requirements are relevant and appropriate for remedial action.
Solid Waste	STATE **New Mexico Solid Waste Act** Closure and Post-Closure Requirements § 20.9.6.9.A.2 NMAC § 20.9.6.9.A.3 NMAC	Establishes closure and post-closure requirements for municipal and special waste landfills, including cover thickness, hydraulic conductivity, erosion control and revegetation.	Substantive requirements are relevant and appropriate for remedial action completion.
Solid Waste	STATE **New Mexico Solid Waste Act** Closure and Post-Closure Requirements § 20.9.6.12 NMAC	Establishes general closure and post-closure requirements for other solid waste facilities, including dismantling of structures and other man-made features.	Substantive requirements are relevant and appropriate for remedial action completion.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Mining Act** **§ 19.10.5.507.A NMAC –** Regulation of Non-Coal Mining	Soil and Cover Materials. Establishes performance and reclamation standards and requirements. Requires reclamation to a condition that allows for re-establishment of a self-containing ecosystem appropriate for the life zone of the surrounding areas following closure, unless conflicting with the approved post-mining land use. Provides for waiver for open pit or waste unit, if the open pit or waste unit meets all applicable federal and state laws, regulations, and standards for air, surface water, and ground water protection following closure and will not pose a current or future hazard to public health or safety.	Substantive requirements are relevant and appropriate for remedial action completion.
Mining	STATE **New Mexico Mining Act** § 19.10.6.603.A and B NMAC § 19.10.6.603.C.1 through .9 NMAC § 19.10.6.603.D through H NMAC	Soil and Cover Materials. Establishes performance and reclamation standards for new mining operations, including impoundments.	Substantive requirements are relevant and appropriate for remedial action completion.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2001 NMAC	Casing and Sealing of Drilling Holes: General Requirements: Requires exposed underground openings to be cased, sealed, or otherwise managed to prevent acid or other toxic drainage from entering ground or surface water.	TBC during any investigation work in and around the site.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2003 NMAC	Casing and Sealing of Drilling Holes and Underground Openings – Permanent: Requires that permanent measures are employed to prevent acid or other toxic drainage from entering ground or surface water from exposed underground openings.	TBC during any investigation work in and around the site.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2005.E NMAC	Topsoil Substitutes and Supplements: Selected overburden material may be substituted or may be used as a supplement to topsoil if determined by the Director of the administering state agency that the resulting soil medium is equal to or more suitable for sustaining vegetation.	TBC during remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2007 NMAC	Topdressing: Redistribution – Regraded land shall be done in a manner that will eliminate slippage, achieve an approximate uniform thickness, prevent compaction and is protected from erosion before and after it is seeded.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2008 NMAC	Topdressing: Nutrients and Soil Amendments – Requires that nutrients and amendments be applied to support the revegetation requirements.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2009.A, .B, .C, .D.1, .D.2, .D.4, .E.1, .E.2, and E.3 NMAC	Hydrologic Balance: General Requirements – Establishes actions to prevent or minimize water pollution. In no case shall federal and state water quality statutes, regulations, standards or effluent limitations be violated.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2010 NMAC	Hydrologic Balance: Water Quality Standards and Effluent Limitations – Requires that all surface flow that leaves the disturbed area shall be made in compliance with all applicable state and federal water quality statutes and regulations.	TBC during remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2011 NMAC	Hydrologic Balance: Diversion and Conveyance of Overland Flow – Overland flows from undisturbed areas may be diverted from disturbed areas if required as necessary to minimize erosion, to reduce the volume of water to be treated, and to prevent or remove water from contact with acid- or toxic-forming materials.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2013 NMAC	Hydrologic Balance: Sediment Control Measures – Requires prevention, to the extent possible, of additional contribution of sediment to streamflow or to run-off outside the permit area.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2014 NMAC	Hydrologic Balance: Sedimentation Ponds – Establishes standards for sediment pond design, sizing, construction and maintenance.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2015 NMAC	Hydrologic Balance: Discharge Structures – Requires that discharges from sediment ponds, impoundments, dams, embankments and diversions shall be controlled by energy dissipaters, riprap channels and other devices.	TBC during remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2016 NMAC	Hydrologic Balance: Acid Forming and Toxic Forming Spoil – Requires that drainage from acid-forming materials into ground and surface water be avoided and water is prevented from coming into contact with acid-forming spoil in accordance with § 19.8.20.2056 NMAC.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2017 NMAC	Hydrologic Balance: Permanent and Temporary Impoundments – Establishes sizing and construction standards based on impoundment classification. Static and seismic safety factors for impoundments are relevant and appropriate to similar structures. Establishes minimum static factor of safety (FOS) of 1.3 for impoundments.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2018 NMAC	Hydrologic Balance: Ground Water Protection – Establishes requirements to control the effects of mine drainage and other mine disturbances in such a manner as to prevent or control discharge of acid, toxic or otherwise harmful mine drainage waters into ground water systems and to prevent adverse impacts on such ground water systems.	TBC during remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2034 NMAC	Disposal of Excess Spoils: General Requirements – Requires that spoil be placed in a controlled manner to ensure that leachate and surface runoff from the fill will not degrade surface or ground water or exceed the effluent limitations and stability of the fill and the land mass are suitable for reclamation and revegetation.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2037 NMAC	Disposal of Excess Spoils: Durable Rock Fills – Establishes standards for stability (Factor of Safety), slope gradient and surface water diversion channel sizing.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2050 NMAC	Air Resources Protection: Fugitive Dust – Requires that operators plan and employ fugitive dust control measures as an integral part of site reclamation operations.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2055 NMAC	Backfilling and Grading: General Requirements – Establishes minimum requirements for backfilling and grading slopes.	TBC during remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2056 NMAC	Backfilling and Grading: Covering Coal and Acid- and Toxic-Forming Material – Requires that exposed acid- and toxic-forming materials be adequately covered with non-toxic and non-combustible materials. Where necessary to protect against adverse effects on plant growth from upward migrating salts, erosion, and formation of acid or toxic seeps; and to provide an adequate depth for plant growth; the Director shall specify thicker amounts of cover using non-toxic materials.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2059 NMAC	Regrading or Stabilizing Rills and Gullies – Requires that surface areas be protected and stabilized to effectively control erosion.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2060 NMAC	Revegetation: General Requirements – Requires that all land effected by mining shall be revegetated to provide a diverse, effective and permanent vegetative cover of the same aspection native to the area of disturbed land.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2061 NMAC	Revegetation: Introduced Species – Allows for introduced species to be used for native species, if approved.	TBC during remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2062 NMAC	Revegetation: Timing – When necessary to control erosion, any disturbed area shall be seeded and planted, as contemporaneously as practicable with the completion of backfilling and grading, with a temporary cover of small grains, grasses or legumes until a permanent cover is established.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2063 NMAC	Revegetation: Mulching and Other Soil Stabilizing Practices – Requires the use of suitable mulch and other soil stabilizing practices on all regraded and topdressed areas to control erosion, promote germination of seeds, or increase the moisture retention capacity of the soil.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2065 NMAC	Revegetation: Standards for Success – Establishes vegetative success measures for ground cover and productivity.	TBC during remedial action.
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2066 NMAC	Revegetation: Tree and Shrub Stocking – Establishes standard of success for tree and shrub stocking.	TBC during remedial action.

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Cultural Resources	FEDERAL **The Native American Graves Protection And Repatriation Act –** 25 United States Code (USC) Section 3001 *et seq* and its regulations Title 43 CFR Part 10.	Protects Native American graves from desecration through the removal and trafficking of human remains and cultural items including funerary and sacred objects.	Substantive requirements applicable if Native American burials or cultural items are identified within area to be disturbed
Cultural Resources	FEDERAL **National Historic Preservation Act –** 16 USC 470 *et seq;* 36 CFR Part 800	Provides for the protection of sites with historic places and structures	Substantive requirements applicable if eligible resources identified within area to be disturbed
Cultural Resources	FEDERAL **Archeological Resources Protection Act of 1979 –** 16 USC Sections 47000-47011; 43 CFR Part 7	Prohibits removal of or damage to archaeological resources unless by permit or exception	Substantive requirements applicable if eligible resources are identified within area to be disturbed
Cultural Resources	FEDERAL **American Indian Religious Freedom Act –** 42 USC Section 1996 *et seq.*	Protects religious, ceremonial, and burial sites, and the free practice of religions by Native American groups.	Substantive requirements applicable if Native American sacred sites are identified within area to be disturbed.
Wildlife	FEDERAL **ESA –** 7 USC Section 136; 16 USC Sections 15331-1548, Title 50 CFR Parts 17 and 402	Regulates the protection of threatened and endangered species or critical habitat of such species	Substantive requirements applicable if protected species are identified within area to be disturbed
Wildlife	STATE NMSA 1978, §§ 17-2-37 through 17-2-46	Threatened and Endangered Species. Provides for the regulation and protection of threatened and endangered species.	Substantive requirements applicable if protected species are identified within the area to be disturbed
Wildlife	STATE NMSA 1978, § 75-6-1	Endangered Plant Species. Provides for the regulation and protection of threatened and endangered plant species. Endangered plant species means any plant species whose prospects of survival within the state are in jeopardy or are likely within the foreseeable future.	Substantive requirements applicable if protected species are identified within the area to be disturbed

Table 1: Preliminary list of Applicable or Relevant and Appropriate Requirements.			
Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Wildlife	STATE Title 19 Chapter 21 NMAC	Threatened and Endangered Plants. Establishes requirements for the protection of threatened and endangered flora and fauna.	Substantive requirements applicable if protected species are identified and within the area to be disturbed
Cultural Resources	STATE NMSA 1978, §§ 18-6-1 through 18-6-27	Historic Building Structures, Sites, or Artifacts. Provides for the preservation, protection, and enhancement of structures, sites, and objects of historical significance within the state.	Substantive requirements applicable if protected areas are identified and within the area to be disturbed
Cultural Resources	STATE NMSA 1978, §§ 18-8-1 through 18-8-8	Prehistoric or Historic Sites. Provides for the acquisition, stabilization, restoration or protection of significant prehistoric or historic sites.	Substantive requirements applicable if protected areas are identified and within the area to be disturbed.
Cultural Resources	STATE § 4.10.12 NMAC	Prehistoric or Historic Sites. Provides for the implementation of the Act.	Substantive requirements applicable if protected areas are identified within the area to be disturbed.

ACRONYMS

AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental, Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
COC	Contaminant of Concern
DOE	Department of Energy
EE/CA	Engineering Evaluation and Cost Analysis
EPA	U.S. Environmental Protection Agency
FR	Federal Register
HHRA	Human Health Risk Assessment
HI	Hazard Index
ICs	Institutional Controls
mg/kg	milligram per kilogram
MOU	Memorandum of Understanding
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NECR	Northeast Church Rock
NMED	New Mexico Environment Department
NNEPA	Navajo Nation Environmental Protection Agency
NPDES	National Pollution Discharge and Elimination System
NPL	National Priorities List
NRC	U.S. Nuclear Regulatory Commission
O&M	Operations and Maintenance
OU	operable unit
pCi/g	picocurie per gram
PRP	Potentially Responsible Party
PTW	Principal Threat Waste
Ra-226	Radium 226
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
ROD	Record of Decision
RSE	Removal Site Evaluation
UAO	Unilateral Administrative Order
UNC	United Nuclear Corporation
UNC/GE	United Nuclear Corporation/General Electric
U.S.C.	United States Code

GLOSSARY OF TERMS

Administrative Record – The body of documents available to the public associated with characterization and remedy selection at a site.

Applicable or relevant and appropriate requirements (ARARs) – ARARs are the Federal and State environmental laws that a selected remedy will meet. These requirements may vary among Sites and alternatives.

Baseline Risk Assessment – An evaluation of the potential threat to human health and the environment in the absence of any remedial action.

Byproduct Material – waste and tailings produced by the processing of ore for its uranium or thorium content. Most of this material is created by uranium recovery and is primarily mill tailings.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - Was enacted by Congress on December 11, 1980. This law created a tax on the chemical and petroleum industries and provided broad Federal authority to respond directly to releases or threatened releases of hazardous substances that may endanger public health or the environment.

Contaminants of Concern – Those chemicals associated with the Site or Site activities that may represent a risk to human health or the environment.

Department of Energy, Office of Legacy Management – This office was established in December 2003 to manage its responsibilities associated with the legacy of World War II and the Cold War. This legacy includes radioactive and chemical waste, environmental contamination, and hazardous material. The DOE program provides for long-term surveillance and maintenance, records management, work force restructuring and benefits continuity, property management, land use planning, and community assistance.

Engineering Controls – Controls that are engineered to manage environmental or human health risk by limiting access and/or preventing exposure to contaminants of concern on the property. These may include such things as fences, signs, or soil covers over contaminated materials.

Excess Lifetime Cancer Risk – Cancer risks posed by a contaminated site in excess of the lifetime probability of developing cancer from other causes.

Ground water – Underground water that fills pores in soils or openings in rocks to the point of saturation. Ground water is often used as a source of drinking water via municipal or domestic wells.

Human Health Risk Assessment – A study that determines and evaluates excess lifetime risk that site contamination poses to human health.

Institutional Controls (ICs) – Institutional controls are actions, such as legal controls, that help minimize the potential for human exposure to contamination by ensuring appropriate land or resource use.

NRC License – Through the licensing process, the U.S. Nuclear Regulatory Commission (NRC) authorizes an applicant to conduct any or all of the following activities: Construct, operate, and decommission commercial reactors and fuel cycle facilities; possess, use, process, export and import nuclear materials and waste and handle certain aspects of their transportation; and/or site, design, construct, operate, and close waste disposal sites.

Milligram per Kilogram (mg/kg) - A unit of measurement equivalent to one milligram of contaminant per kilogram of solid (typically soil).

Monitoring – Ongoing collection of information about the environment that helps gauge the effectiveness of a cleanup action.

National Oil and Hazardous Substance Pollution Contingency Plan (NCP) – Regulations governing cleanups under EPA's Superfund program.
National Priorities List (NPL) – The NPL is the list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. The NPL is intended primarily to guide the EPA in determining which Sites warrant further investigation.
U.S. Nuclear Regulatory Commission – The NRC was created as an independent agency by Congress through the establishment of the Energy Reorganization Act of 1974 to ensure the safe use of radioactive materials for beneficial civilian purposes while protecting people and the environment. The NRC regulates commercial nuclear power plants and other uses of nuclear materials, such as in nuclear medicine, through licensing, inspection and enforcement of its requirements.
picocurie per gram (pCi/g) – A curie (symbol Ci) is a measurement of radioactivity and is defined as 37 billion (37,000,000,000) disintegrations per second (1 Ci = 3.7×10^{10}). This is roughly the activity of 1 gram of the radium isotope 226Ra, a substance studied by the pioneers of radiology, Marie and Pierre Curie, for whom the unit was named. Picocurie (pCi) is 1 million millionth of a curie (1 x 10^{-12} Ci). Picocurie per gram is the measurement of radioactivity per gram of material.
Preferred Alternative – Proposed remedial alternative that meets NCP evaluation criteria and is supported by regulatory agencies.
Present Worth Cost – A method of evaluation of expenditures that occur over different time periods. By discounting all costs to a common base year, the costs for different remedial action alternatives can be compared on the basis of a single figure for each alternative. When calculating present worth cost for Superfund sites, total operations & maintenance costs are to be included.
Radium-226 – decay product of Uranium-238.
Radiation – energy that travels in the form of waves or high speed particles.
Radioactive Decay – process where an unstable radionuclide emits energy or particles resulting in transformation of the radionuclide into another radionuclide.
Radioactivity –the property of some atoms that causes them to spontaneously give off energy as particles or rays. Radioactive atoms emit ionizing radiation when they decay.
Radon-222 – decay product of Radium-226.
Record of Decision (ROD) – A formal document that is a consolidated source of information about a Superfund site, the remedy selection process, and the selected remedy.
Receptor – An organism that receives, may receive, or has received environmental exposure to a chemical.
Remedial Action – Action(s) taken to correct or remediate contamination.
Remedial Action Objectives (RAOs) – Specific goals for protecting human health and the environment. RAOs are developed by evaluating ARARs that are protective of human health and the environment and the results of the remedial investigations, including the human and ecological risk assessments.
Removal Action – A short-term immediate action taken to address releases of hazardous substances that require expedited response.
Resource Conservation and Recovery Act (RCRA) – The Federal act that established a regulatory system to track hazardous wastes from the time they are generated to their final

disposal. RCRA also provides for safe hazardous waste management practices and imposes standards for transporting, treating, storing, and disposing of hazardous wastes.

Tailings – the remaining portion of the metal-bearing ore after some or all of such metal, such as uranium, has been extracted.

United Nuclear Corporation and United Nuclear Corporation/GE – operator of the NECR Mine and UNC Mill and is now an indirect subsidiary of General Electric Corporation ("GE").

Operable Unit – term used to designate each separate action taken at a Superfund Site.

Uranium Mill Tailings Radiation Control Act – To provide for the disposal, long-term stabilization, and control of uranium mill tailings in a safe and environmentally sound manner and to minimize or eliminate radiation health hazards to the public, Congress enacted the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). This Act established two programs to protect the public and the environment from uranium mill tailings: Title 1 and Title 2 programs. The UMTRCA Title I program established a joint Federal/State-funded program for remedial action at abandoned mill tailings sites where tailings resulted largely from production of uranium for the weapons program. Under Title I, the Department of Energy (DOE) is responsible for cleanup and remediation of these abandoned sites. The NRC is required to evaluate DOE's design and implementation and, after remediation, concur that the sites meet standards set by the Environmental Protection Agency (EPA). The UMTRCA Title II program is directed toward uranium mill sites licensed by the NRC or Agreement States in or after 1978. Title II of the Act provides the NRC authority to control radiological and non-radiological hazards; the EPA authority to set generally applicable standards for both radiological and non-radiological hazards; and the eventual State or Federal ownership of the disposal sites, under general license from NRC. The UNC Site falls under the Title 2 program.

USE THIS SPACE TO WRITE YOUR COMMENTS

Your input on the Surface Soil Operable Unit Proposed Plan for the UNC Site is important to the EPA and NMED. Comments provided by the public are valuable in helping the EPA and NMED select a final cleanup remedy for the Site. You may use the space below to write your comments, then fold and mail. Comments must be postmarked by September 21, 2012. If you have any questions about the comment period, please contact Katrina Higgins-Coltrain at (214) 665-8143 or through EPA's toll-free number at 1-800-533-3508, Jason McKinney at (214) 665-8132 or through EPA's toll-free number at 1-800-533-3508, or Earle Dixon, NMED, at 505-827-2890. Those with electronic communications capabilities may submit their comments to the NMED or EPA via Internet at the following e-mail addresses: coltrain.katrina@epa.gov, mckinney.jason@epa.gov, or earle.dixon@state.nm.us.

Name _____
Address _____
City _____
State _____ Zip _____