RECORD OF DECISION
United Nuclear Corporation Site
McKinley County, New Mexico

EPA ID: NMD030443303

Operable Unit: OU02

Surface Soil Operable Unit

U.S. Environmental Protection Agency

Region 6

Dallas, Texas

March 29, 2013

681353

Concurrence Page for the United Nuclear Corporation Site
Surface Soil Operable Unit Record of Decision

Janet Brooks, Remedial Project Manager LA/NM/OK Team	03/26/2013 Date
Cathy Gilmore, Team Leader LA/NM/OK Team	3/26/2013 Date
John Meyer, Deputy Associate Director Remedial Branch	3/26/13 Date
Charles Faultry, Associate Director Remedial Branch	3/26/13 Date
James Costello, Assistant Regional Counsel Regional Counsel Superfund Branch	3/26/13 Date
Mark Peycke, Chief Regional Counsel Superfund Branch	03/26/13 Date
Pam Phillips, Deputy Director Superfund Division	3/28/13 Date
Carl Edlund, Director Superfund Division	3/29/13 Date

Contents

Part 1 Declaration ... 1
1.1 Site Name and Location ... 1
1.2 Statement of Basis and Purpose ... 1
1.3 Assessment of Site ... 1
1.4 Description of Selected Remedy ... 1
1.5 Statutory Determinations ... 4
1.6 ROD Data Certification Checklist ... 5
1.7 Authorizing Signature ... 5
Part 2 Decision Summary ... 6
2.1 Site Name, Location, and Description ... 6
2.2 Federal, State, Tribal, and Local Authorities Roles ... 8
2.3 Site History and Enforcement Activities ... 11
2.3.1 Previous Actions ... 12
2.4 Community Participation ... 20
2.4.1 UNC Site ... 20
2.4.2 NECR Site ... 20
2.4.3 Local Community Association ... 21
2.4.4 UNC Site Surface Soil Operable Unit Proposed Plan ... 22
2.5 Site Characteristics ... 23
2.5.1 UNC Site ... 23
2.5.2 Ground Water at the UNC Site ... 24
2.5.3 Tailings Disposal at the UNC Site ... 25
2.5.4 NECR Site ... 26
2.5.5 Principal Threat Waste ... 28
2.5.6 Similarity of Mine Waste at the NECR Site to Mill Tailings at the UNC Site ... 28
2.6 Scope and Role of Operable Unit or Response Action ... 31
2.6.1 Overview of UNC-NECR Consolidation Area ... 33
2.6.2 Areas of Archaeological or Historical Importance ... 34
2.7 Current and Potential Future Site and Resource Uses ... 34
2.7.1 Land Uses ... 34

012691

2.7.2 Ground and Surface Water Uses 35
2.8 Summary of Site Risks 36
2.9 Remedial Action Objectives (RAO) and Remediation Goals 41
2.9.1 Remedial Action Objectives 41
2.9.2 Remediation Goals 42
2.9.3 Description of Alternatives 43
2.9.4 Alternative 1: No Action Alternative 45
2.9.5 Alternative 2: On-site Disposal within the UNC Tailings Disposal Area 45
2.10 Comparative Analysis of Alternatives 49
2.10.1 Overall Protection of Human Health and the Environment 49
2.10.2 Compliance with ARARs 49
2.10.3 Long-term Effectiveness and Permanence 50
2.10.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment 51
2.10.5 Short-term Effectiveness 51
2.10.6 Implementability 52
2.10.7 Cost 53
2.10.8 State/Support Agency Acceptance 54
2.10.9 Community Acceptance 54
2.11 Selected Remedy 54
2.12 Statutory Determinations 55
2.12.1 Protection of Human Health and the Environment 55
2.12.2 Compliance with ARARs 55
2.12.3 Cost Effectiveness 56
2.12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable 56
2.12.5 Preference for Treatment as a Principal Element 56
2.12.6 Five-Year Review Requirements 56
2.13 Documentation of Significant Changes 57
Part 3 Responsiveness Summary 58
3.1 Description of Surface Soil Operable Unit Proposed Plan 58
3.2 Community Involvement on the Surface Soil Operable Unit Proposed Plan 58

3.3 Summary of Comments Received During the Public Comment Period and EPA Responses 59
3.3.1 Summary of Community Comments and Response to Community Concerns 59
3.3.2 Comprehensive Response to UNC/GE Comments 78
3.3.3 Comprehensive Response to Agency Comments 82
REFERENCES 110
ACRONYMS 113
GLOSSARY OF TERMS 115

List of Tables

Table 1 – Applicable or Relevant and Appropriate Requirements

List of Figures

Figure 1 – Site Location Map
Figure 2 –Site Map
Figure 3 – UNC Site Map
Figure 4 – NECR Site Map
Figure 5 – Church Rock Area Ground Water Cross Section

Appendices

Appendix A – 2011 Non-Time Critical Removal Action Memorandum
Appendix B - New Mexico Environment Department Concurrence Letter
Appendix C – Annual Land Use Report for 2011

Part 1 Declaration

1.1 Site Name and Location

United Nuclear Corporation (UNC)
McKinley County, New Mexico
CERCLIS Identification Number: NMD030443303
SITE ID: 0600819
Surface Soil Operable Unit: OU02

1.2 Statement of Basis and Purpose

This decision document presents the Selected Remedy for Operable Unit 2 (OU2),[1] the Surface Soil Operable Unit, of the UNC Superfund Site (UNC Site[2]), in McKinley County, New Mexico, which was chosen in accordance with Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended by Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for this site.

The State of New Mexico, acting through the New Mexico Environment Department (NMED), concurs with the Selected Remedy.

1.3 Assessment of Site

The response action selected in this Record of Decision (ROD) is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of Selected Remedy

The remedial action for the UNC Site addresses contaminated surface and subsurface soil from the nearby Northeast Church Rock (NECR) Mine Site (NECR Site[3]). To remove the potential threat to human health at the NECR Site, the Selected Remedy will excavate approximately 1,000,000 cubic yards of waste material from the NECR Site to dispose of at the UNC site. Operations at the NECR Site left uranium protore (low grade ore), waste rock, and overburden after the mine was shut down. **Principal threat waste from the NECR Site will not be disposed**

---

[1] Section 300.5 of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR § 300.5, defines an operable unit as a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site.

[2] Within this ROD, The UNC Superfund Site is defined as the UNC Site. In other documents and in some public comments contained within this ROD, this site is identified as the UNC Mill Site.

[3] Within this ROD, the NECR Mine Site is defined as the NECR Site. In other documents and in some public comments contained within this ROD, this site is identified as the NECR Mine Site.

at the UNC Site and is not part of this Selected Remedy. The Selected Remedy described in this ROD **does not address contaminated ground water at the UNC Site** which is being remediated under a separate existing ROD issued by EPA in 1988. EPA refers to the ground water cleanup as Operable Unit 1 (OU1).

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 that make up the UNC Site Tailings Disposal Area, as well as the relative proximity of these facilities (less than 1 mile); the Environmental Protection Agency (EPA) is hereby invoking its authority under CERCLA Section 104(d)(4), 42 United States Code (U.S.C.) § 9604(d)(4), to temporarily treat these related facilities (the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area) as one for the purposes of Section 104 of CERCLA, 42 U.S.C. § 9604. Treatment of the UNC Site Tailings Disposal Area and the NECR Site Consolidation Areas as one begins immediately, but this treatment is temporary and will end once all the NECR Site waste that EPA intends to dispose at the UNC Site Tailings Disposal Area has been disposed at the UNC Site Tailings Disposal Area.

This ROD is only for Operable Unit 2, the Surface Soil Operable Unit, of the UNC Site

This ROD does not select the removal action for the cleanup of the waste at the NECR Site. Although there is extensive information regarding the NECR Site in this ROD, that information is here for the convenience of the reader only. The decisions regarding the removal action that is cleaning up the pertinent NECR Site contamination were made in the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site, and in the associated 2009 "Engineering Evaluation/Cost Analysis Northeast Church Rock (NECR) Mine Site, Gallup, New Mexico (EE/CA). An Action Memorandum serves as the primary decision document that:

- determines the need for a CERCLA removal action,
- authorizes the removal action,
- identifies the action and remediation goals (if applicable) and
- explains the rationale for the removal response (for a non-time critical removal, the EE/CA approval memo documents the appropriateness of a removal action, which is then chosen in an Action Memorandum after the EE/CA and public comment).

This ROD does document EPA's decision to *temporarily* treat the UNC Site Tailings Disposal Area and the NECR Site Consolidation Areas as one for the purposes of CERCLA Section 104, 42 U.S.C. § 9604. Treating these two facilities as one allows EPA, the lead agency, to manage waste transferred between these noncontiguous facilities without having to obtain a permit, thereby, streamlining the disposal action taking place at the UNC Site.

The major components of the selected remedies at the UNC Site and the NECR Site include the following actions:

Repository Design. Design a repository at the UNC Site for the contaminated material excavated and removed from the NECR Site. Design specifications will comply with CERCLA requirements including all applicable or relevant and appropriate requirements (ARARs). The design will include a cap structure that will mitigate direct contact, limit water infiltration, and perform as a radon barrier. Final design will determine actual configurations of cap and liner structure and will be submitted as part of a license amendment request to the Nuclear Regulatory Commission (NRC).

Baseline Sampling. Conduct any additional baseline sampling at the UNC Site necessary to assess current site conditions prior to construction and waste disposal.

Construction. Construct a repository at the UNC Site that will contain the contaminated mine waste and soil excavated and removed from the NECR Site in accordance with the approved design specifications. This action is contingent on the NRC approval of a license amendment for the UNC Site Tailings Disposal Area which comprises three covered tailing cells and two covered borrow pits. In addition, there are two open evaporation ponds located on the South Cell. That is, unless the NRC approves a license amendment for the UNC Site Tailings Disposal Area, the construction described in this ROD will not go forward. If NRC disapproves the request for a license amendment, EPA will stop its efforts to dispose of the NECR Site waste at the UNC Site Tailings Disposal Area, and EPA will evaluate other alternatives for disposal of the NECR Site waste.

Receiving. NECR Site waste that is transported to the UNC Site will be disposed in the Tailings Disposal Area if NRC approves a license amendment. The waste from the NECR Site will contain concentrations of uranium and radium 226 (Ra-226) that exceed Action Levels established in the 2011 NECR Site Non-Time-Critical Action Memorandum (hereinafter the 2011 NECR Site Action Memorandum). The 2011 NECR Site Action Memorandum provides that excavation at the NECR Site will not exceed ten feet, except in areas susceptible to erosion or where placing clean backfill to current grade is not planned, or in areas where principal threat waste will be removed. As stated earlier, principal threat waste is not a part of this Selected Remedy and will not be brought to the UNC Site. Excavation within these areas will continue until confirmation sample results are below the Action Levels established in the 2011 NECR Site Action Memorandum as determined using Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) procedures.

Closure. The UNC Site Tailings Disposal Area repository will be closed under the NRC License Amendment once all NECR Site contaminated waste rock and soil is disposed and existing ground water remediation is complete. The following will occur before the repositories in the UNC Site Tailings Disposal Area are closed:

1) The NECR Site waste from the Consolidation Areas that exceeds Action Levels established in the 2011 NECR Site Action Memorandum will be excavated according to the 2011 NECR Site Action Memorandum.
2) This NECR Site waste will be transported to the UNC Site according to the 2011 NECR Site Action Memorandum.
3) The UNC Site ground water remedy will be complete according to the provisions of the UNC Site OU1 ROD including any future amendments to the OU1 ROD.
4) The existing UNC Site evaporation ponds will be closed according to the provisions of the UNC Site OU1 ROD including any future amendments to the OU1 ROD.
5) All NECR Site waste received at the UNC Site will be disposed in the repository constructed at the UNC Site Tailings Disposal Area and all Remedial Action Objectives and performance standards described in this ROD will be met.

Institutional Controls. IC's are part of the Selected Remedy as described in Section 2.11.

At the UNC Site, the repository for the received NECR Waste will be located in the Tailings Disposal Area. This repository location is suitable for disposal of the NECR Site wastes containing concentrations of uranium or Ra-226 that exceeds action levels established in the 2011 NECR Site Action Memorandum. The repository will be within the footprint of the existing UNC Site Tailings Disposal Area cells. The repository will not use the South Cell which contains the existing evaporation ponds. Construction of a repository within the UNC Site Tailings Disposal Area is contingent on NRC approval of a license amendment for the UNC Site Tailings Disposal Area. The mine wastes and soils at the NECR Site and the UNC Site are similar and any co-disposal would essentially mean that there will be one repository in this area for both the NECR Site waste and for the UNC Site waste. One repository will mean a smaller waste footprint.

1.5 Statutory Determinations

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost-effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

High concentrations of uranium and Ra-226, defined as principal threat waste, will not be accepted at the UNC Site and **are not addressed under the Selected Remedy for the UNC Site**. The concentrations of uranium and Ra-226 in the waste brought to the UNC Site **are not a principal threat waste** for the UNC Site.

Because this remedy may result in hazardous substances, pollutants, or contaminants in soil remaining on the UNC Site above levels that allow for unlimited use and unrestricted exposure, and will take longer than five years to attain remedial action objectives (RAO) and remediation goals, a review will be conducted within five years after initiation of the remedial action for the

UNC Site to ensure that the remedy is, or will be, protective of human health and the environment.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD for the UNC Site OU2. Additional information can be found in the Administrative Record file for UNC Site OU2.

- Chemicals of concern and their respective concentrations - Page 36;
- Baseline risk represented by the chemicals of concern - Page 36;
- Remediation goals established for chemicals of concern and the basis for these levels - Page 50;
- This ROD for the UNC Site OU2 does not address any principal threat waste because there is no principal threat waste that is the subject of this Selected Remedy. – Page 36;
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of surface soil used in the baseline risk assessment and ROD – Page 42;
- Potential land use that will be available at the UNC Site as a result of the Selected Remedy - Page 42;
- Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the UNC Site OU2 remedy cost estimates are projected - Page55; and
- Key factor(s) that led to selecting the remedy for the UNC Site OU2 - Page 65.

1.7 Authorizing Signatures

03/29/2013

Carl Edlund — Date

Region 6 Superfund Division Director

012698

Part 2 Decision Summary

2.1 Site Name, Location, and Description

The UNC Site is a non-operating uranium mill located approximately 17 miles northeast of Gallup, New Mexico, in McKinley County (Site Location Map, Figure 1). The UNC Site is listed on the National Priorities List (NPL). The NPL is the list, compiled by EPA, of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial action and response. The UNC Site is generally comprised of the former ore processing mill facilities and a byproduct material (i.e., tailings) disposal area (hereinafter the Tailings Disposal Area), which cover about 25 and 100 acres, respectively.

The UNC Site is owned by United Nuclear Corporation (UNC) (now an indirect subsidiary of General Electric Company (GE)). The UNC Site is located within Section 2, Township 16 North, Range 16 West (EPA, 1988b). In addition to Section 2, UNC 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 1). Sections 2 and 36 represent the Site Boundary.

The area around the UNC Site is sparsely populated and includes Indian tribal trust land.

To the north of the UNC Site are two former uranium mines identified as the NECR Site and the Kerr McGee Quivira Mines (Quivira) (Figure 2). Both mines are non-NPL sites that are being addressed by EPA under Superfund removal actions. The NECR Site contains the mine waste that is being moved to the UNC Site. The Quivira Site is not involved in this Selected Remedy and is only mentioned to provide context of mines in the nearby vicinity to the UNC Site.

The NECR Site is a non-operating uranium mine located less than one mile northwest of the UNC Site. 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). The NECR Site is 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). The remedy selected in this ROD calls for UNC Site to receive NECR Site wastes. Under the remedy selected in this ROD, the NECR Site wastes will be permanently disposed at the UNC Site.

The Quivira Mines consist of the Quivira Church Rock I mine and the Quivira Church Rock IE mine. These two were operated from 1974 to about 1987. The Quivira site is on the Navajo Indian Reservation immediately north of Sections 35 and 36, Township 17 North, Range 16 West approximately 20 miles northeast of Gallup, New Mexico. The Quivira site also includes an approximate 2,200 foot segment of Red Water Pond Road north of the intersection with State Highway 566. Contaminated material from the Quivira Mine has been observed in the road crown and shoulders and has migrated to at least one homesite east of Red Water Pond Road. To date, EPA Region 9 has overseen the following cleanup activities at the Quivira Mine:

- removed contaminated soil from one property on the east side of Red Water Pond Road,
- repaired fences to keep people and animals off the site,
- stabilized the mine site waste piles, and
- applied chip seal paving to Red Water Pond Road from the turnoff at Rt. 566 up to the bridge

The Quivira Site is near the NECR Site and EPA Region 9 is overseeing UNC's cleanup of the NECR site. Also nearby is the UNC Site which is located on Sections 36 and 2, and which is jointly managed by the NRC and EPA Region 6.

A community lives immediately next to the Quivira Site on the reservation, downstream and down-wind of the waste piles

All the uranium ore from the Quivira Site mines, approximately five-million pounds, was processed at the Ambrosia Lake Mill located in Grants, New Mexico. The Quivira Mines are not part of this Selected Remedy and have only been discussed briefly to provide an overall context of mining impact in the vicinity of the UNC Site.

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 that make up the UNC Site Tailings Disposal Area, as well as the relative proximity of these facilities (less than 1 mile); the EPA is hereby invoking its authority under CERCLA Section 104(d)(4), 42 U.S.C. § 9604(d)(4), to temporarily treat these related facilities (the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area) as one for the purposes of Section 104 of CERCLA, 42 U.S.C. § 9604. Treatment of the UNC Site Tailings Disposal Area and the NECR Consolidation Areas as one begins immediately, but this arrangement is temporary and will end once all the NECR Site waste that EPA intends to dispose at the UNC Site Tailings Disposal Area has been disposed at the UNC Site Tailings Disposal Area.

The facilities that would be temporarily treated as one under EPA's Section 104(d)(4) authority include the areal extent of contamination at the NECR Site 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 treatment of these two facilities as one will facilitate the implementation of the Selected Remedy for the Surface Soil Operable Unit remedial action at the UNC Site described in this ROD, 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 temporarily treating the NECR Consolidation Areas and the UNC Site Tailings Disposal Area as one, the Selected Remedy can be taken without State, Federal or local permits as provided in CERCLA Section 121(e), 42 U.S.C. § 9621(e) with the exception of the associated NRC source materials license, which must be amended by UNC as discussed in Section 1.2.1. In addition, treating the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area as one

means that the action transferring mine waste from the NECR Site Consolidation Areas to the UNC Site 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, temporarily treating the non-contiguous NECR and UNC Sites as one for the purpose of disposing NECR mine wastes at the UNC Site "would be in the best interests of achieving sound and expeditious environmental cleanups." 55 Fed. Reg. 8666, 8691 (1990).

EPA determined that prior to its selection of removal actions for the NECR Site in September 2011, there were eleven households in the immediate vicinity, whose residents could be adversely impacted by the significant disturbances anticipated to be associated with the response actions selected for that site. Based on the information gathered from residents, EPA found 77 people to be eligible for voluntary alternative housing. In addition, Navajo families have informed EPA that 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 as grazing land 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.

2.2 Federal, State, Tribal, and Local Authorities Roles

The EPA is divided into regions. Regions are responsible for the execution of EPA programs within their designated areas. The State of New Mexico is part of Region 6. Within the State of New Mexico and elsewhere, the Navajo Nation issues are addressed by EPA Region 9. EPA Regions 6 and 9 are working jointly on the project to move the NECR Site waste, located on the Navajo Nation, to the UNC Site for permanent disposal. A September 29, 2011, Non-Time Critical Removal Action Memo was signed jointly by both regions (Appendix A) for the NECR Site.

At the UNC Site, there are two agencies with overlapping jurisdiction—EPA and NRC. As stated in the Memorandum of Understanding (MOU), dated September 30, 1988, 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.

For the UNC Site Surface Soil Operable Unit, EPA is the lead agency with EPA Region 6 providing oversight. EPA is also the lead agency for the NECR site with EPA Region 9 providing oversight. All EPA regions follow the same regulations. The NMED is the support agency for the UNC Site. The NMED letter of concurrence for this ROD is included in Appendix B. EPA also consults with the Navajo Nation regarding EPA actions related to the UNC Site that may affect the Tribe.

As stated above in this ROD, unless the NRC approves a license amendment for the UNC Site Tailings Disposal Area, the construction described in this ROD will not go forward. If NRC disapproves the request for a license amendment, EPA will stop its efforts to dispose of the

NECR Site waste at the UNC Site Tailings Disposal Area, and EPA will evaluate other alternatives for disposal of the NECR Site waste.

According to the NRC:

> *"The mechanism to authorize the disposal of non-11e.(2) byproduct materials (e.g., mine waste) is an amendment to the UNC Church Rock Mill source materials license that was issued by the NRC under Title 10 of the Code of Federal Regulations (CFR) Part 40. UNC, the licensee, will need to submit a request to the NRC to amend its Church Rock Mill source materials license SUA-1475 to allow for the disposal of mine waste within the footprint of the existing tailings cells. This license amendment package, supplemented by the final design for the tailings cover, financial surety, and pertinent environmental reports, will be reviewed by the NRC staff. The public will then have opportunities to comment on the UNC amendment request. The totality of this information will be considered by the NRC prior to any final decision on the licensee's license amendment request.*
>
> *In accordance with "NRC Regulatory Issue Summary 2000-23 Recent Changes to Uranium Recovery Policy," Attachment 1, "Interim Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11 e. (2) Byproduct Material in Tailings Impoundments," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML 003773008), the disposal of non-11e.(2) material in the tailings impoundments is subject to specific considerations. Therefore, in reviewing a licensee request for the disposal of waste that has radiological characteristics comparable to 11e.(2) byproduct material, it is incumbent upon the licensee to: (1) provide documentation showing necessary approvals of other affected regulators (e.g., US EPA, Navajo Nation EPA, State, etc.) for material containing listed hazardous wastes or any other material regulated by another Federal agency or State because of environmental or safety considerations; (2) demonstrate that there will be no significant environmental impact from disposing of this material; (3) provide documentation showing approval by the Regional Low-Level Waste Compact in whose jurisdiction the waste originates as well as approval by the Compact in whose jurisdiction the disposal site is located, for material which would otherwise fall under Compact jurisdiction; and (4) demonstrate that the proposed disposal will not compromise the reclamation of the tailings impoundments by demonstrating compliance with the reclamation and closure criteria of Appendix A of 10 CFR Part 40.*
>
> *Since mill tailings impoundments are already regulated under 10 CFR Part 40, licensing the receipt and disposal of non-11e.(2) byproduct material (e.g., mine waste) therein will also be done under 10 CFR Part 40. As part of the process, the U.S. Department of Energy (DOE) and the State of New Mexico will need to be informed of the NRC findings and proposed action, with a request to concur*

within 120 days. A concurrence and commitment from either DOE or the State to take title to the tailings impoundment after closure must be received before granting the UNC license amendment request".

The UNC Site contains "byproduct material" as defined by Section 11e.(2) of the Atomic Energy Act of 1954, as amended (AEA), and is regulated by the NRC pursuant to the AEA and Title II of the Uranium Mill Tailings Radiation Control Act of 1978, as amended (UMTRCA). Since the mill tailings impoundments (also referred to in this ROD as disposal cells) in the Tailings Disposal Area are already regulated under Title 10 Code of Federal Regulations (CFR) Part 40, licensing the receipt and disposal of non-11e.(2) byproduct material (e.g., mine waste) therein will also be done under 10 CFR Part 40.

As part of the process, the U.S. Department of Energy (DOE) and the State of New Mexico will be informed of the NRC findings and proposed action. A concurrence and commitment from either DOE or the State to take title to the tailings impoundment after closure must be received before granting the UNC license amendment request. It is not anticipated that the State will take title. EPA is working with DOE toward this end.

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. Once all required actions are completed under the conditions of the NRC license and final decommissioning activities are completed for the UNC Site, and the NRC license is terminated, it is expected that there would be a transfer of this UMTRCA Title II site as established through the NRC site transfer process to the DOE Long-Term Surveillance and Maintenance Program (LTS&M) that is administered by the DOE 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. Prior to DOE's acceptance of this UMTRCA Title II site for long-term surveillance and maintenance a determination must be made by the NRC that the UNC Site is deemed ready for transfer to DOE without any outstanding technical, regulatory, or jurisdiction issues. In addition with input from DOE, that NRC identifies an appropriate long-term maintenance fee to enable DOE to effectively perform its LTS&M duties, including any that are unique post-closure issues because of the mine waste.

Close coordination with the NRC, DOE, the Navajo Nation Environmental Protection Agency, 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, and complies with the NRC, DOE, EPA and State requirements and regulations.

The EPA has determined that this ROD for the Surface Soil Operable Unit at the UNC Superfund Site (*a.k.a.,* the UNC Church Rock Mill Uranium Recovery Facility) is consistent with the

September 28, 1988, MOU between NRC and EPA (55 Fed. Reg. 37887) regarding the UNC Site.[4] This is so because EPA's selection and implementation of a remedy providing for collocating the NECR mine waste in the Tailings Disposal Area as described in this ROD is an independent action from final soil reclamation activities and ground water corrective measures for the entire UNC Site.

As much as possible, EPA intends to implement and fund the response actions described in this ROD through enforcement actions.

Consultations with the Navajo Nation and the State of New Mexico in 2005 resulted in EPA Region 9 taking the lead on the NECR Site. The Navajo Nation Environmental Protection Agency (NNEPA) sent a letter to EPA Region 9 dated March 22, 2005, formally requesting that EPA Region 9 become the lead agency, consistent with a Memorandum of Understanding between Region 9 and the Navajo Nation. EPA Region 9 issued a letter formally accepting NECR Site lead on November 7, 2005.

EPA will continue to coordinate closely with the Navajo Nation and the State of New Mexico throughout the cleanup process. Both entities will be included as part of a technical design review team of regulatory agencies, including EPA Regions 6 and 9, NRC, DOE, NMED, and the NNEPA. The State of New Mexico has identified requirements that are considered to be ARARs as discussed below under Section 2.10.2.

2.3 Site History and Enforcement Activities

Operations at the UNC Site included a historic uranium mill that was licensed to operate by the State of New Mexico in May 1977. 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 2). A portion of the mine discharge water infiltrated into the subsurface and significantly 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 mill on the UNC Site operated from 1977 to 1982, and processed ore primarily from two of UNC's nearby mines: NECR 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 (north, central, and south). An estimated 3.5 million tons of tailings were disposed in the tailings impoundments.

[4] The UNC Site is referred to in the MOU as the Churchrock [*sic*], New Mexico uranium mill site. EPA generally refers to the UNC Site as the United Nuclear Corporation Superfund Site. NRC generally refers to the site as the UNC Church Rock Mill Uranium Recovery Facility.

Operations at the NECR Site left uranium protore (low grade ore), waste rock, and overburden after the mine was shut down. Uranium and its decay product radium are of primary concern at the NECR Site. Radium is present in significantly elevated concentrations in soil and sediment. The radium has been transported as windborne dust or as rainwater run-off to areas around or adjacent to the NECR Site. Plants can take up radium and these plants may be consumed by people who gather herbs and other plants in these contaminated areas at the NECR Site. Additionally, animals may eat plants that have taken up radium and these animals may be eaten by people in the vicinity of the NECR Site. People who come into contact with dust at the NECR Site may also be exposed to radium through normal hand to mouth contact during eating or smoking. People may also inhale radium in windborne dust, or drink radium contaminated surface water from the NECR Site.

2.3.1 Previous Actions

2.3.1.1 History of the NRC and NMED actions at the UNC Site

Regulatory authority for the site has included the State of New Mexico agency NMED (formerly the New Mexico Environmental Improvement Division), the NRC and the EPA. The initial license for the site was granted by NMED in May 1977. At that time, New Mexico was an Agreement State and had authority to issue a license to UNC. An Agreement State is a State that has signed an agreement with the NRC authorizing the State to regulate certain uses of radioactive materials within the State.[5] Under the jurisdiction of the NMED, UNC was required to prepare a Ground Water Discharge Plan (November 1979), to prevent tailings seepage from contaminating ground water in the UNC Site vicinity.

On July 16, 1979, the tailings impoundment 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. UNC 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 contamination at the UNC Site 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 UNC 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).

---

[5] Section 274 of the Atomic Energy Act of 1954, as amended, provides a statutory basis under which NRC relinquishes to the States portions of its regulatory authority to license and regulate byproduct materials (radioisotopes); source materials (uranium and thorium); and certain quantities of special nuclear materials. The mechanism for the transfer of NRC's authority to a State is an agreement signed by the Governor of the State and the Chairman of the Commission, in accordance with Section 274b of the Act.

The NMED ceded its licensing authority to the NRC in 1986 when it relinquished Agreement State status. Since that time, the license for the UNC Site has been under NRC responsibility. The processes for reclamation and ground water corrective action were implemented beginning in 1986 under the NRC license.

In 1986, the NRC assumed responsibility for the licensing and regulating of uranium mills within the State of New Mexico. UNC's contractor, Canonie Environmental Services Corp. (Canonie) 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 Ra-226 contaminated soils, 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 McKinley County Sections 2 and 36 in 1989 (UNC, 1989), final remediation of windblown tailings in Section 1 in 1990 (UNC, 1990), mill decommissioning in 1992 (UNC, 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 the 1997 report, the final remaining reclamation actions include backfilling of the evaporation ponds located on top of the South Cell, capping of the evaporation pond area (after completion of ground water remediation activities), 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, under NRC authority after remedial actions called for by the UNC Site Surface Soil Operable Unit ROD are completed and the evaporation ponds are no longer necessary for ground water cleanup.

NRC required that UNC begin reclamation construction activities in 1988, three years prior to final approval of the reclamation plan. The NRC ground water corrective action, as required under NRC regulations and in the License, was incorporated into the reclamation plan. The NRC Corrective Action Plan (CAP) included cleanup standards for the UNC Site as determined by the NRC. A draft reclamation plan was submitted in 1987 and the final plan was approved in March 1991. The Corrective Action Plan cleanup standards will be reviewed by EPA during the UNC Site Five Year Review for the OU1 ROD which addressed ground water. This Five Year Review is currently underway and is due to be finalized in the fall of 2013.

2.3.1.2 History of EPA involvement at the UNC Site

EPA, which has authority over the UNC Site under CERCLA, 42 U.S.C. §§ 9601 *et seq.*, placed the UNC Site onto the NPL, 40 CFR Part 300 Appendix B, 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 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, 40 CFR Part 300. NRC's actions at the UNC Site are taken pursuant to the Source Materials License SUA-1475 (the UMTRCA of 1978, 42 U.S.C. §7901 *et seq)*. As stated in the MOU, EPA will take remedial actions on the UNC Site in order to fulfill its regulatory requirements. EPA had consulted with the NRC prior to issuing the Surface Soil Operable Unit Proposed Plan.

After the UNC Site was listed on the NPL, EPA conducted a ground water remedial investigation and a feasibility study (RI/FS) 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 ROD in September 1988 selecting a remedy for the contaminated ground water that included extraction of the ground water and treatment by evaporation. (Hereinafter the Record of Decision for ground water is referred to as the Ground Water Operable Unit ROD.) 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 Ground Water Operable Unit ROD also included ground water monitoring in the Southwest Alluvium, Zone 1, and Zone 3. EPA identified UNC as a potentially responsible party (PRP) under CERCLA. EPA issued a CERCLA Unilateral Administrative Order (UAO; Docket No. CERCLA 6-11-89) to UNC calling for UNC to implement the remedy as selected in the Ground Water Operable Unit ROD. UNC constructed the remedy in 1989, and continues to address ground water contamination under the 1988 Ground Water Operable Unit 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 UNC under the 1988 Ground Water Operable Unit ROD. Ground water is not a component of this Surface Soil Operable Unit ROD for the UNC Site, which addresses only the proposed disposal of the NECR Site mine waste at the UNC Site.

2.3.1.3 History of EPA involvement at the NECR Site

On January 29, 1979, the New Mexico Environmental Improvement Division authorized UNC's use of coarse sand tailings from the UNC Mill for backfilling excavated mine stopes at the NECR Mine.

NRC assumed licensing authority from the State of New Mexico for the UNC Site in June 1986. The NRC was aware that byproduct material from the UNC Site was historically transferred from the UNC Site to the NECR Site to stabilize mine stopes. Thus, the NRC became directly

involved in the NECR Mine closure activity, providing technical input on aspects related to radiologic surficial contamination since 11 e.(2) byproduct material from the UNC Site mill (also known as the UNC Church Rock Mill) operation was formerly staged at the NECR Site.

UNC undertook closure activities at the NECR Site between 1986 and 1988 under the NRC Source Materials license for the NECR Site within UNC's mine permit boundaries (Figure 2). UNC's closure activities at the NECR Site included 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 reviewed the UNC document entitled, "Tailings Sand Backfill Cleanup Verification Report, Northeast Church Rock Mine, United Nuclear Corporation," April 27, 1989 (ADAMS Accession ML080040301). The NRC determined that UNC had adequately removed remaining byproduct material from the NECR Site and that no further action was required at the NECR Site by UNC pursuant to Condition No. 33 of its Church Rock Mill source materials license (ADAMS Accession No. ML073650348).

The NRC never had jurisdictional responsibility for the NECR Site nor regulatory authority to require mine close-out activities. Therefore, there was never any area of the mine that was licensed by the NRC or subsequently released for unrestricted use by the NRC.

EPA first became aware of community efforts to address contamination at the NECR Site in 2003 when the Church Rock Chapter of the Navajo Nation initiated the Church Rock Uranium Monitoring Project (CRUMP). Information collected from this grass roots field effort raised awareness of the NECR Site.

Consultation with the Navajo Nation and discussions with 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 consulted with the Navajo Nation about the NECR Site cleanup action before, during, and after issuing the EE/CA for the Non-Time Critical Removal Action at the NECR Site. EPA's formal consultations with the Navajo Nation are currently broader in scope, addressing the next 5-Year Uranium Cleanup Plan. Informal consultation regarding the NECR Site cleanup continues as the Navajo President has requested biannual meetings attended by top-level representatives of US EPA Regions 6 and 9, DOE, NRC, and Navajo Nation. The consultations that have been held so far are documented in the NECR Site Administrative Record. Some of these consultations are listed below:

- October 2009 - Meeting in Phoenix between Navajo Nation President Shirley and Acting EPA Region 9 Administrator, Laura Yoshii regarding the NECR Site.
- December 21, 2009 -Letter to President Shirley from Acting Regional Administrator, Laura Yoshii – This letter was a follow up to the October 2009 meeting between President Shirley and Ms. Yoshii. The letter provided a plan to implement various actions that the Navajo had requested regarding the NECR Site. Future small meetings

with the Red Water Pond Community were among the action items described in the plan.

- February 15 and 16, 2011 – EPA met with representatives of NNEPA and DOJ, and with the policy advisor to the Navajo Nation President regarding the cleanup of the NECR Site.
- July 7, 2011 - Letter to Steve Etsitty, politically appointed Executive Director of the NNEPA, from Jane Diamond, Director of the EPA Region 9 Superfund Program. As part of the formal consultation process regarding the cleanup at the NECR Site, this letter responded to Navajo Nation concerns.
- September 1, 2011 - Letter from Ms. Diamond to Mr. Etsitty providing additional technical information about the NECR Site, in response to Navajo Nation concerns.
- September 8, 2011 – Meeting between President Shirley and Ms. Diamond regarding the NECR Site cleanup.

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 six years. UNC 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 UNC. UNC 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 UAO to the UNC. The UAO required UNC to perform the cleanup described in the NECR Site Residential Action Memorandum. Under the terms of the UAO, UNC 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 pCi/g[6] Ra-226, removals were conducted for half-acre areas around

[6] Throughout this Surface Soil Operable Unit ROD, 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 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.

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) would be necessary to reduce or eliminate threats to human health and the environment.

- In May 2009, EPA issued an Engineering Evaluation/Cost Analysis (EE/CA) that evaluated several alternatives for cleanup of the NECR Site. EPA evaluated the following five cleanup alternatives for the NECR Site:

  Alternative 1. No Action;

  Alternative 2. Excavation and disposal at an off-site treatment, storage and disposal facility (TSDF) of all NECR Site wastes;

  Alternative 3. Consolidation and covering of mine wastes on the NECR Site;

  Alternative 4. Construction of an above-ground, capped and lined repository on the NECR Site; and

  Alternative 5. Consolidation of the mine wastes with a cap and liner at the UNC Site currently under license by the NRC, either in an existing tailings cell or in a newly-constructed repository.

  Alternatives 3, 4 and 5 had the following option:

  Option A: Removal of high-concentration ("principal threat waste") material to an off-site Class I hazardous waste disposal facility, or an alternative appropriate facility.

  In addition, Alternatives 3 and 4 have the following option:

  Option B: Removal of principal threat waste material for containment in an existing tailings cell on the UNC Site.

After evaluating public comments received regarding the EE/CA, and the five alternatives, EPA selected its preferred Alternative 5A as the action it will take to clean up contamination at the NECR Site.

- On July 23, 2009, EPA signed the NECR Step-Out Area Interim Removal Action Memorandum. The part of the NECR Site that is located to the north and east of NECR-1 is identified as the 2009 Step-Out Area. The NECR Step-Out Area Interim Removal Action Memorandum called for an Interim Time Critical Removal Action involving approximately 100,000 cubic yards of radium contaminated soil from the Step-Out Area beyond the NECR Site, including the Unnamed Arroyo and vicinity residential area. The work, with EPA oversight, involved excavation, consolidation and capping of radium contaminated soils on the NECR Site.

- On July 24, 2009, under an AOC issued by EPA, UNC/GE agreed to undertake this 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[7] footprint; excavation and placement onto the NECR-1 pile of approximately 109,800 cubic yards of soil from the 2009 Interim Cleanup Step-Out Area (Figure 4), including approximately 33,000 cubic yards from an on-site arroyo (Figure 4); 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 Quivira Site (Figure 2); and fencing, seeding and other restoration activities (EPA, 2011b).

- On September 26, 2011, 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 (2012 Eastern Drainage Cleanup) (Figure 4) on July 25, 2012, UNC/GE signed an Administrative Order on Consent agreement with EPA to undertake the removal action at the Drainage East of Red Water Pond Road 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 of approximately 30,000 cubic yards of soil from the area east of Red Water Pond Road.

- On September 29, 2011, EPA signed the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Site calling for implementation of removal action Alternative 5, described above, with Option A, also described above. For more information about this removal action see Section 2.4.4 of this ROD for the UNC Site Surface Soil Operable Unit.

During all previously mentioned removal actions and in close coordination with EPA Community Involvement Coordinators, the EPA arranged for voluntary temporary housing for the residents for the duration of those actions.

2.3.1.4 EPA's decision to dispose of waste from the NECR Site Waste Consolidation Area at the UNC Site Tailings Disposal Area

In the NECR Site EE/CA, EPA identified its preferred alternative as Alternative 5A, listed above. EPA's preferred alternative in this ROD for the UNC Site, is essentially 5A from the EE/CA. However, 5A from the EE/CA was re-identified as Alternative 2 in the Proposed Plan. The "A" in 5A, which became a part of Alternative 2 in the Proposed Plan, is an element that provides for

[7] 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.

removal of high-concentration ("principal threat waste") material to an off-site Class I hazardous waste disposal facility, or an alternative appropriate facility. Principal threat waste is not a part of this Selected Remedy and no principal threat waste will be disposed of at the UNC Site as part of this remedy.

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 that make up the UNC Site Tailings Disposal Area, as well as the relative proximity of these facilities (less than 1 mile); the EPA is hereby invoking its authority under CERCLA Section 104(d)(4), 42 U.S.C. § 9604(d)(4), to temporarily treat these related facilities (the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area) as one for the purposes of Section 104 of CERCLA, 42 U.S.C. § 9604. Treatment of the UNC Site Tailings Disposal Area and the NECR Consolidation Areas as one begins immediately, but this treatment is temporary and will end once all the NECR Site waste that EPA intends to dispose at the UNC Site Tailings Disposal Area has been disposed at the UNC Site Tailings Disposal Area.

Since the selected cleanup action for the NECR Site included disposal of NECR Site waste at the UNC Site, the NECR Site cleanup decision was made contingent upon both modification of the license issued by the NRC for the UNC site, and issuance of an appropriate decision document by EPA Region 6 consistent with the NCP, 40 CFR Part 300. The NCP is the federal government's blueprint for responding to both oil spills and hazardous substance releases.

Under the NCP, for remedial actions at NPL Sites, EPA goes through several steps before it makes its final decision selecting a remedy for an NPL site like the UNC Site. EPA has completed one of these steps—issuing a Proposed Plan that describes EPA's preferred plan of action for the UNC Site along with a description of the alternatives considered. On June 20, 2012, EPA issued the Proposed Plan for the Surface Soil Operable Unit at the UNC Site and EPA invited the public to comment on its Proposed Plan.

The Proposed Plan for the Surface Soil Operable Unit at the UNC Site included two options:

> **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**: Alternative 2 includes the transportation, receipt, consolidation, and disposal of NECR Site mine waste at the UNC Site within the Tailings Disposal Area. EPA identified Alternative 2 as EPA's preferred remedy in the Surface Soil Operable Unit Proposed Plan for the UNC Site. Principal threat waste is not a part of this Selected Remedy and principal threat waste from the NECR Site will not be disposed of at the UNC Site.

2.4 Community Participation

2.4.1 UNC Site

As early as 1979, the Centers for Disease Control and Prevention (CDC) convened public meetings. The meetings were intended to address citizen concern after the July 16, 1979 tailings spill from the UNC Site into the Rio Puerco. The CDC also provided health tests for humans and livestock at these meetings.

After the UNC Site was placed on the NPL in September 1983, EPA representatives interviewed local officials and area residents to determine issues and concerns. At that time, EPA's major concern was possible contamination of nearby private wells.

In April 1987, EPA held a public meeting to discuss the status of the on-going investigations at the UNC Site and to clarify the roles and responsibilities of EPA and the NRC. A Navajo translator was provided and the meeting was well attended.

On July 18, 1988, EPA announced an open house meeting at the Red Rock State Park. The purpose of the open house was to summarize the results of the remedial investigation and to describe the respective responsibilities of EPA and NRC. The open house was held on August 4, 1988, and about 40 residents attended.

Additional open house meetings and workshops were held in February 1992, November 1998, and May 2009.

EPA's first ROD for the UNC Site selected a remedy to address contaminated ground water at the UNC Site. EPA published the Ground Water Operable Unit ROD Fact Sheet in October 1988. The Ground Water Operable Unit ROD Fact Sheet summarized and explained for the public the remedy selected in the Ground Water Operable Unit ROD. To summarize and explain for the public EPA activities at the UNC Site, EPA published additional Fact Sheets in May 1990, June 1991, February 1992, October 1998, January 2003, February 2004, May 2006, February 2008, June 2009, April 2012, and July 2012. EPA developed a Community Involvement Plan in June 1984 and revised the Community Involvement Plan in May 1989, January 2004, May 2008, February 2009, and December 2012. The purpose of the Community Involvement plan was to guide EPA staff as they informed the public and encouraged public participation in the Superfund process.

2.4.2 NECR Site

EPA first became aware of community efforts to address contamination at the NECR Site in 2003 when the Church Rock Chapter of the Navajo Nation initiated the CRUMP. Information collected from this grass roots field effort raised awareness of the NECR Site and in 2005; the Navajo Nation requested EPA to take the lead on the mine site cleanup efforts.

Data were collected from the NECR Site in 2006 as part of the Removal Site Evaluation. In 2007, EPA conducted a residential cleanup action at several of the surrounding nearby homesites where contamination was found in the yards. These homesites were located between the NECR Site and the Quivira Site. In response to the residential removal action, the residential community organized and formed the non-profit Red Water Pond Road Community Association

(RWPRCA), which has been the primary community group providing input to EPA on the NECR Site removal actions.

After issuing the EE/CA for the NECR Site Non-Time Critical Removal Action, EPA began a two-year campaign of community outreach, working more closely with the surrounding community regarding the NECR Site. In part, this campaign was in response to the request of the Navajo Nation President, made in a December 2009 meeting with EPA. A list of all of the public meetings that were held during this period is on EPA's NECR Site website at www.epa.gov/region9/necr. Many of EPA's meetings with the Navajo were held at Chapter Houses or other public venues, and some of these meetings were attended by residents of the surrounding communities. EPA also contracted with the RWPRCA to reach out to the Chapter Houses and to other residents with information, fact sheets, and meeting information.

EPA has mailed copies of fact sheets and relevant information to the Chapters, providing sufficient copies so that these documents can be distributed to all Chapter Residents. Information about the public meetings regarding the NECR Site EE/CA and about the public meetings regarding the UNC Site Proposed Plan was published in both the Gallup and Navajo Nation newspapers.

EPA provided a 90-day public comment period for the NECR Site EE/CA. EPA received numerous written public comments regarding the EE/CA. 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.

2.4.3 Local Community Association

The RWPRCA received funding from EPA to help facilitate distribution of information from EPA to local residents and chapter officials. RWPRCA holds community meetings and distributes documents, and, in this way it keeps the community informed and receives feedback. RWPRCA brings concerns of the local community about activities related to the NECR Site to EPA's attention in a timely manner. The RWPRCA estimates that 250-300 individuals are living within two miles of the NECR Site.

EPA has funded technical assistance for the Red Water Pond Road Community through an EPA contract called Technical Assistance Services for Communities (TASC) to explain and interpret technical information and documents for community members. EPA has also contracted with the RWPRCA to assist EPA with outreach to local community members and Chapters.

RWPRCA community members and the TASC contractors participate in monthly teleconference calls with EPA. In August and September, 2012, TASC explained elements of the UNC Site

Surface Soil Operable Unit Proposed Plan and the technical basis for the Proposed Plan at the monthly meetings of the RWPRCA.

The TASC contract is primarily focused on providing information to the Red Water Pond Road Community which is most directly impacted by the NECR Mine Site cleanup due to its proximity to the site. Community members from outside the Red Water Pond Road area are invited to these meetings and have attended.

2.4.4 UNC Site Surface Soil Operable Unit Proposed Plan

After EPA issues a Proposed Plan for public comment, EPA responds to those comments in a Responsiveness Summary. EPA responds to comments regarding the Proposed Plan for the UNC Site Surface Soil Operable Unit in the Responsiveness Summary that is Part 3 of this ROD.

In accordance with Section 117 of CERCLA, the press release and Surface Soil Operable Unit Proposed Plan Fact Sheet announcing the public comment period and the CERCLA, 42 U.S.C. § 9617, and 40 CFR § 300.430(f)(3), were published on July 20, 2012. EPA published a notice of availability and a brief analysis of the Proposed Plan for the Surface Soil Operable Unit at the UNC Site in local newspapers of general circulation—the *Gallup Independent* and *Navajo Times.*

In addition, information on the Surface Soil Operable Unit Proposed Plan was delivered to the following Chapter Houses: Red Rock, Coyote Canyon, Pinedale, Church Rock, Crown Point, and Nahodishgish. EPA Community Involvement Coordinators delivered flyers on the proposed plan to about 15 homes located about one and a half miles north of Pipeline Canyon Road, to about homes located near the Nahodishgish Chapter House and to homes located near the Coyote Canyon Chapter House.

These newspaper notices announced that public meetings would be held on August 29, 2012, at the Pinedale Chapter House, Church Rock, New Mexico, and on August 30, 2012, at the Octavia Fellin Public Library, Gallup, New Mexico. About 56 people attended the first meeting, which was held at the Pinedale Chapter House closest to the UNC Site, and about 50 attended the second meeting which was held in Gallup for the outlying communities and local Gallup residents. To ensure that all comments were captured, a court reporter and a Navajo translator were present at both meetings. The comments that EPA addresses in Part 3 of this ROD include comments submitted and recorded at the two meetings.

EPA made the Proposed Plan and the rest of the administrative record for the UNC Site Surface Soil Operable Unit available at the following locations:

Navajo Nation Environmental Protection Agency
Superfund Program
Highway 264/43 Crest Road
Saint Michaels, AZ 86511
(928) 871-6859 / (800) 314-1846

Octavia Fellin Public Library
115 West Hill Avenue
Gallup New Mexico 87301
(505) 863-1291

On August 10, 2012, the EPA received the meeting minutes from RWPRCA's August 8, 2012 meeting. These meeting minutes were approved by the Executive Committee of the RWPRCA, and submitted to EPA by the TASC contractor. EPA provided a written response via an email on August 20, 2012. This email is included as part of the administrative record for this ROD.

On August 29, 2012, EPA held a public meeting at the Navajo Pinedale Chapter House, located in Pinedale. On August 30, 2012, EPA held a public meeting at the Octavia Fellin Public Library located in Gallup. At the meetings, EPA provided the opportunity for RWPRCA members and other community members from the region surrounding the UNC Site to ask questions and make comments regarding the Proposed Plan for the Surface Soil Operable Unit at the UNC Site. Invitations to the public meetings were published in the *Gallup Independent* and *Navajo Times*. The published invitations included information telling how to submit comments and that the public comment period would last 60 days (July 20, 2012 – September 21, 2012).

Comments were received from individuals and from various community groups, stakeholders, and other Federal and State agencies including the following: RWPRCA, DOE, NMED, Bluewater Valley Downstream Alliance (BVDA), Citizens for Alternatives to Radioactive Dumping (CARD), NRC, TASC, Multicultural Alliance for a Safe Environment (MASE), and UNC/GE. EPA also received verbal comments at the two public meetings. All written comments (with the exception of those that contained private information) as well as transcripts of the public meetings are posted on EPA's UNC Superfund Site webpage at http://www.epa.gov/region6/6sf/newmexico/united_nuclear/index.html. Please access these documents under "Documents and Reports" then select "Comments Section. "

2.5 Site Characteristics

2.5.1 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.

The EPA has determined that this ROD for the Surface Soil Operable Unit at the UNC Superfund Site is consistent with the MOU between NRC and EPA (55 Fed. Reg. 37887) regarding the UNC Site. This is so because the EPA's selection and implementation of a remedy providing for collocating the NECR mine waste in the Tailings Disposal Area as described in this ROD is an independent action from final soil reclamation activities and ground water corrective measures for the entire UNC Site.

2.5.2 Ground Water at the UNC Site

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).

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, 2012).

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 UNC, are ongoing, and will continue under the 1988 ROD as a separate remedial action. Ground water is not a component of this ROD, which addresses only the 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 at the UNC Site. Mine waste disposal will be designed and constructed to provide for continued protection against contaminant migration into the ground water in support of ongoing ground water remediation efforts.

2.5.3 Tailings Disposal at the UNC Site

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_30_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), UNC's contractor, 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, UNC'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.

2.5.4 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 shut down. The mine wastes consists of uranium-bearing waste rock that produces uranium daughter products during decay[8], 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 ROD, the term mine waste refers to NECR Site soil that is contaminated with hazardous substances that are either radioactive or heavy metals.

During the 2006 RSE field investigation of the NECR Site, UNC 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

[8] 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.

values ranged from 0.8 to 875 pCi/g and uranium values ranged from 0.7 to 3,970 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[9] 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.[10]

Based on the results from the gamma radiation surveys and soil sampling conducted by UNC, 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 ROD (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.

---

[9] 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. In this particular instance, the soil screening levels used represent 1×10^{-6} excess lifetime cancer risk at the NECR Site.

[10] 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.

- *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, sediment pond, ion exchange plant, and other areas containing mine waste.
- *Sandfills 1, 2 & 3.* During closure of the UNC Mill, the sandfill areas at the NECR Site were used as temporary staging grounds for tailings material that had been processed through the UNC Site facility. The material was staged in the sandfill areas until disposed of in the mine stopes.[11] The subsurface mine stope backfill (*i.e.,* the tailings material from the UNC Site facility) will not be removed from beneath the NECR Mine.
- *Ponds 1, 2, 3 and 3a, plus surrounding areas affected by mine wastes, including an unnamed arroyo adjacent to the ponds*. At the NECR Site, 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 a National Pollution Discharge and Elimination System (NPDES)[12] permit) to the unnamed arroyo.
- *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.

2.5.5 Principal Threat Waste

Principal threat waste is not a part of this Selected Remedy and principal threat wastes from the NECR Site will not be disposed of at the UNC Site.

2.5.6 Similarity of Mine Waste at the NECR Site to Mill Tailings at the UNC Site

UNC 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

[11] 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.

[12] National Pollution Discharge Elimination System, part of the Clean Water Act.

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 UNC'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, UNC cleaned up the three stockpile areas, the four ponds, and the muck pad that were contaminated by uranium byproduct (*i.e.,* tailings) material[13]. 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 UNC 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 outcroppings 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. UNC used uranium to radium ratio to distinguish uranium tailings material from non-byproduct mine waste (NRC, 1989). Consequently, whenever this ratio was found in soil, UNC excavated the contaminated soil until concentrations of radium at the bottom of the excavated area met the cleanup level of 5 pCi/g Ra-226 above background concentrations (NRC, 1989). UNC 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

[13] 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.

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.

CERCLA Section 104 requires EPA to remediate uncontrolled hazardous waste sites in ways that will protect both human health and the environment. As the first step to fulfill this mandate, the NCP requires that a baseline risk assessment "characterize the current and potential threats to human health and the environment" [40 CFR §300.430 (d)(4)]. The NCP also specifies that "environmental evaluations shall be performed to assess threats to the environment, especially sensitive habitats and critical habitats of species protected under the Endangered Species Act" [40 CFR §300.430 (e)(2)(i)(G)]. For this ROD, a new ecological risk assessment was not performed. Instead, EPA relied on the ecological risk evaluation that was undertaken as part of the NRC licensing process for the UNC Site. It was appropriate for EPA to use this older evaluation because the NECR Site waste that will be brought to the UNC Site is very similar to the waste that was addressed during licensing. That is, the ecological risk posed by the NECR Site waste being brought to the UNC Site is essentially the same as the ecological risk that already exists at the UNC Site. This ecological risk was already evaluated as part of the NRC licensing process for the UNC Site. In addition, EPA's reliance on this older report is conservative because many of the contamination sources analyzed during the NRC licensing process have been eliminated; making the overall ecological risk much lower than it was at the time of licensing.

The ecological risks at the UNC Site were reported in "Environmental Effects of Mill and Mine Operation" (UNC, 1975), a report which formed the basis of the Environmental Review Report prepared for the original NRC License. As part of the decision making process for this ROD, EPA determined, based on that report, that the mule deer, the single most important species, had the highest potential for exposure to ionizing radiation. EPA determined that mule deer risked contamination through two exposure pathways—inhalation and ingestion. Specifically, there was a risk that the deer could inhale radionuclides in air, there was a risk that the deer could

ingest contaminated plants that had taken up contaminants from soil, and there was a risk that the deer could drink contaminated water.

EPA's approach to environmental risk at the UNC Site under this ROD is conservative because, at the time the Environmental Effects of Mill and Mine Operation report was prepared (about 1975), the inhalation pathway risk came from airborne radiation originated from mine tailings, mill ventilation stacks and vents, piles of unprocessed ore, and from the tailings pond. The ingestion risk came from the potential for deer to consume water discharged from the NECR mine into the arroyo that drains into Pipeline Canyon. Currently, the only source of airborne radiation is the evaporation ponds located on the south cell of the Tailings Disposal Area. In addition, mine water discharge stopped with the mine closure and is no longer a source of water for animals. Consequently, the ecological risk is certainly much less than it was at the time that the Environmental Effects of Mill and Mine Operation report was prepared.

2.6 Scope and Role of Operable Unit or Response Action

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 that make up the UNC Site Tailings Disposal Area, as well as the relative proximity of these facilities (less than 1 mile); the EPA is hereby invoking its authority under CERCLA Section 104(d)(4), 42 U.S.C. § 9604(d)(4), to temporarily treat these related facilities (the NECR Site Consolidation Areas and the UNC Site Tailings Disposal Area) as one for the purposes of Section 104 of CERCLA, 42 U.S.C. § 9604. Treatment of the UNC Site Tailings Disposal Area and the NECR Consolidation Areas as one begins immediately, but this arrangement is temporary and will end once all the NECR Site waste that EPA intends to dispose at the UNC Site Tailings Disposal Area has been disposed at the UNC Site Tailings Disposal Area.

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.

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.

The Selected Remedy for 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 operable unit 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[14]. 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%.

The Selected Remedy does not include approximately 10,000 cubic yards of PTW addressed in the 2011 Non-Time-Critical 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.

The Selected Remedy for the UNC Site is independent of the ground water remedial actions that are undertaken by UNC 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 ROD, 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

[14] 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.

contaminant migration into the ground water (see Section 2.5.2) in support of ongoing ground water remediation efforts.

The Selected Remedy 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 ROD 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 DOE LTS&M 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: 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 NCP (40 CFR Part 300) 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 operable unit remedy for the UNC Site. This ROD completes 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 UNC's NRC license to allow for disposal. The license amendment process will begin when UNC 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 UNC's license to allow this disposal will be necessary to fulfill step two.

2.6.1 Overview of UNC-NECR Consolidation Area

UNC has an NRC mine permit for an approximately 125 acre area at the NECR Site (Figure 2). The NRC Site is located on both sides of a small unnamed arroyo. This arroyo drains to the northeast into another east-west trending lateral unnamed arroyo. These arroyos subsequently drain eastward into Pipeline Canyon, located east of Red Water Pond Road and the Quivira Mines (Figure 2). The UNC Site is bifurcated by Pipeline Canyon with the old UNC mill (approximately 40 acres) located to the west of Pipeline Canyon and the Tailings Disposal Area (approximately 100 acres) located east of Pipeline Canyon (Figure 2). Elevations at the UNC Site range from 7,100 to 7,200 feet. Pipeline Canyon is a northeast-southwest trending alluvial valley that drains intermittently to the southwest, eventually emptying into the Rio Puerco.

2.6.2 Areas of Archaeological or Historical Importance

There are areas of archaeological significance in the vicinity of the NECR Site (Begay, 2011). These areas will be identified and protected prior to the removal actions at the NECR Site. There are no archaeological areas of significance in the vicinity of the UNC Site Tailings Disposal Area.

2.7 Current and Potential Future Site and Resource Uses

2.7.1 Land Uses

The NRC License Condition 31 requires UNC to submit annual land-use updates. According to the Revised Site-Wide Supplemental Feasibility Study Parts I and II, Church Rock Site, Church Rock, New Mexico (Chester, 2011a), review of annual land-use updates from 1999 through 2009 was conducted for purposes of that report. The annual land-use reports describe all land-use changes within a 2-mile radius of the former UNC Site. All land use changes have been minor. The following paragraph was obtained from the referenced report:

> *Within UNC property (Sections 2 and 36), the following activities are representative of occasional land-use changes: (1) abandonment or installation of new monitoring wells, test wells, or extraction wells; (2) cessation of pumping at some former extraction wells; (3) reinforcement or reinstallation of perimeter fences to prevent trespassing or cattle grazing; (4) improvement of local drainage control; and (5) various remedy enhancement field activities conducted in the Zone 3 impacted groundwater on Section 36.*

The Church Rock Updated [Human Health Risk Assessment] HHRA (Chester, 2012a) provides a thorough current review of land use and potentially exposed populations in the vicinity of the [UNC] Site (as part of the exposure assessment). The Annual Land Use Report for 2010 is presented as Appendix D in that document and is attached as Appendix C in this ROD. The HHRA states that:

> *Land use in the vicinity of the Site has not changed significantly in more than 30 years. The area surrounding the Site is sparsely populated and the primary land use is grazing for sheep, cattle, and horses. The 2010 Land Use Report indicates that there are a total of thirty-four home sites and eight wells within approximately two miles of the former mill site. Two of the wells listed in the 2010 Land Use Report are abandoned and two are used as monitoring wells. Only two of the wells are identified as having domestic use (including the Church Rock Site water supply well (the mill well, which is very deep and open to the Westwater Canyon Formation) and the Circle Wash Well (an alluvium well south of the Puerco River). Three wells, including the Circle Wash Well, the Friendship Well (14T-586), and Well 15K-303 are used for livestock watering. The Circle Wash Well and the Friendship Well cannot be impacted by seepage from the Church Rock tailings impoundments due to their topographic locations relative to hydraulic gradients. Well 15K-303, located more than two miles to the northeast of the mill Site, is the only local well known to tap the Upper Gallup Formation and is used for livestock watering; however, it is too distant to be impacted by seepage from the Church Rock Site, and the results of sampling (King, 2007) indicate both that the water has not been impacted by*

tailings seepage and it is unsuitable for human consumption. No residents have private wells for domestic water supply and many haul their own water from known (although often unregulated) sources for domestic supply and livestock watering. King (2007) cites the results of a 1999 survey by the Church Rock Uranium Mining Project (CRUMP) which indicated that more than 80 percent of the nearby Churchrock Chapter residents haul water even when connected to a public water supply system. King (2007) also cites CRUMP groundwater monitoring data which indicate that the Friendship Well (Well 14T-586) was abandoned in 2003.

Proposed land use for the UNC will be restricted by CERCLA from uses other than long-term care of the Tailings Disposal Area. This means that residential and industrial use will be prohibited and grazing uses will be restricted. 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.

2.7.2 Ground and Surface Water Uses

According to the Revised Site-Wide Supplemental Feasibility Study Parts I and II, Church Rock Site, Church Rock, New Mexico (Chester, 2011a):

There is no current human exposure to groundwater at the Site (EPA, 2008) except for UNC personnel if they fail to use required protocols and safety requirements during the quarterly groundwater sampling. UNC is unaware of any event in which this occurred. There is no potential future exposure to groundwater contaminants on UNC-owned property, because no groundwater supply wells drawing on any of the three hydrostratigraphic units will be allowed on UNC-controlled property. UNC owns the property and imposes and enforces restrictions on use and access. The same restriction will apply once this property is turned over to the DOE for long-term surveillance monitoring.

Current potential effects on the ecology are mainly from the discharge of pumped water from Zone 3, and purged water from quarterly groundwater sampling, into the evaporation ponds on the south cell. Illegally grazing stock have very rarely consumed water here but Site access is restricted according to the NRC License and key parts of the Site fencing have recently been physically strengthened, which has further decreased the rate of incursions.

Considering land ownership patterns, UNC and future DOE control of access and use, and limited water availability, alternate future land use is unlikely, with the possible exception of additional mining-related activities such as in-situ leach mining. The hypothetical potentially exposed populations to [Chemicals of Potential Concern] COPCs in groundwater, in the future residential exposure scenarios evaluated in the updated HHRA report, are those individuals that would use groundwater for domestic purposes from hypothetical wells overlying the

seepage-impacted groundwater in locations just outside Section 2 (for the Southwest Alluvium and Zone 1) and just north of Section 36 (for Zone 3).

Please see Figure 1 in the Annual Land Use Report for 2010 (Appendix C) for an illustration of the property interests that encompass the UNC-NECR Consolidation Area and the surrounding lands that are of potential interest to this ROD.

Regarding surface water, the UNC 1975 "Applicants Environmental Report" states:

> *The proposed mill site lies near Pipeline Canyon, which is a tributary to the North Fork of the Rio Puerco in the drainage basin of the Little Colorado River. The North Fork of the Rio Puerco drains approximately 280 sq miles, of which 18.7 sq miles comprise the drainage area of Pipeline Canyon above the mill site. All of the watercourses within the North Fork drainage are normally dry arroyos except during storm runoffs. During the dry season, the only measurable surface water originates from Applicant's and the Kerr-McGee's mines.*
>
> *No surface water diversions or control structures exist below the mill site, and only one significantly large impoundment exists above. This impoundment is capable of storing 10 acre-ft of water for erosion control and stock needs. An erosion control dam is located at approximately the center of the tailings dam site.*
>
> *Downstream uses of surface water are limited to occasional livestock watering. The subflow in the alluvium in the North Fork is tapped by several shallow wells. This water, technically groundwater, is derived from storm flows passing down the arroyos and is pumped for domestic and stock-watering use).*

2.8 Summary of Site Risks

Removal Site Evaluation Report and EE/CA adopted as Remedial Investigation/Feasibility Study. This Surface Soil ROD 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 surface soil operating unit 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 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 ROD fulfills the NCP requirements for an RI/FS and the

detailed analysis of alternatives. Thus, the 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 Selected Remedy:

- 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 Selected Remedy. 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 operable unit, 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 Selected Remedy for the surface soil ROD 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 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:

<u>Threshold Criteria</u>

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

<u>Primary Balancing Criteria</u>

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 ROD 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.

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

At a Superfund site, where EPA is responding to contamination, the NCP calls for a site-specific BHHRA 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.

Since the action contemplated in this ROD 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, UNC 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 ROD 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 Section 2.3.1.2 and Section 2.5.2). 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 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 Selected Remedy identified in this ROD, 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.

2.9 Remedial Action Objectives (RAO) and Remediation Goals

This section of the ROD provides the basis for evaluating the remedial alternatives presented in Section 2.9.3. When determining which remedial alternative to select at a Superfund site, the NCP requires that EPA establish RAOs. RAOs are to specify contaminants of concern, media (*e.g.,* soil, water, and 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 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 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 ROD are specific to the disposal and containment of mine waste and tailings within the UNC Site Tailings Disposal Area. Under Clean Air Act rulemaking establishing National Emission Standards for Hazardous Air Pollutants (NESHAP) for NRC licensees, Department of Energy facilities, and many other 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.

2.9.1 Remedial Action Objectives

The RAOs for this Surface Soil operable unit action are:

- Prevent exposure to current and future human and ecological receptors from internal/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 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 internal/external radiation, ingestion, dermal contact, and inhalation (*i.e.,* inhalation of associated gas or dust) of soil, mine waste, and tailings does not exceed interim 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 operable unit 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.

2.9.2 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[15] release rate of 20 picocuries per square meter per second (pCi/m^{2}s) [16] [40 CFR §§ 192.02(b)(1) and 192.32(b)(1)(ii)].

[15] 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)].

[16] 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 x 10^{-4} is essentially equivalent to the presumptively safe level of 1 x 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.

Although the 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 internal/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 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 is presented in Table 1.

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)].

2.9.3 Description of 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 Section 2.3.1.3). 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[17]. 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 Section 2.3.1.3 and Section 2.5.2). 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, 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 operable unit remedial action at the UNC Site is independent of the ground water remedial actions that are undertaken by UNC under the EPA's 1988 Ground Water Operable Unit ROD for the UNC Site. Ground water is not a component of this ROD, 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 Ground Water Operable Unit 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

[17] 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.

contaminant migration into the ground water (see Section 2.9.3) in support of ongoing ground water remediation efforts.

A total of two remedial alternatives are being considered for the UNC Site with regards to disposal of the mine waste from the NECR Site in the Tailings Disposal Area. These two alternatives are evaluated below in ROD against the nine NCP criteria found at 40 CFR § 300.430(e)(9)(iii). The Selected Remedy for the UNC Site is Alternative 2: On-site Disposal at the UNC Site within the Tailings Disposal Area.

2.9.4 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.

2.9.5 Alternative 2: On-site Disposal within the UNC Tailings Disposal Area

Alternative 2 includes the transportation, receipt, consolidation, and disposal of NECR Site mine waste at the UNC Site within the Tailings Disposal Area. EPA identified Alternative 2 as EPA's preferred remedy in the Surface Soil Operable Unit Proposed Plan for the UNC Site. Principal threat waste is not a part of this Selected Remedy and principal threat waste from the NECR Site will not be disposed of at the UNC Site. The O&M cost is estimated at $100K year which was calculated as a percentage of the remedy. The net present worth of O&M for 30 years was $1,230,000 (rounded). This was part of the $41.5 million estimated for the entire project. The design and license approval could take between two and four years; construction is projected to take an additional four years.

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.
>
> 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.

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.

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 facilitate 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[18] of no more than 1×10^{-7} centimeters per second (cm/s)]. The liner will serve the following purposes:

    1 – The liner will help protect workers doing construction.

[18] 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.

2 – The liner will be an added level of protection for groundwater

3 – The liner will provide a stable foundation on which to place the NECR Site waste.

4 - The liner will form an added barrier, preventing exposure to the higher level of radioactivity found in the mill tailings that are currently disposed in the UNC Site Tailings Disposal Area.

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[19]. 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 ROD 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. 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 conducted by EPA. The capped area will require 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 ROD, 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 Ground Water Operable Unit ROD as a separate remedial action. The actions called for by the 1988 Ground Water Operable Unit ROD include monitoring and reporting to document potential contaminant migration and to ensure compliance with ground water remediation goals established under the 1988 Ground Water Operable Unit ROD and any amendments to that Ground Water Operable Unit 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 monitoring

[19] 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.

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 and industrial use will be prohibited and grazing uses will be restricted. 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, UNC is addressing source material and on-site surface reclamation at the UNC Site under the direction of the NRC, pursuant to UNC'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 UNC's NRC license is an effective IC. Under NRC's license termination process, the site owner (in this case UNC/GE) 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)].

Institutional Controls are discussed in Section 2.11.

2.10 Comparative Analysis of Alternatives

2.10.1 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.

2.10.2 Compliance with ARARs

Alternative 1 does not change current UNC Site conditions.

Alternative 2 will be designed and implemented to 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)].

The UNC-NECR Consolidation Area Final List of ARARs is provided in Table 1.

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*.

2.10.3 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, UNC 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. 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.

2.10.4 Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Alternative 1 does not change current UNC Site conditions

Alternative 2: No principal threat waste from the NECR Site will be sent to the UNC Site. This ROD for the UNC Site addresses only high volume low level threat NECR Site waste. Due to the high volume of waste, treatment is not practicable.

2.10.5 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 stormwater 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.

While it is not part of the remedy selected in this ROD, it should be noted that the 2011 Non-Time-Critical Action Memorandum for the NECR Site provides that voluntary alternative housing options will be offered to those residents significantly impacted by disruptions associated with that 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.

2.10.6 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 UNC, 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. The ROD begins EPA's process to fulfill step one: issuance of an appropriate decision document consistent with the NCP. Step two involves UNC'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 UNC's license to allow this disposal will be necessary to fulfill step two as described in the 2011 Non-Time-Critical Removal Action Memorandum.

2.10.7 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, 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).

2.10.8 State/Support Agency Acceptance

The State of New Mexico supports the Selected Remedy (see Appendix B).

2.10.9 Community Acceptance

The local community prefers that the NECR mine waste be moved to a LTDF off of the Navajo Reservation. The Navajo Nation leadership has been supportive of the Selected Remedy.

2.11 Selected Remedy

EPA, the lead agency, has selected Alternative 2: On-site Disposal at the UNC Site within the Tailings Disposal Area as the Selected Remedy for disposal of the NECR mine waste received at the UNC Site. Based on information currently available, EPA, the lead agency, has determined that the Selected Remedy meets the NCP threshold criteria (40 CFR § 300.430(f)(1)(i)(A)) and provides the best balance of tradeoffs among the other alternatives with respect to the NCP balancing criteria (40 CFR § 300.430(f)(1)(i)(B)). The EPA expects the Selected Remedy to satisfy the statutory requirements of CERCLA section 121 (b), 42 U.S.C § 9621 (b), that is, the Selected Remedy will:

- Be protective of human health and the environment;
- Comply with ARARs for all media;
- Be cost-effective; and
- Utilize permanent solutions and alternative treatment technologies or resource recovery technologies (such as recycling/reuse) to the maximum extent practicable.

As summarized in the NECR Site 2011 Non-Time-Critical Removal Action Memorandum, the Navajo Nation and the community preferred off-site disposal at a regulated facility to on-site disposal of the NECR Site mine waste at the NECR Site. As also explained in the Action Memorandum, EPA selected disposal at the UNC Site over disposal at an off-site regulated facility for important reasons:

- First, disposal at the UNC Site provides a greater level of *short-term protectiveness* as compared to disposal at an off-site regulated facility. This is because disposing of the NECR Site waste at the UNC Site means the waste material will be transported over a significantly shorter distance. By transporting the NECR Site waste over a shorter travel distance the potential for accidents during construction is reduced. Moreover, the time until protection is achieved is much shorter.
- Second, the reduced travel and construction time reduces overall *cost*.
- Third, the much higher costs associated with off-site disposal at a regulated facility do not provided increased effectiveness when compared to disposal at the UNC Site. That is, the costs of off-site disposal at a regulated facility are not proportional to its overall effectiveness. Disposal at the UNC Site is *cost-effective,* because its costs are proportional to its overall effectiveness for the two reasons listed above.

Finally, as explained in the NECR Site Non-Time Critical Removal Action Memorandum, a post EE/CA analyses of 11 other alternate disposal locations (EPA 2011a) determined that, given the

administrative, legal and cost challenges presented by each of the 11 locations, the UNC Site was the most suitable (EPA, 2011a).

Engineered controls have been discussed in Section 2.10.2. The goal of the Selected Remedy's Institutional Controls will be to limit exposure to hazardous substances (40 § CFR 300.420(a)(1)(ii)(D)). The following institutional controls will be implemented:

To help protect the cap which will prevent exposure to the waste, well completion at the UNC Site will be regulated by the New Mexico Office of the State Engineer, requiring approval of one of the following:

1. An Application for Permit to Drill a Well with No Consumptive Use of Water or
2. An Application for Permit to Use Underground Waters in Accordance with Sections 72-12-1.1, 72-12-1.2, or 72-12-1.3 New Mexico Statutes.

During the NRC license termination phase at the UNC Site, EPA working with NRC, will install warning signs at the UNC Site and will publish notices in a newspaper of general circulation warning area residents of the dangers of the chemicals of concern and how to avoid exposure to the potential contamination associated with UNC Site contamination. The purpose of these NRC/EPA ICs will be to prevent area residents from grazing livestock in the capped area. Our goal in preventing grazing is to prevent erosion or other damage to the cap, thereby protecting human exposure.

2.12 Statutory Determinations

Under CERCLA §121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

2.12.1 Protection of Human Health and the Environment

The Selected Remedy 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.

2.12.2 Compliance with ARARs

The Selected Remedy will be designed and implemented to 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)].

The UNC-NECR Consolidation Area Final List of ARARs is provided in Table 1.

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*.

2.12.3 Cost Effectiveness

The cost of the Selected Remedy ($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).

2.12.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

The Selected Remedy 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.

2.12.5 Preference for Treatment as a Principal Element

Principal threat waste is not a part of the Selected Remedy and no principal threat waste will be disposed of at the UNC Site under this ROD. This ROD for the UNC Site addresses only high volume low level threat NECR Site waste. Due to the high volume of waste, treatment is not practicable.

2.12.6 Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on the UNC Site that are above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

2.13 Documentation of Significant Changes

The Proposed Plan for the Surface Soil Operable Unit was released for public comment on July 20, 2012. The Proposed Plan identified Alternative 2, soil excavation from the NECR Site and transportation and capping at the nearby UNC Site, as the Preferred Alternative for soil remediation at the NECR Site. EPA reviewed all written and verbal comments submitted during the public comment period. EPA has determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

Erratum: Removal of the Principal Threat Waste from the NECR Site has always been part of the Non-Time Critical Removal Action at the NECR Site as documented in the 2011 Non-Time Critical Action Memorandum for the NECR Site. An error was made in the Proposed Plan for the UNC Site Surface Soil Operable Unit and the removal of the Principal Threat Waste was inadvertently included in the description of remedy Alternative 2. Note that, as far as the physical disposition of the Principal Threat Waste is concerned, nothing has changed. That is, the Principal Threat Waste will be disposed at an off-site facility, but that will not be part of the action described in this ROD."

Part 3 Responsiveness Summary

This Responsiveness Summary has been prepared to provide written responses to comments submitted regarding the EPA's ***Proposed Plan for the United Nuclear Corporation Superfund Site Surface Soil Operable Unit***.

3.1 Description of Surface Soil Operable Unit Proposed Plan

On June 20, 2012, EPA issued the Proposed Plan for the Surface Soil Operable Unit at the UNC Site and EPA invited the public to comment on its Proposed Plan.

The Proposed Plan for the Surface Soil Operable Unit at the UNC Site included two options:

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, receipt, consolidation, and disposal of NECR Site mine waste at the UNC Site within the Tailings Disposal Area. EPA identified Alternative 2 as EPA's preferred remedy in the Surface Soil Operable Unit Proposed Plan for the UNC Site. Principal threat waste is not a part of this Selected Remedy and principal threat waste from the NECR Site will not be disposed of at the UNC Site.

After EPA issues the Proposed Plan for public comment, EPA responds to those comments in a Responsiveness Summary. This is EPA's Responsiveness Summary responding to the comments that EPA received regarding the June 20, 2012, Proposed Plan for the Surface Soil Operable Unit at the UNC Site. This Responsiveness Summary is part of EPA's ROD selecting its remedy for the Surface Soil Operable Unit at the UNC Site.

3.2 Community Involvement on the Surface Soil Operable Unit Proposed Plan

On August 10, 2012, the EPA received the meeting minutes from RWPRCA's August 8, 2012 meeting. These meeting minutes were approved by the Executive Committee of the RWPRCA, and submitted to EPA by the TASC contractor. EPA provided a written response via an email on August 20, 2012.

EPA held two public meetings on August 29, 2012 and August 30, 2012. The meetings were held at the Pinedale Chapter House in Pinedale and the Octavia Fellin Public Library in Gallup. Invitations to the public meetings were published in the *Gallup Independent* and *Navajo Times*. The published invitations included information telling how to submit comments and that the public comment period would last 60 days (July 20, 2012 – September 21, 2012).

After the 60-day public comment period, which ended on September 21, 2012; EPA received numerous comment letters from individuals and from various community groups, stakeholders,

and other Federal and State agencies including the following: RWPRCA, DOE, NMED, BVDA, CARD, NRC, TASC, MASE, and UNC/GE. EPA also received verbal comments at the two public meetings. All written comments as well as transcripts of the public meetings are posted on EPA's UNC Superfund Site webpage at http://www.epa.gov/region6/6sf/newmexico/united_nuclear/index.html. The comments are posted under the Documents & Reports Section then Comments.

Due to the volume of comments received and due to the similarity of the comments, EPA has grouped similar comments in its response.

The Responsiveness Summary contains the Summary of Comments Received during the Public Comment Period and EPA Responses. The comments (both verbal and written) are summarized and EPA's responses are provided. The summary is divided into two parts:

- Summary of Community Comments and Response to Community Concerns
- Comprehensive Response to Agency Comments

The community requested that a meeting be held to present the response to its comments prior to finalization of the ROD. EPA attended a community meeting on January 19, 2013 hosted by the RWPRCA to participate in a community tour which showcased areas of concern for the community members along with a tour of the Standing Black Tree Mesa.

3.3 Summary of Comments Received During the Public Comment Period and EPA Responses

3.3.1 Summary of Community Comments and Response to Community Concerns

The major concerns expressed by the community during the public comment period are summarized and responded to below:

3.3.1.1 Alternative Selection and/or Off-site Disposal

Several comments were received on the lack of alternatives in the Surface Soil Operable Unit Proposed Plan.

EPA Response: In the Proposed Plan, EPA considered only two alternatives for the disposal of the NECR Waste at the UNC Site. These two alternatives were 1) the no further action alternative; and 2) on-site disposal at the UNC Site within the Tailings Disposal Area. The reason that EPA considered only two alternatives is that, as described in Section 2.3.1.3, EPA had already considered, and received public comments on, five alternatives (plus two options) for disposal of the NECR waste.

3.3.1.2 The UNC Site Surface Soil Operable Unit Remedial Action Proposed Plan is the culmination of EPA's effort to address contaminated material from the NECR Site located on Navajo trust land. Use of Ft. Wingate as a repository for the NECR Site waste – Some commenters suggested using Fort Wingate to store mine waste, which is located about 17 miles from Gallup*.*

EPA Response: Ft. Wingate, an Army post, was closed in 1993 under the Base Realignment and Closure Act (BRAC). Using Ft. Wingate was not considered as one of the five alternative cleanup

alternatives for the NECR Waste when EPA undertook the EE/CA because after closure activities are completed, most of the Ft. Wingate property will be returned to the U.S. Bureau of Indian Affairs (BIA). These lands will be held in trust by the BIA for the benefit of the Navajo Nation and Pueblo of Zuni indefinitely. Part of the Ft. Wingate property will be retained by the Department of Defense for on-going operations. A smaller portion of the property will also be retained by the Department of Defense for an on-site disposal cell designed for exploded and unexploded ordnance disposal and for access to existing monitoring wells.

In addition to the usual time constraints, an agreement with the Department of Defense likely would be necessary to create a disposal facility at this location. In addition, the presence of exploded and unexploded ordinance makes this site unsuitable. Furthermore, siting the facility at Fort Wingate potentially would remove the land from beneficial use for the Navajo Nation and Pueblo of Zuni.

3.3.1.3 Will the UNC Site Tailings Disposal Area become a Certified Repository? - One commenter asked if the UNC Site Tailings Disposal Area would become a Certified Repository

EPA Response: We are not sure what the commenter meant by a "Certified Repository." The UNC Site is currently an NRC licensed repository for uranium mill tailings. Under this ROD, EPA's remedial action is contingent upon NRC's approval of an amendment to NRC's license that would allow the NECR Site waste to be disposed there as described in this ROD.

At the UNC Site, EPA intends to follow all ARARs as it implements the remedy selected in this ROD. These ARARs are listed in this ROD in Table 1. Neither EPA nor the NMED intend to issue any permits allowing the UNC Site to become a commercial treatment, storage, or disposal facility.

3.3.1.4 Another commenter asked whether it was possible to move the NECR mine waste to UNC *on a short-term basis and then later move it to an off-site disposal facility.*

EPA Response: CERCLA Section 121, 42 U.S.C. § 9621, directs, among other requirements, that remedial actions protect human health and the environment, be permanent to the maximum extent practicable and be cost-effective. A decision to temporarily store the NECR mine waste at the UNC Site without determining a permanent disposal site is inconsistent with CERCLA.

3.3.1.5 Educational Sessions – Community members requested that EPA provide more educational sessions for the community.

EPA Response: Yes, we plan to have numerous additional community involvement opportunities at all stages of remedial design and remedial action. CERCLA and the NCP require a number of community involvement activities throughout removal and remedial processes. EPA has learned that early and continuous involvement of affected citizens is a crucial aspect to successful Superfund cleanups. The current EPA community involvement program stresses:

- Early and continuous involvement
- Direct contact with citizens
- Innovative activities above and beyond the statutory and regulatory requirements.

The combination of these program goals ensures the community is included throughout all major steps in the response process. EPA will provide educational outreach workshops for the following issues at the UNC Site:

- Remedial Design Process
- Remedial Action Work Plan
- Remedial Action Timeline and Schedule

EPA will work with the community to define the terms used and what is involved in each phase and process of the above activities. EPA is also available to coordinate additional meetings to provide information on topics that the community identifies such as the remedy design process or consultations on cultural issues.

3.3.1.6 Compensation – Some individuals requested compensation. One commenter asked about the status of UNC as a company, inquiring whether UNC, as the responsible party and the company doing the cleanup, could provide compensation for associated health problems to workers who worked for UNC in the mine and for those impacted by the 1979 tailings dam spill. The commenter said that the community needs to hold this company accountable and to compensate those who got sick from the company's activities.

EPA Response: EPA is authorized by congress to correct environmental problems but is not authorized to provide such compensation. EPA does take enforcement actions against responsible parties and can require those parties who are liable under CERCLA to pay for or undertake environmental remedies but not compensation to people potentially harmed by the environmental problem.

The U.S. Department of Justice (DOJ), acting under the Radiation Exposure Compensation Act (RECA), does have a program that provides monetary compensation to individuals who contracted certain cancers and other serious diseases following their exposure to radiation released during the atmospheric nuclear weapons tests, or following their occupational exposure to radiation while employed in the uranium industry during the Cold War arsenal buildup. Under RECA, monetary compensation is provided to individuals who contracted certain cancers and other serious diseases following their exposure to radiation as a result of covered activities. DOJ has posted additional information regarding RECA on the DOJ webpage at http://www.justice.gov/civil/common/reca.html or by calling DOJ at 1-800-729-7327. EPA has no role under RECA.

3.3.1.7 Construction – Requests were received for a new sustainable community or new homesites for local residents to be located west of the Quivira Mine. Requests were also received for a new Pipeline Road and new Community Center. It was stated that a nearby community center could serve multiple purposes; including as an administrative center during the construction phase, as a central location for remediation/restoration employment opportunities, and an educational facility for post-remediation/restoration monitoring and maintenance activities. Another comment was that the Navajo Nation could use the facility to

house some of its technical staff and offer parts of the facility to local schools and colleges for environmental sciences instruction and job training.

EPA Response: Voluntary alternative housing is a part of the 2011 Action Memorandum for the NECR Site. EPA is researching information to provide voluntary alternative housing to those families living within the immediate vicinity of the NECR Site that would experience significant disruption from the construction activities.

3.3.1.8 Disaster Notification – We received questions asking what disaster notification was available and about the backup plan for notification.

EPA Response: As part of the remedial action, an emergency contingency plan (ECP) will be put in place. An ECP is defined as a plan of action to be taken in the event of foreseeable emergencies that may involve the risk of serious or material environmental harm. ECPs help prevent and manage incidents that could result in environmental impacts, such as:

- environmental harm, e.g. soil contamination, surface or ground water pollution
- environmental nuisance, e.g. excessive odor, noise, dust or smoke
- unacceptable risk to public health

ECPs provide clear guidance during situations (such as accidental spillages, equipment or plant failure) when decisions must be made rapidly. The ECP may also be aligned with the other Occupational Health and Safety policies or Emergency Response Procedures.

3.3.1.9 Economic development and job creation - There was interest from the community in training and employment of local residents to participate in the mine cleanup activities.

EPA Response: EPA expects that the selected alternative will provide economic opportunities for the local community. EPA encourages the hiring of local employees that have the necessary skills and training. To assist local residents in obtaining these specialized job skills, EPA held a Superfund Job Training Initiative for the Navajo Nation in Gallup, New Mexico during the fall 2012. This multi-week training program included the technical and other training skills needed for mine cleanup and construction jobs. There were 19 graduates from this program. EPA plans to hold future Superfund Job Training Initiative programs. EPA anticipates that the final NECR removal action will provide employment for approximately 50 to 60 employees over 3 to 4 years. UNC/GE has committed to giving first preference to qualified Navajo applicants, to the extent legally permitted.

3.3.1.10 Some commenters called for full restoration of mine sites on the Navajo Nation and if Congressman Henry Waxman's 5-year plan need to be replaced with a 10-year plan?

EPA Response: Restoration of other mine sites on the Navajo Nation is addressed in the EPA Five-Year Plan which can be found on the EPA website *Addressing Uranium Contamination in the Navajo Nation* at http://www.epa.gov/region9/superfund/navajo-nation/index.html. Although there have been tremendous accomplishments in cleaning up uranium contamination over the last five years, EPA recognizes that the vast majority of the uranium mine cleanup efforts still remain. The federal agencies are currently partnering to develop a new Five-Year Plan and will be seeking public input into this plan at the Annual Navajo Abandoned Uranium

Mine Stakeholders Workshop in Gallup, New Mexico, April 16-17, 2013 which will be hosted by EPA Region 9.

3.3.1.11 1979 Tailing Spill and Mine Discharge – several requests were made for reports from studies of the 1979 UNC tailings dam breach and resulting flood, and for a description of the cleanup efforts that were done between 1979 and 1982 to address any resulting contamination. In addition, requests were made for reports resulting from any studies of the effluent that was discharged from the United Nuclear Corporation Churchrock Uranium Mill into the unnamed arroyo prior to the 1979 spill.

EPA Response: Applicable health or risk studies related to the 1979 spill are listed below:

Assessment of Potential Risk to Individuals from Released Radioactivity at the UNC Churchrock Uranium Mill on July 16, 1979, EPA Region 6 Radiation Program, Dallas, Texas. October 4, 1979.

Biological Assessment after Uranium Mill Tailings Spill, Church Rock, New Mexico, EPI-79-94-2, Public Health Service-CDC-Atlanta, December 24, 1980

Survey of Radionuclide Distributions Resulting from the Church Rock, New Mexico, Uranium Mill Tailings Pond Dam Failure, Battelle Pacific Northwest Lab. (PNL-4122) for U.S. Nuclear Regulatory Commission (NUREG/CR-2449)

The Assessment of Human Exposure to Radionuclides from a Uranium Mill Tailings Release and Mine Dewatering Effluent, Ruttenber, et. al., Centers for Disease Control, Atlanta, June 1982.

Rio Puerco Monitoring Program, EPA Region 9, June 2, 1982.

The Church Rock Uranium Mill Tailings Spill: A Health and Environmental Assessment Summary Report, New Mexico Environmental Improvement Division, September 1983.

Public Health Assessment for United Nuclear Corporation, Church Rock, McKinley County, New Mexico, EPA Facility ID: NMD030113303, November 21, 1988, U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry.

Draft Final: Remedial Investigation UNC Church rock Site, Volumes I & II, CH2M Hill, August 1988.

Draft Feasibility Study for United Nuclear Corporation Churchrock Site, Chapter 4, Public Health Assessment, CH2M Hill, August 1988. pp. 4-1 through 4-24.

These reports are part of the administrative record for this site and can be found at the public repositories.

3.3.1.12 Additional Waste – EPA received several requests for information as to whether any other mine waste (except for NECR) would be accepted at the UNC Site including the Quivira Mine waste and HRI Mine Section 17 waste, also known as the Northeast Church Rock 2 Mine. The community requested written guarantees that mine waste would not be

accepted at UNC except for the NECR mine waste. A couple of comments were received, however, that requested that all of the mine waste impacting the local community be moved to the UNC Site.

EPA Response: This ROD does not decide whether other mine waste from the local area will be disposed of at the UNC Site. In the future, before waste from other mines and contaminated areas could be disposed at the UNC Site, EPA would make its plans available for comment by the community and the State, and any action to dispose of additional wastes at the UNC Site would have to be consistent with NRC licensing requirements.

3.3.1.13 2009 NECR Cleanup – A resident stated that he has seen an unsigned report stating that the placement of backfill around homesites conducted as part of the 2009 NECR cleanup action was complete and requests a copy of that report.

EPA Response: In June of 2010, UNC/GE submitted the Northeast Church Rock Mine Interim Removal Action (IRA) Completion Report. This report was signed by Lance Hauer, certifying that the information in the report is true, accurate, and complete. This report is available at the EPA website, www.epa.gov/region9/NECR. However, after reviewing the report, EPA required GE to conduct additional removal activities in small areas adjacent to the mine site in the fall of 2010. In addition, in follow up to diesel fuel contamination that was found during the 2009 NECR cleanup, additional removal activities were conducted in the 2009 IRA area as part of the 2012 Eastern Drainage Removal Action. Deeper diesel fuel contamination will be addressed through bioremediation activities. The bioremediation system will be installed during the summer of 2013 over a period of several months. Finally, GE continues to maintain erosion control measures, fencing, and revegetation as part of ongoing maintenance activities related to the 2009 NECR cleanup action. If residents have specific concerns about problem areas that may exist around the homesites as a result of EPA cleanup activities, please contact Sara Jacobs at 415-972-3564 or Jacobs.sara@epa.gov or Superfund (800) 887-6063.

3.3.1.14 Alternatives Report and Cost - Commenters questioned if an assessment of alternatives other than the placement on the UNC tailings pile was done and if a cost benefit analysis was performed as part of the Alternatives report. In addition, related questions were received asking about the source of the cleanup funds, definition of cost effective, who GE is and can they double their funding and move the waste off-site, how much does capping cost, and whether there is an alternative plan that was ruled out based on cost effectiveness.

EPA Response: As explained above in our response to Comment I.2, the UNC Site Surface Soil Operable Unit Proposed Plan considered only two alternatives. However, this Proposed Plan was based on a process that began in 2005 when the NNEPA asked EPA to take the lead regarding the cleanup of waste at the NECR Site. As explained in Sections 2.3.1.1 and 2.3.1.3 above, EPA considered five alternatives with two additional options for the cleanup of the NECR Site before it decided the best option was to dispose of the NECR Site mine waste at the UNC Site. In response to public comments submitted regarding the five alternatives, EPA completed an additional analysis of a total of 14 potential disposal sites. This report is available on the NECR website at www.epa.gov/region9/necr and is described in detail below.

Under the NCP, a response action is cost-effective when the response action's costs are proportional to its overall effectiveness (*see* 40 CFR §300.430(f)(l)(ii)(D)). EPA uses the term "proportional" because it intends that in determining whether a remedy is cost-effective, the decision-maker should both compare the cost to effectiveness of each alternative individually and compare the cost and effectiveness of alternatives in relation to one another. In analyzing an individual alternative, the EPA decision-maker should compare, using his or her best professional judgment, the relative magnitude of cost to effectiveness of that alternative. In comparing alternatives to one another, the decision-maker should examine incremental cost differences in relation to incremental differences in effectiveness. For example, if the difference in effectiveness is small but the difference in cost is very large, a proportional relationship between the alternatives does not exist. The more expensive remedy may not be cost-effective. EPA does not intend, however, that a strict mathematical proportionality be applied because generally there is no known or given cost-effective alternative to be used as a baseline. EPA believes, however, that it is useful for the decision-maker to analyze among alternatives, looking at incremental cost differences.

At the NECR Site, costs for the removal action alternatives considered were not comparable since disposal at a licensed commercial disposal facility would have increased cost by a factor of almost seven over the other alternatives that did not use a licensed commercial disposal facility. For example, Alternative 2, which would have used a commercial facility, was estimated to cost $293,600,000, in comparison to Alternative 5A, the selected alternative, which was estimated to cost $44,300,000. However, the environmental and public health benefits for the two alternatives were comparable. Alternatives 3 and 4 left the waste on Tribal Land, which was not acceptable to the Navajo Nation. On balance, US EPA selected the least expensive alternative that was protective, met all requirements in the NCP, and removed waste from Tribal Lands. In the September 29, 2011, NECR Site Non-Time Critical Removal Action Memorandum, EPA documented its selection of Alternative 5A, which calls for NECR Site mine waste disposal at the UNC Site and the removal of high-concentration mine waste to an off-site Class I hazardous waste disposal facility.

On September 27, 2011 (prior to EPA's issuance of the September 29, 2011, Action Memorandum selecting the removal response alternative for the NECR Site) EPA issued a Memorandum entitled "*Northeast Church Rock – Post EE/CA Analysis of Alternatives, Alternative Off-Site Disposal Locations*" which evaluated ten disposal sites in addition to those discussed in the EE/CA for the NECR Site. This *Analysis* was undertaken in response to the comments received from the community, NNEPA and other stakeholders during the public comment period. The potential disposal locations evaluated by EPA, as part of the *Analysis,* fell into four categories:

1) An on-site facility exempted from the off-site rule,

2) A licensed facility able to accept low-level waste,

3) A current UMTRCA site which has waste similar to that being disposed, and

4) An off-site location where a licensed facility could be built.

The first category, an on-site facility, is legally and technically implementable. The second category is also legally and technically implementable; however, the cost is prohibitive given the volume of mine waste and the travel distance to the currently licensed facilities. Disposal at a current UMTRCA facility (Category 3) is implementable if the final closure cover is not in place and the license does not prohibit the facility from accepting additional waste. Of the seven UMTRCA facilities within a 250 mile radius of NECR, only UNC has the capacity and the NRC license status to potentially accept the NECR waste with a license amendment. Constructing a new facility (Category 4) would require either an NRC license or a Resource Conservation and Recovery Act (RCRA) permit or both, which is a lengthy and uncertain process. Once a location was identified, it could take decades for the necessary license and/or permit to be issued and for a facility constructed. In summary, there were only two disposal sites that would be considered implementable in the near future: the UNC Site and the NECR Site. Details of the evaluation can be found in the *Alternative Off-site Disposal Locations Memorandum,* which is posted on the Northeast Church Rock Mine webpage at www.epa.gov/region9/NECR.

As explained above, in the September 29, 2011, Action Memorandum for the NECR Site, EPA made its selected removal action contingent upon both modification of the license issued by the NRC for the UNC site, and upon issuance of an appropriate decision document by EPA Region 6 consistent with the NCP, 40 CFR Part 300. This Responsiveness Summary is part of a ROD that is the decision document that documents EPA's decision to go ahead with disposal of the NECR Site mine waste at the UNC Site as called for in the September 29, 2011, Action Memorandum for the NECR Site. Part of this ROD for the Surface Soil Operable Unit of the UNC Site includes a cost-effectiveness analysis (*see* Section 2.10.7). Generally speaking, EPA has decided that the Selected Remedy for the Surface Soil Operable Unit is cost-effective based on an evaluation of its costs compared to its overall effectiveness.

3.3.1.15 Design Questions – There were numerous concerns raised by the community, and by various organizations about the design of the disposal cells for the disposal of the NECR Site mine waste at the UNC Site Tailings Disposal Area. Many of the concerns had to do with placing the NECR Site mine waste on top of the waste in the existing mill tailings disposal cells. Concerns included:

- ***How does EPA know capping the waste will work?***
- ***Has this capping technology has been used elsewhere?***
- ***What studies were reviewed and where were the studies located?***
- ***Will there be protection from lightning strikes and other natural disasters, including flooding?***
- ***What is the type of material that will be transported from the NECR Site to the UNC Site?***
- ***What is the existing thickness of the compacted waste at UNC?***
- ***What is the volume and tonnage of mine waste that will be moved from NECR?***
- ***What will the compacted thickness of the layers be?***
- ***What does minimal settlement mean?***
- ***Are the nearby homes in danger from settlement?***

- ***Where will the water come from for dust suppression?***
- ***Why does the proposed design of the disposal cell come to a point? Will the disposal cell look like a pyramid?***

In addition, comments from the area residents emphasized that if the proposed alternative to consolidate the NECR waste on the UNC Mill site was to be selected, they would want to see a liner and a robust, redundant, state-of-the art cover. In addition, several community members discussed the urgency of moving quickly to address the health risk that has been present for so long. They also had questions about the timeline for making and implementing a cleanup decision. In addition, the residents wanted assurances that the funding would be available to complete the project.

EPA Response: EPA shares the community's concerns that the design of the NECR disposal cells be robust enough to protect against any migration of contamination to the surrounding land, air, surface water, or ground water. The purpose of the liner is for the following:

1 – The liner will help protect workers doing construction.

2 – The liner will be an added level of protection for groundwater.

3 – The liner will provide a stable foundation before the NECR Mine waste is placed.

4 - The liner forms an added barrier to higher level radioactivity in the mill tailings below the liner to exposure at the surface.

EPA will ensure that the cells are strong enough to withstand lightning strikes and other natural disasters, including flooding. However, detailed analysis of specific design issues is not performed as part of the remedy selection process. Once an alternative is selected, then the remedial design occurs. As a result, we cannot say at this time if the cap we will use has been used elsewhere, as some commenters inquired. However, EPA is committed to using state-of-the-art procedures and standards at the UNC facility and has assembled a design and review team comprising leading national experts in the area of cover design. Due to the strong concerns about the above-referenced technical issues raised by community members, interest groups, and the Navajo Nation, EPA conducted additional research and modeling prior to alternative selection in the September 29, 2011, Non-Time Critical Removal Action Memorandum for the disposal of the NECR Site mine waste. As a result of this additional work, EPA discovered that there was not enough room on the UNC Site outside the current disposal cell to construct a new cell for the NECR Site mine waste without impacting the current ground water remediation efforts. Therefore, all analysis for the remedy selected in this ROD assumed the NECR Site mine waste would be disposed in a cell located on top of the UNC Site mill tailings that are already in the Tailings Disposal Area.

Containment System Prior Studies: Some commenters asked about prior studies of capping technology. The understanding of containment systems has evolved dramatically since the UNC Site was closed in the early 1980s. In the 1990s and early 2000s, the Alternative Landfill Cover Demonstration (performed at Sandia National Laboratories and funded by DOE) investigated the performance of various landfill cover systems, including alternatives that may

be well suited for arid and semiarid climates. A large-scale field demonstration comparing final landfill cover designs was constructed and monitored at Sandia National Laboratories in Albuquerque, New Mexico. Two conventional cover designs (a RCRA Subtitle "D" Soil Cover and a RCRA Subtitle "C" Compacted Clay Cover) were constructed side-by-side with four alternative landfill test covers designed for dry environments. Performance of the covers was based on their ability to minimize the movement of water through each profile. In other words, the cover with the lowest flux (a measurement of water movement) was deemed the best performer while the cover that yields the highest flux was the worst performer. Flux is the value used by regulators and design engineers to determine the adequacy of a cover.

Also in the 1990s, the DOE started assessing the performance of some of its older disposal cells and established its Environmental Sciences Laboratory (operated by S.M. Stoller Corporation for the DOE), which assessed cover performance. A key finding in the Stoller Report assessment is that the containment system should be compatible with the environment in which it is placed. EPA agrees that co-disposal (that is disposal of the mine waste from the NECR Site along with the UNC mill tailings) at the UNC Site will provide an opportunity to bring the containment system currently at the Tailings Disposal Area at the UNC Site up to state-of-art standards. EPA will work with stakeholders during the design phase to use current knowledge and understanding of design and construction of containment systems

Cover/Liner Design Concerns: Proper placement and capping of mine waste can effectively contain contamination and EPA has extensive experience with capping hazardous substances. EPA will utilize improvements in cover design knowledge and technology such as those evident from studies like the Stoller Report described above. Significant advancements in cover design have occurred since the design of the UNC mill tailings cells. Bringing NECR Site waste to the UNC Site Tailings Disposal Areal provides the opportunity to improve upon the existing cover. During the design phase, EPA will evaluate new technologies such as evapotranspiration covers for the cells to be constructed at the Tailings Disposal Area on the UNC Site. EPA will also evaluate techniques for improving water management at the Tailings Disposal Area to ensure that no rain or snowmelt moves through the cover to the NECR Site mine waste or UNC Site mill tailings. Consistent with its Memorandum of Understanding with the NRC (September 28, 1988), EPA's ROD makes its remedy contingent upon NRC's approval of the selected remedial alternative (*i.e.,* co-disposal of NRC Site waste with UNC Site waste in the UNC Site Tailings Disposal Area). However, to address this design concern of the Navajo Nation and the community, the remedy selected in this ROD provides that a low permeability layer (liner) will be placed below the NECR waste to provide an additional level of protection against water intrusion into the more radioactive tailings cells. 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. A final decision on the liner will be made during the final design phase and after collection of additional technical data.

"Squeezing" and Land Settlement Concerns: A copy of the modeling report titled "*Evaluation of Consolidation and Water Storage Capacity Related to the Placement of Mine Material on the*

existing UNC Site Tailings Impoundment" (May 2011) is posted on EPA's Northeast Church Rock Mine Site webpage at www.epa.gov/region09/NECR. Based on our research and the modeling results, EPA has concluded that water will not be squeezed from the mill tailings due to the loading with NECR waste material under any scenario. This model also estimates that there will be minimal settlement at the disposal cell after placement of the waste, and this settlement will not impact the stability of the cell. See Section 3.3.3.14.

Debris Concerns: Closure of the Mill Site and disposal of the debris was closely regulated by the NRC. EPA obtained the Mill Decommission Report prepared by UNC dated April 1993, which included documentation of the content and placement of the debris including a detailed description with maps and photographs. This document can be found at www.epa.gov/region09/NECR. After thorough review of this documentation, EPA has a clearer understanding of the amount, type, placement, and location of debris within the cells and can appropriately incorporate this knowledge into the cap design over this area and monitor for any potential settlement concerns.

Type of material to be brought to the UNC Site from the NECR Site**:** Under this ROD, low level threat waste excavated from the NECR Site under EPA's September 29, 2011, NECR Site Non-Time Critical Removal Action Memorandum will be taken to the UNC Site for disposal in 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 previously 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. Furthermore, 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.

Volume Estimates: Page 21 of the Surface Soil Operable Unit Proposed Plan states the following: "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 [2009 interim] 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 excavated as part of a separate [2012] time-critical removal action at the NECR Site [Eastern Drainage location]. The estimated 1,000,000 cubic yards of mine waste from the NECR Site is approximately 1.35 million tons."

Typically, volume estimates for excavations are subject to variations and can be off by plus or minus 50%. Alternative 2, the remedy selected in this ROD, is able to accommodate this potential variation in volume.

Compacted Layer Thickness: After the liner is installed, the NECR waste will be transported to the Mill site and spread out in layers or lifts then compacted to improve stability. The actual thickness of the compacted layers will be determined during the design phase taking into consideration the soil properties of the waste and the desired percent compaction. Typically, waste or soil-layer thickness ranges from8 to 14 inches before compaction.

Minimal Settlement: It is expected that some settlement will occur due to the weight of the NECR waste material on the surface of the impoundment. Settlement occurs in two phases: primary settlement which occurs in a relative short time and usually is the largest amount of settlement.

Prior to placement of the existing cover at the UNC Site in 1992, settlement markers were installed and monitored to measure primary settlement. The average primary settlement for the North Cell was 0.5 foot and for the Central Cell was 0.7 foot. After primary settlement, secondary settlement occurs which is a much slower process. Secondary settlement was not measured at UNC after the cover was installed; however, it is estimated to be less than an inch. In 2011, EPA evaluated the potential for release of water from the existing tailings ("*Evaluation of Consolidation and Water Storage Capacity Related to the Placement of Mine Material on the existing UNC Site Tailings Impoundment*") which also included calculations for estimated primary settlement under several conservative scenarios. The calculated settlement was minimal and was estimated between 0.14 and 0.24 feet. This report can be found on the EPA website at www.epa.gov/region09/necr.

Potential for sinkhole: Sinkholes develop when the underlying material shifts or a void develops via geochemical changes. The current UNC disposal facility has been stable for over 20 years and any geochemical changes that have occurred would not create the void that might predicate the formation of a sinkhole. The waste from the NECR site and the new cover will be placed, compacted, and monitored in a manner that will prevent formation of sinkholes.

Water Source for Dust Suppression: Currently, water from the on-site Mill well has been used for dust suppression at the UNC Site. The Mill well is drilled into the Dakota/Westwater Canyon water bearing unit. EPA sampled and analyzed ground water from the well in 2010 and determined that it had high levels of total dissolved solids (TDS), but all other constituents and radionuclide levels were below drinking water standards. This water can be safely used for dust suppression.

Timeline: EPA understands that residents have been living with the NECR Site mine waste and want to expedite cleanup and disposal as much as possible. EPA is now moving forward and anticipates that, upon issuance of this ROD; it will take approximately three years for the planning, design, and NRC license amendment phase of the project followed by four years of active construction. As indicated in recent fact sheets, EPA anticipates the project will be under construction by 2016. To expedite this process, EPA is working collaboratively with its co-

regulators NRC, DOE, NN, and NM in order to set up a design process that would avoid duplication of efforts and comply with all applicable or relevant and appropriate regulations.

Project Funding: EPA anticipates that the design phase will be undertaken under an AOC, and the remedial action will be undertaken under a consent decree.

3.3.1.16 Existing Tailings – Several questions were received that relate to the existing UNC tailings site including:

- ***What is surface evaporation?***
- ***Are there contaminants in the evaporation ponds?***
- ***What if the evaporation ponds fill up and the dust becomes airborne?***
- ***Is the dust dangerous?***
- ***Are there any underground developments beneath the UNC tailings?***

EPA Response: Surface evaporation is the process by which water changes from a liquid to a gas or vapor at the interface of the liquid and the atmosphere. At the UNC Site, EPA built a ground water extraction and treatment system to address contaminated ground water. The ground water was contaminated by historical seepage from the Tailings Disposal Area. This system was installed and began operating during the summer and fall of 1989. The hazardous substances of primary concern in contaminated ground water are arsenic, cadmium, cobalt, nickel, radium-226/228, selenium, and gross alpha. Gross alpha particles are a type of ionizing radiation ejected by the nuclei of some unstable atoms. The historical tailings seepage contaminated portions of the shallow alluvial ground water system and underlying aquifers in the Upper Gallup Sandstones. EPA's Selected Remedy for the ground water operable unit was designed to contain the ground water contamination plume by pumping. Extracted ground water was pumped into evaporation ponds. However, when the water evaporates, it leaves behind a precipitate that may contain hazardous substances. According to UNC/GE, these precipitates are in general building up along the edges of the percolation ponds and could become airborne with increasing wind speed. To prevent dry precipitates from becoming windborne, UNC has been supplementing the extracted ground water with water from the mine site to decrease the amount of pond evaporation which helps to maintain the integrity of the evaporation pond liner and decrease the amount of material that may become windborne.

In addition, EPA will develop an air monitoring program to verify that the dust control measures implemented as part of the NECR cleanup are effectively working.

As far as we are aware, there are no underground workings beneath the disposal cells in the UNC Site Tailings Disposal Area.

3.3.1.17 Design Concerns – several community members were concerned about the lack of a design plan in the UNC Site Surface Soil Operable Unit Proposed Plan, the federal government, including the EPA, bears a trust responsibility to Indian Tribes, including the Navajo Nation. EPA acknowledges this trust responsibility in its Policy for the Administration of Environmental Programs on Indian Reservations (1984), which states: "In keeping with [the] trust responsibility, the Agency will endeavor to protect the environmental interests of

Indian Tribes when carrying out its responsibilities that may affect the reservations." The EPA has consulted with the Navajo Nation throughout the development of the Proposed Plan. Other commenters asked why the UNC Site Surface Soil Operable Unit Proposed Plan is only proposed and is not considered final.

EPA Response: EPA must present its Proposed Plan for the remediation of a Superfund site listed on the NPL to the public, before it can become a final plan. (Note that the NECR Site is not listed on the NPL. It was a removal action not a remedial action, and, consequently, it followed a different process.) Under the NCP, EPA's Proposed Plan for an NPL site is to "[p]provide a brief summary description of the remedial alternatives evaluated. . . ." (40 CFR § 300.430(f)(2)(i)). Providing just a brief summary, as required by law, makes sense because detailed Remedial Designs are costly (frequently costing about $2 million); consequently, it would be unwise to spend money on a detailed Remedial Design for an alternative that has not yet been reviewed by the public. It is important to note, however, that much more detailed information regarding the remedy selection process and the information considered was made available to the public in the Administrative Record File. The availability of the Administrative Record File was published in the newspaper announcements regarding the availability of the Proposed Plan. EPA made the Proposed Plan and the rest of the administrative record file for the Surface Soil Operable Unit available at the following locations:

Navajo Nation Environmental Protection Agency
Superfund Program
Highway 264/43 Crest Road
Saint Michaels, AZ 86511
(928) 871-6859 / (800) 314-1846

Octavia Fellin Public Library
115 West Hill Avenue
Gallup New Mexico 87301
(505) 863-1291

In addition, in response to the specific public concerns regarding the feasibility of the proposed alternative, EPA has conducted pre-design activities and has required extensive modeling of the proposed alternative to respond to public concerns about potential migration of contaminants.

Following receipt of public comments and any final comments from the support agency, which is NMED for the UNC Site; the EPA, as lead agency for the UNC Site selects and documents the remedy selection decision in a ROD. The ROD documents the remedial action plan for an NPL site or for an operable unit at an NPL Site and serves the following functions:

- It certifies that the remedy selection was carried out in accordance with CERCLA and, to the extent practicable, with the NCP

- It describes the technical parameters of the remedy, specifying the methods selected to protect human health and the environment including treatment, engineering, and institutional control components, as well as remediation goals.
- It provides the public with a consolidated summary of information about the site and the chosen remedy, including the rationale behind the selection.

The ROD provides the framework for the transition into the next phase of the remedial process. Remedial Design (RD) is an engineering phase during which additional technical information and data identified are incorporated into technical drawings and specifications developed for the subsequent remedial action. These specifications are based upon the detailed description of the Selected Remedy and the cleanup criteria provided in the ROD.

3.3.1.18 Proposed Land Use – A question was raised about the restrictions that will be placed on the UNC property and if the UNC property could be used for planting or grazing.

EPA Response: The UNC disposal site will be controlled. This means that residential and industrial use will be prohibited and grazing uses will be restricted. These restrictions are necessary to maintain the integrity of the cover as well as to help eliminate risks to human health. However, EPA supports DOE policy to encourage and support beneficial reuse at sites they manage.

However, after cleanup of the NECR site, there won't be any restrictions on surface land use and the NECR site will be open for residential, agricultural, grazing, and commercial use as approved by the Navajo Nation.

3.3.1.19 NRC License Amendment – Several questions were raised about the NRC license amendment process:

- ***Is there a need for a new NRC license or just a license amendment?***
- ***How long does it take for NRC to approve a license amendment? What is the timeline for an NRC license amendment relative to short term and long term cleanups?***
- ***Can NRC reject the Surface Soil Operable Unit Remedial Design?***
- ***Once the NECR Site mine waste is disposed at the Tailings Disposal Area at the UNC Site, will the U.S. Department of Energy (DOE) accept the UNC Site into the DOE's Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management?***

EPA Response: UNC already has a license for the UNC Site. NRC agrees that only a license amendment is needed, not a new license.

NRC's license amendment process includes a comprehensive safety and environmental review, a public comment and participation period. The safety review scrutinizes the design safety, operational programs, and site safety to ensure that the facility will meet NRC requirements. The NRC also performs an environmental review to fulfill its obligation under the National Environmental Policy Act (NEPA). The NRC will prepare a supplemental Environmental Impact Statement (EIS) or an Environmental Assessment (EA) to review impacts. Typical license amendments take between two and three years. EPA is committed to working with NRC to expedite the license amendment process.

EPA agrees that NRC rejection of the EPA-selected Remedial Design and license denial would significantly delay the project and be a major setback. To minimize the potential for this situation, EPA has sought and received NRC input throughout the remedy selection process. In addition, NRC has agreed to be on the design review team so that NRC's design concerns can be identified early on. The NRC will need to amend UNC's license for the UNC Site to enable it to accept mine waste from the NECR Site. While NRC participation on the design review team does not guarantee license approval, it will help to ensure that the design submitted as part of the license amendment process complies with NRC regulations.

Regarding DOE's acceptance of the UNC Site into the DOE's Long-Term Surveillance and Maintenance Program under DOE's Office of Legacy Management, EPA wants to help facilitate that process. Under this DOE program, the UNC Site would be maintained and managed under the DOE to provide for continued containment and protectiveness. Toward this end, EPA is coordinating with DOE and will work to ensure that DOE's concerns are addressed through DOE's participation on the design review team.

3.3.1.20 Process – General questions were received from the community relating to CERCLA process. Clarification was requested:

- ***What is the difference between the National Priority List waste at the UNC Site and the CERCLA regulated NECR Site mine waste?***
- ***How does cleanup of a Superfund site take place under the Superfund removal program?***
- ***Will any additional findings impact the design and delay implementation of the cleanup?***

EPA Response: The waste at the two facilities, the NECR Site and the UNC Site is similar; although, the waste at the NECR Site generally has a lower concentration of contaminants. Part of the reason for this is that the UNC Site mill processed much of the ore from the NECR Site mine. This means that mill tailings disposed at the Tailings Disposal Area at the UNC Site came from ore that was mined at UNC. In addition, tailings sand from the Mill Site was transported between the two sites in conjunction with UNC mill decommissioning and reclamation activities.

Removal actions are generally immediate, short-term responses intended to protect people from immediate threats posed by hazardous substances. Examples of removal actions are excavating contaminated soil, erecting a security fence, or stabilizing a berm, dike, or impoundment. Removal actions may also include taking abandoned drums to a proper disposal facility to prevent the release of hazardous substances into the environment. Removal actions may occur at NPL or non-NPL sites. Remedial actions take place at NPL sites. Remedial actions are long-term cleanups designed to prevent or minimize the release of hazardous substances and to reduce the risk and danger to public health or the environment. Remedial actions (RA) follow the remedial design (RD) phase of the Superfund cleanup process and are a part of the actual construction or implementation phase of the cleanup. The action at the NECR Site to consolidate the mine waste is a removal action. The long-term disposal of that waste at the UNC Site, an NPL Site, is a remedial action. EPA is currently reviewing all the field data to

determine if there are any gaps in the data needed for the design and the environmental review. The design schedule includes time to collect some field data. However, unforeseen data gaps or discoveries made during Remedial Design or Remedial Action could delay implementation of the cleanup.

3.3.1.21 Long-term Monitoring – Community members requested long-term monitoring of the air, water, land, vegetation, and fencing with annual reporting back to the local residents. Some commenter's expressed concern about maintenance of the fencing and cells over the long term given the long half-life of some of the uranium by-products and the limited lifetime for the cell design of 200 - 1,000 years. Several residents expressed concern about potential exposure during the NECR Interim Remedial Actions (IRA) with the monitoring that occurred only during the hours of construction and not over the entire 24-hour period. The community requested continuous air monitoring during the Surface Soil Operable Unit Proposed Plan removal action. Residents raised concerns about the ability to control dust over the entire area of the mill site once the existing cover is disturbed and the trucks are in use. Additional questions were received about the state of current monitoring of the tailings. Concern was expressed that the EPA will not follow up on the long-term monitoring and protection as cattle are already breaking fences and getting onto the tailings.

EPA Response: Ground water monitoring has been ongoing at the UNC Site since the 1970's and will continue under the Ground Water ROD. *Annual Review Reports for the Groundwater Corrective Action* is published annually and is available for review at the NCR Adams website: http://adams.nrc.gov/wba/. The latest annual report entitled "Annual Review Report – 2012, Groundwater Corrective Action, Church Rock Site, Church Rock, New Mexico" (Chester, 2013) is available in the Administrative Record for this ROD.

Air monitoring and dust suppression activities will be a component of the remedy and will be detailed during the remedial design as discussed in Sections 2.9.5 and 2.10.5.

EPA shall review the remedial action at the UNC Site at least every five years for as long as hazardous substances remain on the site above concentration levels that allow for unlimited use and unrestricted exposure. These reviews are required under CERCLA. As part of these reviews, EPA will assess whether the remedy remains protective. EPA will look at all media (*i.e.,* ground water, surface water, air, soil, and sediment) to ensure that there is no significant risk to human health or the environment. These reviews will also ensure that the integrity of any cap and fencing is maintained. At the beginning of each five-year review, the EPA UNC Site team will determine the best way to notify the public. Included in that notice will be an explanation of how the community can contribute during the review process.

The statutory five-year review requirement applies to all remedial actions selected under CERCLA §121, 42, U.S.C. § 9621; however, EPA may also conduct other five-year reviews at its discretion. Consequently, EPA has the discretion to conduct a five-year review at the NECR Site, which is not a remedial action, if appropriate.

3.3.1.22 Regulatory Process – Several commenters indicated they did not understand how the various agencies work together and which were responsible for the various concerns.

Specifically mentioned were the interaction between EPA Regions 6 and 9, the New Mexico Environment Department: (NMED), NRC, NNEPA, and UNC/GE.

EPA Response: Please see Section 2.2 for a detailed discussion of the various agencies involved and their roles with this site.

3.3.1.23 **Local residents expressed concern with the relocation of NECR mine waste to the UNC Site and stated they wished to have the mine waste removed to a TSDF. The community's concern reflects their wish to have the mine waste relocated out of the nearby vicinity and to a federal facility. The community also wished to be more involved in the decisions being made that will impact their daily lives. They are concerned that their wishes were not being considered by EPA in selection of this remedy.**

EPA Response: EPA has been working with the local community and the Navajo Nation since 2005 and EPA is aware of the local concern with the NECR Site mine waste and the impact that has on the health and culture of the nearby residents. This history of Navajo Nation and the local community is described more fully in Sections 2.3.1.3, 2.4.2and 2.4.3.

EPA recognizes the community's concern with the long-term detrimental impacts uranium mining has had and continues to have on the cultural, psychological, and physical health of this community and other Navajo communities. EPA understands the desire to remove all mining related contamination, including the mill tailings, from the immediate area. EPA evaluated remote disposal of the NECR Site mine waste in the May 30, 2009, NECR EE/CA and in the September 29, 2011, NECR Site Non-Time Critical Removal Action Memorandum. As explained above in detail in EPA's response to comment 3.3.1.1, EPA researched multiple off-site disposal locations and concluded that there are currently no other cost-effective disposal alternatives available for the large volume of NECR mine waste. Under the criteria established in the NCP, EPA found that remote disposal could, therefore, not be supported.

The EE/CA and Action Memorandum found that, contingent upon both modification of the license issued by the NRC for the UNC site, and issuance of an appropriate decision document by EPA Region 6 consistent with the NCP, disposal at the UNC Site was the best option.

EPA has now issued a decision document consistent with the NCP—this ROD. EPA's analysis finds that the remedy selected in this ROD is supported under the criteria established in the NCP. EPA's evaluation of the Selected Remedy under these criteria is described in Section 2.11 of this ROD.

The NECR Mine has been identified by both EPA and NNEPA as the highest priority abandoned uranium mine on the Navajo Nation for cleanup. The purpose of the remedy selection process, under the NCP, is to implement remedies that eliminate, reduce, or control risks to human health and the environment. The NCP remedy selection process evaluates remedial alternatives using nine criteria which are based on CERCLA's mandates to determine advantages and disadvantages of the alternatives, thus identifying site-specific trade-offs between options. These trade-offs are balanced in a risk management judgment as to which alternative provides the most appropriate solution for the site problem. The nine criteria are listed below.

Threshold Criteria

1. Overall Protection of Human Health and the Environment
2. Compliance with ARARs

Balancing Criteria

3. Long-term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment
5. Short-term Effectiveness
6. Implementability
7. Cost

Modifying Criteria

8. State/Support Agency Acceptance
9. Community Acceptance

The final remedy selection decision is based on an evaluation of the major trade-offs among the alternatives in terms of the nine evaluation criteria listed above. Remedial alternatives must be protective of human health and the environment and comply with ARARs (or justify a waiver) in order to be eligible for selection. These are the two threshold criteria from among the nine criteria.

Among alternatives that meet the threshold criteria special emphasis is to be afforded alternatives that offer advantages in terms of long-term effectiveness and permanence, and reduction of toxicity, mobility or volume through treatment, in performing the balancing by which the remedy is selected. These criteria will be the most important, decisive factors in remedy selection when the alternatives perform similarly with respect to the other balancing criteria.

When the alternatives provide similar long-term effectiveness and permanence and reduction of toxicity, mobility or volume, the other balancing criteria rise to distinguish the alternatives and play a more significant role in selecting the remedy. For example, if two alternatives offer similar degrees of long-term effectiveness and permanence and reduction of toxicity, mobility or volume through treatment, but one alternative would require more time to complete and would have greater short-term impacts on human health and the environment, the decision-maker would focus on the distinctions between the alternatives under the short-term effectiveness criterion.

The alternative that is protective of human health and the environment, is ARAR-compliant and affords the best combination of attributes is identified as the preferred alternative in the proposed plan.

State and community acceptance are factored into a final balancing in the ROD which determines the remedy and the extent of permanent solutions and treatment practicable for the site. Community acceptance cannot be assessed definitively until the formal public comment period is held. This part of the ROD is EPA's response to comments submitted during the formal public comment period.

EPA has responded to the communities wish to have more participation in the decision making for the UNC Site. Recently, RWPRCA has appointed a community member to sit in on meetings between the PRP and regulatory agencies along with TASC to provide technical support to the community.

3.3.1.24 Health Concerns - Many residents expressed concerns about the health and safety of families, including the children and elderly living near the NECR Site and UNC Site. The health of livestock and the safety of cultural uses of the local plants and herbs were also a concern. The community requested a comprehensive health study to better understand the impacts of mining on the health of the community.

EPA Response: EPA acknowledges your concerns and we are working with the appropriate health agencies in this endeavor. Ongoing studies are discussed below with the purpose of addressing potential health effects of past exposure and continuing exposure from uranium mining in the larger Navajo community. The Diné DiNEH project, conducted by the University of New Mexico (UNM) and Southwest Research and Information Center (SRIC), assesses water quality, health and uranium exposure in the Eastern Agency. Dine College is collaborating in an investigation of water quality in well water at the Shiprock Agency. The Navajo birth cohort study conducted by the University of New Mexico, SRIC, the Agency for Toxic Substances and Disease Registry, the Navajo Nation Department of Health and the Navajo Area Indian Health Service, will look at birth outcomes and child development in several Navajo areas. The Partnership for Native American Cancer Prevention, Northern Arizona University, and the University of Arizona are investigating water quality and health effects in the Black Hills area by conducting animal studies on uranium in drinking water, and by looking at the effect on hormone levels. Finally, Christine Samuel, a Navajo who is working on her doctorate in the School of Nursing at UCLA, will be looking at uranium content in animals that have grazed in contaminated soil or that have been given contaminated water to drink. Ms. Samuel will also be looking at the garden produce grown with contaminated soil and water. Ms. Samuel's study will also assess contaminants in animal tissue and the possible transfer of contamination to people who consume this meat. Ms. Samuel's study is funded by National Institute of Health. All of these studies are the initial steps in further determining the correlation between uranium exposure and health outcomes in people and looking for potential effects in the population.

The Navajo Area Indian Health Service also has a non-occupational health monitoring program and is holding health fairs around the Navajo Nation. Although this program is not a study, it can provide information about disease rates on the Navajo Nation compared to other communities.

The NECR Site will be remediated to allow the cultural use of plants and herbs, to allow their livestock to graze and to allow residential units.

3.3.2 Comprehensive Response to UNC/GE Comments

The following sections details EPA Responses to the comments received.

3.3.2.1 Total Volume to be disposed at the Mill Site: Page 21 states the following: "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 Mine Site, 109,800 cubic yards for a removal action at the NECR Mine Site that predates the 2011 Non-Time-Critical Removal Action Memorandum for the NECR Mine Site and on estimated 30,000 cubic yards to be excavated as port of a separate time-critical removal action at the NECR Mine Site." This is incorrect. The 871,000 cy estimate double-counts ~50,000 cubic yards from the removal action at the NECR Mine Site that predates the 2011 Non-Time-Critical Removal Action Memorandum and includes the principal threat waste that will not be disposed of at the Mill Site under the current plan (but see our comment below), and includes a hypothetical 20% contingency, all of which total ~200,000 cy. Therefore the surface soil OU remedial action will actually address disposal of an estimated total volume of ~800,000 cy, not 1 million cy. For consistency, this estimated volume should be cited throughout the plan.
EPA Response: We understand that UNC/GE and EPA have estimated the volume differently; however, this small difference in volume does not affect the overall preferred alternative. Typically, volume estimates for excavations are subject to variations and can be off by plus or minus 50%. While UNC/GE estimated a volume of NECR waste of approximately 500,000 cubic yards, EPA used a more conservative approach in the EE/CA and estimated a volume of 900,000 cubic yards. Specifically, EPA stated in the EE/CA that the remedy "would excavate to a maximum depth of 10 feet." This limit removes some of the uncertainties in the volume estimates since the horizontal extent of the contamination is well defined.

The design should be able to accommodate this potential variation in volume. The major factor influencing the ultimate height of the NECR waste and new cover is whether the NECR waste is placed on all three existing cells, or is limited to one or two cells. The new cells will be designed to fit into the landscape visually. The volume mentioned in the Surface Soil Operable Unit Proposed Plan was an estimate and will be refined during design.

No principal threat waste will be disposed of at the UNC Site.

3.3.2.2 O&M Costs: Page 38 includes a table "Summary of Remedial Alternatives and Estimated Cost", which indicates that the estimated Annual O&M is $1,227,767. This amount represents the total estimated O&M over a 30 year period, not the annual O&M. The table heading should be revised accordingly.
EPA Response: EPA agrees that the reported estimated Annual O&M of $1,227,767 was actually for a period of 30 years. Therefore, the Annual O&M has been reported as $40,926 in this ROD.

3.3.2.3 PTW: The discussion on principal threat waste (PTW) on page 18 indicates that principal threat wastes are those source materials considered to be highly toxic or highly mobile, which general cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur. This section later defines PTW as waste containing either 200 pCi/g or more of Ra-226 and/or 500 mg/kg or more total uranium. However, this plan, as well as the EPA Region 9 EE/CA fails to justify why materials containing Ra-226 and uranium above these level pose a significant risk to human health and

the environment. In fact, on Page 5 that plan indicates that the UNC Site poses no significant risk, although as summarized on Page 16, data for the fine-grained tailings showed an average Ra-226 concentration of 547 pCi/g, significantly higher that EPA's proposed PTW level and the average Ra-226 concentrations in mine spoils (approximately 42 pCi/g). How can EPA consider that mine materials that contain lower Ra-226 concentrations than existing tailings propose a significant risk, when EPA has determined that higher levels already at the Mill Site do not pose a significant risk, and when they will be placed in a repository designed consistent with or to higher standards than the current UNC Site impoundments?

The adverse effects associated with distant offsite disposal of PTW would present greater risk of harm than potential radiological exposures associated with placing the PTW in the UNC Site Tailings Disposal Area. Therefore consistent with the CERCLA evaluation criteria, PTW should be disposed of in the mill site repository and this approach should be evaluated in accordance with NRC's requirements as part of the UNC's license amendment request to the NRC. UNC/GE recommends that EPA delete this determination of PTW and allow placement of these materials at the Mill Site, rather than unnecessarily increasing risk of traffic accidents and other consequences of long distance hauling.

EPA Response: The determination of PTW was made in the September 29, 2011, NECR Site Non-Time Critical Removal Action Memorandum, that all NECR Site wastes, containing either 200 pCi/g or more of Ra-226 and/or 500 mg/kg or more of total uranium present a significant risk to human health and will be disposed at an off-site treatment, storage and disposal facility (TSDF). Since PTW will not be disposed of at the UNC Site, this ROD does not alter the definition of PTW.

3.3.2.4 This Record of Decision (ROD) addresses only disposal of those wastes that EPA has decided to dispose at the UNC Site. This ROD does not address principal threat wastes from the NECR Site. EPA/NRC Coordination: UNC/GE urges the EPA to coordinate closely with the NRC to ensure that the license amendment process determined by the Agencies to be necessary is efficient and expedited. In addition, as the PRPs expected to implement the Proposed Plan, should the remedy proposed be selected, UNC/GE requests close coordination and communication throughout the process.

EPA Response: All federal agencies (EPA, NRC, and DOE), the State of New Mexico and the NNEPA will continue to work together with UNC/GE to efficiently resolve issues as they arise.

3.3.2.5 Navajo jurisdiction: UNC/GE asserts that the UNC Site is not subject to Navajo jurisdiction. The UNC Site property is owned in fee by UNC. In Hydro Res. Inc. v. U.S. EPA, --- F.3d ----, 2010 WL 2376163 (10th Cir. June 15, 2010) (en bonc) (HRI II), the court held that a parcel of land owned by HRI in a "checkerboard" area. Section 8, outside but near the Navajo Reservation, was not "Indian country" and thus was subject to a state Underground Injection Controls (UIC) permit under the Safe Drinking Water Act, rather than a federal permit. The court also vacated EPA's 2007 Land Determination (the 2007 Determination) that this parcel was Indian country. The Court in HRI II found that under the test for "Indian country" in 18 U.S.C. §1151, in order for a parcel of land to be subject to Indian Jurisdiction, two factors

needed to be present based on the 1998 two-prong test established by the United States Supreme Court in the Alaska v. Native Village of Veneti,. 522 US 520 (1988) ("Venetie"): (1) the land in question needed to be set aside for Indian occupancy, and (2) the land must be under "federal superintendence."

The facts at the UNC Site parallel those in HRI II, namely, the UNC Site is privately owned, and therefore cannot have been "set aside for Indian occupancy," nor can it be under "federal superintendence" for the benefit of the Navajo Nation. Therefore, UNC/GE believes that the Navajo Nation does not have Jurisdiction over the Mill site, and cannot respond in its governmental capacity as an oversight authority or regulatory agent. While EPA considers community concerns, we note that the UNC Site, where the NECR spoils are proposed to be disposed, is further from local residences than the NECR Mine Site, and note as well, as EPA points out in the Proposed Plan, that community concerns, under NCP criteria, are a third tier consideration and should not drive remedy decisions.

EPA Response: EPA recognizes that a trust responsibility derives from the historical relationship between the Federal Government and Indian Tribes as expressed in certain treaties and Federal Indian Law. EPA's Policy for the Administration of Environmental Programs on Indian Reservations (1984), states: "In keeping with [the] trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations." The EPA has consulted with the Navajo Nation throughout the development of the Surface Soil Operable Unit Proposed Plan and this ROD and has endeavored to protect the Navajo Nation's interests during preparation of this ROD.

3.3.2.6 Role of New Mexico Environment Department: Page I, first paragraph: The Surface Soil Operable Unit Proposed Plan (Proposed Plan) states that the New Mexico Environment Department (NMED) is the support agency for site activities. However, it needs to be stated that NMED does not have authority to enforce any actions discussed in the Proposed Plan under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and UMTRCA.

EPA Response: CERCLA Section 121(f)(1), 42 U.S.C. § 9621(f)(1), calls for EPA to promulgate regulations "providing for substantial and meaningful involvement of each State in the initiation, development, and selection of remedial response actions to be undertaken in that State." The regulations codified at 40 CFR Part 300 Subpart F (State Involvement in Hazardous Substance Response) implement Section 121(f)(1). These regulations, along with other parts of the NCP describe a State's role as support agency. For a better understanding of what it means for a State to be a support agency, please see the NCP and Subpart F in particular. At the UNC Site Surface Soil Operable Unit, the EPA is the lead agency and NMED is the support agency. Integrity of Existing UMTRCA Title II Disposal Cells: Page 13, bottom of first column; page 15 bottom of first column; page 24, bottom of first column; page 28, bottom of first column; page 35, bottom of first column; and page 40, bottom of second column. Two reports, "Evaluation of Consolidation and Water Storage Capacity Related to Placement of Mine Material on the Existing UNC Site Tailings" (Dwyer, 2011), and "Mill Decommissioning report, license No. SUA-

1475" (UNC, 1993), are referenced to support the conclusion that placement of Northeast Church Rock Mine Site (NECR Mine Site) mine waste will not affect the drainage or stability of the existing disposal cells. EPA also indicates data will be collected during remedial design to validate assumptions used to model potential consolidation and expelling of excess pore fluids as a result of placing additional load on the existing disposal cells. DOE agrees with this approach.

3.3.3 Comprehensive Response to Agency Comments

The following sections details EPA Responses to each responding agencies comment received.

3.3.3.1 DOE acknowledges the modeling used in the Dwyer, 2011, report follows accepted practices. However, in-place moisture contents were determined using calculations, or assumed values. It is essential to validate the model used in the report using data representing actual conditions. This may be done by measuring the in-situ moisture condition of the fine tailings in the existing tailings disposal cells to verify and confirm soil structure and in-situ moisture conditions. A standard geotechnical investigation, after the design for placement of the NECR mine waste is completed, needs to be conducted as part of the validation process. One to two borings per acre is likely sufficient to characterize the existing tailings pile. Standard soil investigation procedures should be followed which include, among other procedures: continuous borehole logging; performance of standard penetration testing; in-situ moisture content determination; and classification of samples.

EPA Response: In response to community concerns about the potential for the weight of the mine waste to 'squeeze" contaminated water from the existing tailing piles, EPA requested UNC/GE provide an analysis to determine what would be the effect of the placement of the mine waste on the existing tailing cells. UNC/GE developed the Dwyer Report referenced in the commenter's statement. Information collected from the Mill cells during the Mill closure between 1989 and 1992 were used in the model when available; otherwise literature information that defined the characteristics of similar materials were used.
EPA's objective in requesting the model prior to the Remedial Design stage was to assure the community and stakeholders that even under reasonable, worst-case conditions, the addition of the NECR Site mine waste to the existing tailing piles would not result in a discharge . Given the model and the extremely conservative approach, EPA concluded that there was enough information to select co-disposal at the tailings pile. However, as stated in the proposed plan, "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."

Since issuance of the proposed plan, UNC/GE has refined the model to incorporate actual data including soil properties of the NECR mine waste to be brought to the UNC Site, soil properties from the proposed borrow pit, a refinement of the tailings profile from the closure plans, and hydraulic properties from similar uranium tailings at the Durango Colorado UMTRCA site. The revised modeling uses actual data from similar sites and better represents potential final site conditions. A preliminary run of the model using these site-specific or site-similar properties

also indicated that there will be no excess water forced from the fine tailings layer due to the placement of mine waste on the existing impoundment area.

Although EPA agrees that in-place measurements are preferred, we do not believe the additional information that could be gained by collection of samples within the tailings cell would justify the burdens associated with collecting the information, particularly because the samples collected may not be representative of the conditions throughout the cells. The process of collecting such samples would involve significant additional administrative burden, delay, expense, and exposure risk. Given the similarities between the Durango Colorado UMTRCA site and the UNC Site, EPA does not believe the moisture properties will vary dramatically between the two sites.

EPA will continue to revise the model as the design progresses, and will continue to work with DOE and other stakeholders to develop a design of the disposal cells that is protective.

3.3.3.2 Intermediate or Final Remedial Action: Page 21, middle of first column: It is unclear what is meant by EPA's statement that the surface soil operable unit (OU) proposed remedial action will be an "intermediate" step prior to "final" remedial action for the surface soil OU at the UNC Site. DOE requests clarification about whether the Proposed Plan covers all actions through final reclamation of the surface soil OU at the UNC Site. If the Proposed Plan only covers the activities associated with the "intermediate" step, there will need to be assurance that possible exposure of NECR mine waste from the intermediate step through final reclamation would be cared for and would not impact the existing UMTRCA Title II disposal cells. Additionally, there would need to be assurance that the integrity and soundness of the disposal cells would be maintained through final reclamation.

EPA Response: The Surface Soil Operable Unit Proposed Plan stated at the end of the paragraph referenced above "Once the NECR Mine Site mine waste has been disposed in the UNC Site Tailings Disposal Area and all the mine waste is capped, final remedial 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." The phrase "intermediate" refers to "disposal and capping" of the NECR mine waste. The phrase "final" refers to backfilling of the evaporation ponds, capping of the evaporation pond area, and construction of the final drainage swales at the Tailings Disposal area. These final actions will not affect the existing UNTRCA Title II disposal cells.

3.3.3.3 Long-Term Care: Page 22, bottom of first column; page 30, bottom of second column; page 33, middle of second column; and page 40, top of second column: With regard to the Department's role, the discussion of "long-term care" activities in the Proposed Plan was not clear. Additionally, the discussion seems to imply that DOE may be responsible for activities it is not authorized to perform. As EPA is aware, LTS&M [Long-Term Surveillance and Maintenance] activities under UMTRCA are not necessarily the same as Operations and Maintenance (O&M) activities under CERCLA. Generally speaking, although both LTS&M and O&M are considered "long-term care", they are also distinguishable. This is important to note

because DOE is not authorized to conduct or enforce CERCLA-related O&M activities at UMTRCA disposal cells. However, DOE is authorized to perform LTS&M at these cells. As you know, the existing disposal cells found at the UNC Site are UMTRCA Title II disposal cells. DOE also understands that the CERCLA-related O&M period starts when remediation goals other than ground- or surface-water restoration actions are complete (OSWER 9200.1-3FS), and any groundwater remedy is considered to be operational and functional. However, DOE's LTS&M obligations under UMTRCA (10 CFR 40.28) would not start until groundwater restoration actions are complete and the specific license is terminated.

It also is expected that DOE will conduct LTS&M at the UNC Site in accordance with requirements of the general license and an NRC approved site-specific Long-Term Surveillance Plan (LTSP). Requirements include performing annual inspections, reporting to NRC and taking emergency measures when necessary. Other requirements will be determined on the basis of final site conditions, and may include monitoring of other environmental media. Also note that DOE does not conduct routine radon monitoring under the general license. The radon standard for UMTRCA Title II disposal cells is a design standard that applies "at the end of the closure period" [40 CFR 192.32(b)]. As long as surveillance (i.e., inspection) indicates the engineered cover has not degraded, the radon flux should not increase.

In a letter dated March 2, 2012 from David G. Geiser, Director of DOE's Office of Legacy Management, to Dr. Keith McConnell, Director of NRC, Decommissioning and Uranium Recovery Licensing Directorate, DOE stated what it understands its role will be with regard to long-term care of NECR mine waste at the UNC Site if EPA issues a decision document and NRC approves a license modification. Following are two important points from that letter to consider:

Waste from the NECR mine placed on the existing cell complex is, and will be, regulated under the Uranium Mill Tailings Radiation Control Act (UMTRCA). Additionally, any other material on the processing site will be remediated to UMTRCA standards as well. It is our understanding that the licensee would also have to comply with NRC requirements for disposal of non-11(e).2 wastes.

DOE acceptance of the UMTRCA site for long-term surveillance and maintenance (LTS&M) is established through the NRC site transfer process. This includes: A determination by NRC that the UMTRCA Title II site is deemed ready for transfer to DOE for long-term care without any outstanding technical, regulatory, or jurisdiction issues.

With input from DOE, NRC identification of an appropriate surety cost estimate to enable DOE to effectively perform its LTS&M duties, including any that are unique because of the mine waste. Appropriate LTS&M costs could include those necessary for cell maintenance and inspection; sampling and other activities for groundwater compliance; vegetation control, if necessary; and maintenance and evaluation of the effectiveness of institutional controls.

DOE encourages future discussions involving NRC, EPA and the Department to discuss long-term care activities at the UNC Site. It is important the role of each federal agency is determined through collaboration, and long-term care activities are agreed upon in cooperation with one another.

EPA Response: The EPA looks forward to working closely with DOE, NRC, NN, and NMED and other stakeholders, including the community, to establish appropriate Long-Term Surveillance and Maintenance activities and processes, as well as ICs, that will meet the objectives and responsibilities under the relevant-regulatory authorities and will provide long-term protection at the UNC Site. The EPA understands the challenges of long-term maintenance and integrating the different agencies regulations and the need for site use restrictions. Because mine wastes will remain on the site above levels that would allow for unrestricted use or unlimited exposure, site use restrictions will be necessary to protect human health and the environment. These restrictions will include prohibition of any use of the Tailings Disposal Area that would result in the potential for exposure. Specifically, residential, commercial/industrial, and grazing uses will not be permitted in the Tailings Disposal Area. Site restrictions will be engineered to protect against potential exposure to human health and the environment as well as against any potential for damage to the cap that could result in exposure or contaminant migration. EPA will work closely with DOE and the NRC to establish appropriate Long-Term Surveillance and Maintenance activities and Institutional Controls that will provide long-term protection. For a list of ICs and prohibited Site uses please see this ROD at Section 2.11

Because mine wastes will remain on the site above levels that would allow for unrestricted use or unlimited exposure, EPA is required to perform a remedy review no less than every five years [40 CFR §300.430(f)(4)(ii)].

EPA agrees that many of the activities required under the LTS&M are similar to those activities required during Operation and Maintenance at Superfund Sites. EPA expects to work closely with DOE and NRC to establish appropriate LTS&M activities and processes that will meet the objectives and responsibilities under both regulatory authorities without causing undue hardship or duplicative efforts by the site custodian during long-term stewardship.

3.3.3.4 Use of Liner (or Layer): Page 31, second column, last bullet: The Proposed Plan calls for the licensee to salvage and reuse the erosion control rock from the existing cover within the footprint of the proposed NECR cell and to place a low permeability layer between the mine waste and the tailings disposal area. The last bullet under Cap Design Criteria states, "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 saturated hydraulic conductivity of 10-7 centimeters per second (cm/s)]." DOE acknowledges EPA has responded to DOE's comments, which identified concern with the use of a liner, on EPA's Engineering Evaluation/Cost Analysis (EE/CA) for the NECR Mine Site (May 30, 2009). However, DOE remains concerned about the use of any liner or layer. Following is feedback which captures these additional concerns:

According to the Proposed Plan, DOE assumes the mine waste will be placed over the re-compacted soil and isolated beneath a vegetated cover. This system creates a potential long-term care concern for DOE as moisture may eventually pass through the cover (a vegetated cover transpires the majority of infiltrating precipitation; however, periodically the storage capacity is exceeded, as observed at the large-area lysimeter beneath the cover of the Monticello, Utah, disposal cell) and will perch on the low-permeability layer. The moisture could then move laterally as the water volume continues to increase. DOE does not believe this would result in an unacceptable risk, but monitoring for and potential management of seepage water would be required. If EPA intends to use a liner or layer, please provide the technical rationale for its use.

It is also DOE's experience that at UMTRCA Title I sites the moisture content of the material as it is placed in the cell should be carefully controlled to avoid excess water in the completed cell. For this reason, DOE recommends that the mine waste be placed several percentage points dry of optimum moisture content to reduce the potential for transient drainage. Additionally, there is potential for introducing excess moisture into the cell through the addition of dust control water or by exposure to precipitation. For example, at the Rifle, Colorado, UMTRCA Title I Disposal Cell, DOE must pump and evaporate transient drainage water to prevent saturation of the embankment, and at the Durango, Colorado, UMTRCA Title I Disposal Cell, DOE had to manage a collection gallery, drain, and pond system to address transient drainage resulting from snow melt that occurred while the cell was constructed. DOE suggests these issues can be managed during construction of the cell by use of temporary sealants for dust control on surfaces that will be undisturbed for some time and by ensuring that uncapped portions of the cell drain freely into a storm water management system.

We believe DOE's continued involvement in the interagency work group which will review a design to incorporate NECR mine waste into the existing UMTRCA Title II disposal cells will result in the development of an appropriate design solution.

EPA Response: EPA agrees that the system should be designed and constructed to eliminate foreseeable maintenance problems, and EPA appreciates DOE involvement in the design planning to ensure design and construction techniques that will result in a remedy that will be protective and functional.

As DOE mentions above, construction techniques to minimize water use and construction sequencing to maximize evaporation during construction can be implemented to prevent excessive water from entering into the containment system. EPA will work with DOE during design and construction so that EPA can benefit from DOE's expertise.

EPA also believes that the design can include a liner without compromising the long-term integrity or pose significant maintenance issues. As DOE mentions above, construction techniques to minimize water use and construction sequencing to maximize evaporation during

construction can be implemented to prevent excessive water from entering into the containment system. EPA hopes that DOE will continue to provide its expertise during design and construction.

However, EPA believes it is unlikely that significant, if any, flux would pass through a well designed vegetative cover and cause a problem at the liner below the waste. The cover will be designed with the storage capacity for a reasonable maximum anticipated storm event and snowmelt. The design storm/snowmelt event for calculating storage capacity will be determined in design with DOE input, to satisfy DOE's concerns. In addition, the thickness of cover for storage capacity will also be compared to the caliche layer in the UNC vicinity to verify that only the rare event would result in percolation out of the cover. In the rare and unlikely event that the storage capacity of the vegetative cover is exceeded, the flux would be stored in the upper portion of the waste and transpired out after the event, especially in a the climate at UNC where the ratio between evapotranspiration and precipitation averages 6.5:1. There are multiple studies that show vegetative covers work well in climates similar to UNC Site and in fact have flux rates significantly below regulatory standards. Finally, there is a comparable system already at the UNC Site that has similar properties to a liner and has not experienced any maintenance problems – the current radon barrier.

3.3.3.5 Restricted Use of UNC Site: Page 33, first and second paragraphs; page 40, second and third paragraphs: DOE is concerned with EPA's discussion about restricted use of the UNC Site. EPA makes statement such as:

...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 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.

...the UNC site is expected to be transferred to DOE under a general license allowing no other permitted use of the UNC Site other long-term care of the disposal area. Unauthorized access will be prohibited except for Long-Term Surveillance and Maintenance Program maintenance personnel working under the DOE program...

EPA's statement that DOE will be responsible for LTS&M within the general license boundary of the UNC Site is correct. DOE supports EPA's suggestion to limit use of the site to long-term care, but only to the amount practicable. It may prove unrealistic to expect that DOE will completely restrict future use which allows no other permitted use other than long-term care of the disposal area and which prohibits unauthorized access. DOE does not have the ability to enforce such activities. Additionally, NRC is our regulator and oversees LTS&M activities at UMTRCA Title II sites where DOE is the general licensee.

DOE is continually challenged with preventing all access and grazing from occurring within the general license boundary at a number of UMTRCA Title I and Title II sites we currently

manage. For example, DOE performs LTS&M at the Shiprock, New Mexico UMTRCA Title I Site located on the Navajo Nation. DOE is permitted to access the land within the site boundary to perform LTS&M; however, we do not have the authority to enforce restrictions within the site boundary. Despite fences (physical controls) that border the site boundary, livestock and nearby residents still access the site. Similarly, DOE finds it difficult to prevent grazing within the LTS&M site boundary at the Bluewater UMTRCA Title II Site in New Mexico. Like the UNC Site, this site is in a relatively remote location. Although DOE has an agreement with a local resident to monitor and report grazing at the Bluewater Site, it still occurs. Without a full-time presence at DOE-managed UMTRCA Title I and Title II sites, it is unrealistic to expect that access (by people other than DOE personnel) and grazing can be restricted even where this use is prohibited.

Please also note it is DOE policy to encourage and support beneficial reuse at sites we manage. This is in accordance with DOE Order 430.1B which states, "Land use planning and stewardship responsibilities will be implemented consistent with the principles of ecosystem management and sustainable development." DOE Office of Legacy Management's (LM) effort to promote beneficial reuse is also in accordance with Goal 4 of the LM 2011-2020 Strategic Plan (see http://www.lm.doe.gov/LM_Program/Strategic_Plan.aspx). At several of our sites, beneficial reuse has shown to be protective and appropriate. However, DOE acknowledges EPA and stakeholder concerns exist with regard to any other reuse of the site other than long-term care. As such, LM could agree to make an exception to this policy, if necessary.
DOE encourages future discussions involving NRC, EPA, the Department and the community to discuss long-term care activities at the UNC Site. It is important the future role of each federal agency is determined through collaboration, and long-term care activities are agreed upon in cooperation with one another.
EPA Response: EPA acknowledges the challenges in long term oversight at remote facilities and the need to develop a plan for appropriate, reliable access restrictions. The ICs and access restrictions listed in Section 2.11 of this ROD are intended to accommodate reasonable reuse, but to also protect the disposal cells. These restrictions will protect against potential exposure to human health and the environment as well as against any potential for damage to the cap that could result in exposure or contaminant migration. EPA will work closely with DOE, the NRC and the community to establish appropriate Long-Term Surveillance and Maintenance activities and Institutional Controls that will provide long-term protection.

3.3.3.6 DOE Suggestions: Institutional Controls (ICs): Page 33, third paragraph; page 40, second column.

EPA indicates it will, "work closely with the NRC and DOE to identify the necessary and appropriate ICs…" DOE appreciates EPA's suggestion to have the three federal agencies work in cooperation with one another to establish ICs. ICs required for areas beyond the disposal site boundary need to be fully implemented and function properly before termination of the specific license occurs. DOE also recommends NRC, EPA and DOE work

cooperatively together with stakeholder agencies to determine defined site boundaries. Boundaries also need to be in place before license termination. DOE recognizes that there may be areas beyond the general license boundary that will be regulated solely by EPA under its CERCLA authority.

EPA Response: The language in the proposed plan acknowledges the limits of DOE LTS&M by stating that "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 the UNC Site under these circumstances." Under these circumstances, EPA would work with the property owner to develop and file the appropriate IC which would then be enforced by the governing body where it is established. During Operation and Maintenance activities and Five-Year reviews, the adequacy of the IC will be reviewed and revised as necessary to ensure long-term protection.

The EPA expects to work closely with DOE, NRC, and other stakeholders to establish appropriate Long-Term Surveillance and Maintenance activities and processes, as well as ICs, that will meet the objectives and responsibilities under both regulatory authorities the will provide long-term protection at the UNC Site.

3.3.3.7 Applicable or Relevant and Appropriate Requirements (ARARs):
Chemical-Specific ARARs, Page 45: DOE suggests that 40 CFR § 192(a)(5), which establishes a dose limit for uranium fuel cycle operations and effluent standards for uranium mines and mills, is an ARAR. This is consistent with NRC guidance that allows disposal of non-11e.(2) byproduct material.

DOE also suggests listing all of 40 CFR § 192.32(b) as an ARAR, including the radium in soil standards in 40 CFR § 192.32(b)(2). DOE submits that the radium in soil criteria at Section 192.32(b)(2) were likely used for reclamation of the former mill site, and the NECR radium in soil cleanup criterion may apply solely to areas affected by handling of the NECR mine waste. DOE notes that the longevity requirement in 40 CFR § 192.32(b)(1)(i) is listed as an action-specific ARAR.

Chemical-Specific ARARs, Page 46, first ARAR: DOE notes the citation of the Clean Air Act may imply that radon monitoring will be required during LTS&M. Under UMTRCA, radon control is a design standard addressed in the reclamation plan. It is believed NRC will evaluate the licensee's design of the radon barrier (NUREG 1620, Section 5). Prior to termination of the specific license, the licensee will demonstrate that radon control has been achieved by conducting radon flux measurements on top of the radon barrier. DOE submits that radon monitoring has not been a component of LTS&M under UMTRCA and believes that the regulation, as cited, does not require it. (Please also see comment #4.)
EPA Response: Section 192.32(a)(5) is not an applicable requirement. Section 192.32(a)(5)(i) is relevant and appropriate in that it applies 40 CFR Part 190 which includes standards for radiation doses received by members of the public in the general environment. Section

192.32(a)(5) (ii) is not a relevant or appropriate requirement because it would apply 40 CFR Part 440 which pertains to effluent limitations, and effluents are not part of this remedy.

Section 192.32(b) is not applicable. Section 192.32(b)(2) is not a relevant or appropriate requirement because it deals with soil cleanup and this remedy does not clean up soil. The soil will be cleaned up under the removal actions at the NECR Site. This remedy creates a permanent disposal site for those soils that are excavated and under the NECR Site removal actions. EPA has already identified, in the Proposed Plan, 192.32(b)(i) and 192.32(b)(ii) as ARARs.

Regarding the Clean Air Act and radon monitoring requirements, we note DOE's comment.

3.3.3.8 Acronyms: DOE suggests including, "LTS&M" on the list which is an acronym meaning "long-term surveillance and maintenance".
EPA Response: This acronym has been incorporated into this ROD.

3.3.3.9 Glossary: DOE suggests that EPA's definition "Department of Energy, Office of Legacy Management" be changed to:

Department of Energy, Office of Legacy Management – The Office of Legacy Management was created in 2003 to manage the long-term responsibilities of closed sites associated with the legacy of World War II and the Cold War. Long-term responsibilities include long-term surveillance and maintenance (LTS&M) as well as physical management of the site. Conditions sometimes permit compatible reuse of the site. Long-term responsibilities also include managing site records and electronic information, overseeing the pension and benefit programs for contractor personnel, and responding to stakeholder inquiries.

Additionally, DOE suggests adding the following definition:
Long-Term Surveillance and Maintenance (LTS&M) -The site-specific physical or engineering controls, institutions, information, and other mechanisms needed to ensure protection of people and. the environment at Legacy Management custodian sites where cleanup (e.g., landfill closures, remedial actions, removal actions, and facility stabilization) has occurred. The scope of LTS&M includes land-use controls, monitoring systems and information management, and requesting adequate funding to implement specific plans. The term "long-term stewardship" is often used synonymously with LTS&M. The duration of activities is defined in the Long-Term Surveillance Plan.
EPA Response: This clarification is reflected in this ROD.

3.3.3.10 There is no discussion of the best available science and technology in the proposed plan. Nor has the most recent information on public health from 2009 surveys within the affected communities been incorporated into EPA's Public Health Assessments.
EPA Response: Under NCP 40 CFR Part 300, EPA's remedial actions are generally required to meet ARARs, unless there is a waiver. In this ROD EPA has listed the ARARs that the Selected

Remedy must meet in Table 1. We are not aware of any ARARs that would require the remedy to meet "best available science and technology" as a standard; however, under the NCP EPA is required to utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. We address this requirement in Section 2.12.4 of the ROD. The documents regarding public health that you refer to, along with various other documents regarding risk to human health, are part of the administrative record which forms the basis for the decision memorialized in this ROD.

There are several investigations ongoing to address potential health effects of past and continuing exposures from uranium mining in the larger Navajo community. The DiNEH project, conducted by the UNM and SRIC, assesses water quality, health and uranium exposure in the Eastern Agency. Dine College is collaborating on investigating water quality of well water in the Shiprock Agency. The Navajo birth cohort study, conducted by University of New Mexico, SRIC, the Agency for Toxic Substances and Disease Registry, Navajo Nation Department of Health and the Navajo Area Indian Health Service, will look at birth outcomes and child development in several Navajo areas. The Partnership for Native American Cancer Prevention, Northern Arizona University, and the University of Arizona are investigating water quality and health effects in the Black Hills area by conducting animal studies on uranium in drinking water and looking at the effect on hormone levels. Finally, Christine Samuel, a Navajo Ph.D. candidate in the School of Nursing at UCLA, will be looking at uranium content in animal grazed and garden produce grown in contaminated soil or watered with contaminated water. The study will also assess both the tissue content and the possible transfer to people who consume the animals. The study is funded by National Institute of Health and is anticipated to start this fall. These studies are the initial steps in further determining the correlation between uranium exposure and health outcomes in people and looking for potential effects in the population.

The Navajo Area Indian Health Service also has a non-occupational health monitoring program and is holding health fairs around the Navajo Nation. Although this program is not a study, it can provide information about disease rates on the Navajo Nation compared to other communities.

3.3.3.11 Double-lined cells with leak detection systems for uranium mill tailings and separate analyses of combining mine waste with mill waste and contaminated equipment, along with more detailed studies of tailings settlement around buried debris in the borrow pits should have been included.

EPA Response: The Remedial Design stage of remedy implementation will include additional investigation and analyses as part of the design of the disposal cells at the UNC Site in order to ensure that they will be robust enough to prevent migration of contamination to the surrounding land, air, surface water, or ground water. The NECR waste is soil with elevated levels of radium, uranium and thorium. The type of waste does not decompose or generate leachate in the absence of infiltration; and it is the intent of the cap to minimize to the extent possible all infiltration. Therefore, a double-liner underneath for leak detection is not warranted. EPA, as well as the NMED, NNEPA, NRC and DOE will evaluate all technical

information at the Site and design a containment system remedy that best protects the environment and that meets the ARARs listed in Table 1.

3.3.3.12 A discussion of the EPA Region 6 Five-Year Plan for the Grants Mining District should be part of the template in any analysis of the proposed plan alternative(s). The ongoing need for comprehensive regional groundwater characterization in the GMD [Grants Mining District] and regional epidemiological studies make any discussion of groundwater and health impacts in the district premature and less credible.

EPA Response: The EPA Region 6 Five-Year plan does address regional ground water concerns; however these activities do not impact the Selected Remedy in this ROD. The local impact to ground water is a part of the ground water operable unit at the UNC Site. Health studies are being conducted as described in Section 3.3.1.24.

3.3.3.13 Other study flaws exist in the engineering design details and regulatory requirements for the proposed tailings cap which should be made available for public review and comment. Not only will an amendment to GE's NRC-issued radioactive materials license be required to mix mine wastes with mill tailings at the proposed site, a site-specific analysis and discussion of Applicable or Relevant and Appropriate Requirements (ARARs) should have been incorporated into the proposed plan as required by EPA regulations.

EPA Response: The entire technical basis for the decisions by EPA has been made available to the public as the administrative record file, which is now the administrative record for this ROD. The technical basis for the decisions which the EPA, the NRC and DOE will be making during the license amendment process regarding the site will also be made public by the NRC. EPA and the other regulatory agencies involved share the community's concerns that the design of the UNC disposal cells be robust enough to prevent any migration of contamination to the surrounding land, air, surface water, or ground water. Typically, detailed analysis of specific design issues is not performed as part of the Proposed Plan or ROD. Rather, the Remedial Design stage follows selection of an alternative. Due to the strong concerns about the above-referenced technical issues raised by the community, interest groups, and the Navajo Nation, EPA conducted additional research and modeling prior to alternative selection in the Non-Time Critical Action Memorandum for the NECR Mine Site. However, a detailed Remedial Design will be completed after this ROD is issued. This sequence of events (Remedial Design follows ROD) is consistent with the NCP.

As part of the development of the remedial alternatives presented in the proposed plan, ARARs were preliminarily identified. Table 1 at the end of the Proposed Plan identified the preliminary list of ARARs. This table identified both NRC requirements, which generally codify the requirements of UMTRCA, and State requirements. In addition, EPA is working closely with NRC and NMED to ensure their regulations are applied appropriately and that their concerns are addressed. The final list of UNC Site ARARs is included in this ROD for the UNC Superfund Site Surface Soil Operable Unit at Table 1.

3.3.3.14 A Remedial Investigation and Feasibility Study is needed to adequately characterize the UNC Superfund Site as suitable for permanent waste disposal. A simple

Removal Site Evaluation does not contain the requisite data and long-term maintenance analysis that will justify a radioactive materials license amendment or the adoption of appropriate and relevant requirements with community input.

EPA Response: The proposed plan relied on the technical analysis and data collection activities conducted for the NECR Site and reported in the Removal Site Evaluation Report dated October 2007. In addition, the proposed plan relied on information and technical assessments presented in the NECR Site EE/CA. Additional information was provided in the responsiveness summary and supporting documentation prepared by EPA as part of the Non-time-Critical Removal Action Memorandum for the Northeast Church Rock Mine Site dated September 29, 2011.

1. The proposed plan provided a significant discussion related to the evaluation and investigations that were conducted as part of the NECR RSE (RSE: 2007) and EE/CA (2009), and how these actions are consistent with and analogous with the RI/FS process.

    a. The purpose of the RI/FS is to assess site conditions, including an evaluation of health risks, and evaluate alternatives to the extent necessary to select a remedy. The NECR RSE and EE/CA address site characterization describing field investigations and studies conducted at the NECR Site. Because the mine waste characterized in the NECR RSE and EE/CA is the mine waste that will be brought to the UNC Site, it is appropriate to use the information gathered during the NECR investigation. The human health risk evaluation undertaken at the NECR Site as part of the RSE and EE/CA describes the potential 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. Because the mine waste evaluated in the NECR risk assessment is the mine waste that will be brought to the UNC Site, it is appropriate to use the information gathered during the NECR Human Health Risk Evaluation.

    b. 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. In the EE/CA, the short and long-term aspects of the criteria related to effectiveness, implementability, and cost were used to guide the development of the alternatives considered for the disposal of the NECR Site mine waste. In doing this, the remedial action screening criteria were effectively applied to all alternatives being considered. The disposal of the NECR mine waste at the UNC Site was among the alternatives evaluated.

    c. 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. After going through this

remedy development and selection process in the NECR Site EE/CA, 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 [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 a 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.

2. 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 prevent any migration of contamination to the surrounding land, air, surface water, or ground water. Many community comments and concerns were received over the extended 24-month discussion period related to the evaluations and alternatives presented in the EE/CA. During this time and in response to these comments, EPA performed additional data analyses.

a. 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 UMTRCA.

Sites with similar mine waste disposal, and locations where new licensed facilities potentially could be built (EPA, 2011a). Evaluations included reviews of the legal and administrative restrictions and procedures that would need to be completed for each of these potential disposal locations. Based on the review, the UNC Site was identified as the most appropriate disposal location.

i. Disposal at licensed facilities was determined to present excess risks and to be cost prohibitive due to the long distances that the mine waste would have to be hauled if these other facilities were used. All of these facilities were in excess of 430 miles.
ii. Disposal at facilities where similar mine waste is already disposed would require an NRC license amendment to accept the mine waste, and it would also require EPA's determination that the facilities were 'acceptable' under the Off-site Rule. To be identified as acceptable under the Off-Site Rule, a facility must be in compliance with environmental regulations including its disposal permit, and the facility cannot have any releases that are not under remediation or under control; moreover, there can be no releases (controlled or otherwise) from the receiving unit. The UNC Site was identified as

preferable to other indentified facilities because these other facilities had limited capacity to accept the mine waste, because some of these other facilities were releasing contamination, and because some of these facilities would require NRC license amendments to either accept the mine waste or reopen a closed disposal location to accept the mine waste.

iii. Disposal at new locations with the construction of a disposal cell would require that the new areas be investigated to determine their suitability as disposal locations. In addition, permits, either an NRC License or a Resource Conservation and Recovery Act Permit, or both, would be required. Implementation of this option would extend the cleanup process considerably due to additional planning, investigation and permitting requirements.

b. Various locations within the boundary of the UNC Site, other than the Tailings Disposal Area, were evaluated to determine if these other 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. 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. If mine waste were to be placed in this area, all of these wells would have to be removed and current ground water remediation would have to stop. This would also limit any future implementation of potential ground water cleanup remedies because the new disposal cell would be placed above the current ground water contamination area. The second location was identified as the mill facility area. This area was determined to be too small to accommodate the volume of mine waste that would need to be disposed.

c. 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.

i. At the request of EPA, engineers contracted by UNC/GE developed computer models that simulated potential settlement of the mine waste. The computer models were also designed to determine if water would be released from the tailings present in the Tailings Disposal Area because of the added weight and pressure that would be added as a result of disposing of the NECR mine waste on top of these tailings (Dwyer, 2011). The models that were developed are based on site documented data and literature values which were evaluated over a variety of scenarios. Based on these scenarios, the additional disposal of NECR mine waste would

result in minimal compaction and would not result is the release of excess water from the tailings located within the disposal cells. (See response to Section 3.3.2.6).

ii. EPA also reviewed the Mill Decommission Report (UNC, 1993) and the Borrow Pit No. 2 Final Reclamation Report (Smith, 1996b). These historic reports describe the manner in which tailings and debris (*e.g.,* concrete, steel, and wood) was disposed 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. This stability is evident in the fact that there has been minimal settlement 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 a negligible impact 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 it will promote material stability and reduces the potential for future subsidence and irregular settlement.

iii. 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 based on the conclusions from these additional analyses and reviews.

d. EPA reviewed documents related to the historic releases of tailings liquids from the Tailings Disposal Cells into the ground water.

i. With the cessation of mine dewatering, ground water recharge from this surface later source through Pipeline Arroyo no longer occurs (except during precipitation events). Water levels in all three aquifers under the UNC Site 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. 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 Mine Site can be stored in the cells at the Tailings Disposal Area without direct contact with the ground water. 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).

ii. In 2004, the UNC Site was investigated to determine whether the tailings continued to release contaminated water from the North and Central disposal cells into the Zone 3 aquifer. Locations where tailings

contaminated water could possibly be released were identified and monitored. Since construction, water levels have been measured at these locations; however, too little water is present within these monitoring locations for sampling. This continues to be the case and indicates that an ongoing source of tailings contaminated water is not occurring.

iii. Disposal of the NECR Mine Site mine waste at the UNC Site Tailings Disposal Area is not expected to interfere with or affect the ongoing ground water remediation efforts regarding tailings or ground water at the UNC Site based on the conclusions from these additional analyses and reviews.

e. All of the facts described above in this response were described in the Proposed Plan, which was made available to the community for its review during an extensive public comment period. In addition, all the documents that form the basis for EPA's decision were made available to the community in the administrative record file. The availability of the administrative record file and the Proposed Plan was announced in a newspaper of general circulation, and mailers announcing this availability and summarizing the Proposed Plan were sent to all community members on the UNC Site and NECR Site email lists.

3.3.3.15 The commenters stated that they "fully support the recommendation of the Red Water Pond Road Community Association and TASC program to include consideration of at least 2 other alternative disposal sites based on NRC's "prime option" of below-grade disposal in engineered containment cells for ease of long-term maintenance and surveillance, with the primary goal of protecting the public health and environment. Cost considerations should be secondary to implementing the "protectiveness'" criterion of both the EPA and the Nuclear Regulatory Commission."

EPA Response: Please refer to Section main text 2.3.1.3 and Section 3.3.3.14.

3.3.3.16 Lack of engineering details and design of the mine waste cell on the tailings pile contributes to lack of community acceptance of the Proposed Plan and Technical basis for the Proposed Plan is too limited to demonstrate compliance with EPA's standard for longevity of control of the uranium mill tailings in the UNCSS.

EPA Response: EPA and the other regulatory agencies involved in the NECR cleanup share the community's concerns. EPA intends to ensure that the NECR disposal cells be robust enough to prevent any migration of contamination to the surrounding land, air, surface water, or ground water. Additional detailed analyses of specific design issues will be performed during the Remedial Design stage, which is the next step after the issuance of this ROD. This sequence of events, Remedial Design following ROD, is consistent with the NCP. The ARAR standard for longevity of control for uranium mill tailings is 40 CFR § 192.02 *which states: "Control of residual radioactive materials and their listed constituents shall be designed to* (a) Be effective for up to one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years, and, (b) Provide reasonable assurance that releases of radon-222 from residual radioactive material to the atmosphere will not: (1) Exceed an average release rate of 20

picocuries per square meter per second, or (2) 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." Section 192.02 is listed as an ARAR that the remedy must meet, in Table 1 of this ROD.

3.3.3.17 Recent investigations of the limitations of earthen covers on uranium mill tailings piles are relevant for evaluating the long-term effectiveness of the Proposed Plan.

EPA Response: Significant advancements in cover design have occurred since the design of the UNC mill tailings cells. Bringing NECR Site waste to the UNC Site Tailings Disposal Area provides the opportunity to improve upon the existing cover. During the design phase, EPA will evaluate new technologies such as evapotranspiration covers, to improve water management in an effort to ensure that no precipitation enters the NECR waste or UNC mill tailings. The NRC will have the approval authority on the proposed design for Alternative 2 because it is the licensing authority for the UNC Site. However, to ensure protectiveness and to address this design concern of the community, this ROD provides that the NECR waste will be placed on top of a low permeability layer (liner) within the disposal cell at the UNC Site Tailings Disposal Area. This liner will, along with the cover placed over the disposed NECR Site waste, will prevent water form intruding into the more radioactive waste that is already disposed in the Tailings Disposal Area at the UNC Site.

3.3.3.18 Proposed Plan does not adequately characterize the UNC Superfund Site for permanent waste disposal as would a Remedial Investigation/Feasibility Study.

EPA Response: See Response to Part II.32 above.

3.3.3.19 Proposed Plan should include additional alternatives for public review and comment.

EPA Response: In 2009, EPA released the NECR EE/CA (2009, EPA) that contained five alternative remedies for the waste at the NECR Mine Site including the preferred option of co-disposing at the UNC Site. During the public comment period, at the request of the community, EPA performed additional evaluations on eleven additional 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). Evaluations included reviews of the legal and administrative restrictions and procedures that would need to be completed for each of these potential disposal locations. Based on the review, the UNC Site was identified as the most appropriate disposal location. EPA received and considered comments on those additional alternatives at that time. Since the UNC Site is on the NPL, and since there was no EPA ROD for the UNC Site Tailings Disposal Area, a ROD was required before the NECR waste could be accepted at the UNC Site. As a result, the UNC Superfund Site Proposed Plan and this ROD were issued so that EPA could apply the NCP rules to determine whether it is appropriate to accept the NECR Site waste at the UNC Site.

3.3.3.20 Implications of federal cost-sharing to clean up the Northeast Church Rock Mine: Community members have asked if the fact that the government shares in the cost of cleanup influenced EPA Region 9's decision to adopt a less costly remedy and Region 6's decision not to analyze more technically rigorous and more expensive on-tailings disposal scenarios, such as construction of and disposal in engineered/lined cells.

EPA Response: Under the NCP, 40 CFR Part 300, EPA is required to consider cost when it selects a remedy. Please note, however, that alternatives do not make it to the cost evaluation stage unless they first meet the threshold criteria which are "overall protection of human health and the environment" and "compliance with ARARs." For a more complete explanation of the NCP remedy selection process and the nine criteria that EPA uses, please see Section 2.11, above.

For alternatives that are found to provide overall protection of human health and the environment, and that are found to meet ARARs (or qualify for a ARARs waiver—not pertinent here), cost is one of the evaluation criteria that is applied. Under the NCP, a response action is cost-effective when the response action's costs are proportional to its overall effectiveness (*see* 40 CFR §300.430(f)(l)(ii)(D)). EPA uses the term "proportional" because it intends that in determining whether a remedy is cost-effective, the decision-maker should both compare the cost to effectiveness of each alternative individually and compare the cost and effectiveness of alternatives in relation to one another. In analyzing an individual alternative, the EPA decision-maker should compare, using his or her best professional judgment, the relative magnitude of cost to effectiveness of that alternative. In comparing alternatives to one another, the decision-maker should examine incremental cost differences in relation to incremental differences in effectiveness. For example, if the difference in effectiveness is small but the difference in cost is very large, a proportional relationship between the alternatives does not exist. The more expensive remedy may not be cost-effective. EPA does not intend, however, that a strict mathematical proportionality be applied because generally there is no known or given cost-effective alternative to be used as a baseline. EPA believes, however, that it is useful for the decision-maker to analyze among alternatives, looking at incremental cost differences.

At the NECR Site, costs for the removal action alternatives considered were not comparable since disposal at a licensed commercial disposal facility would have increased cost by a factor of almost seven over the other alternatives that did not use a licensed commercial disposal facility. For example, Alternative 2, which would have used a commercial facility, was estimated to cost $293,600,000, in comparison to Alternative 5A, the selected alternative, which was estimated to cost $44,300,000. However, the environmental and public health benefits for the two alternatives were comparable. Alternatives 3 and 4 left the waste on Tribal Land, which was not acceptable to the Navajo Nation. On balance, EPA selected the least expensive alternative that was protective, met all requirements in the NCP, and removed waste from Tribal Lands. In the September 29, 2011, NECR Site Non-Time Critical Removal Action Memorandum, EPA documented its selection of Alternative 5A, which calls for NECR Site mine waste disposal at the UNC Site and the removal of high-concentration mine waste to an off-site

Class I hazardous waste disposal facility. Alternative 5A is essentially the remedy that was also selected in this ROD.

3.3.3.21 The Proposed Plan would benefit from summarizing recent public health studies to determine if the Preferred Alternative meets the "protectiveness" criterion of EPA regulations.

EPA Response: There are several ongoing investigations. The purpose of these investigations is to address potential health effects of past exposure and continuing exposure from uranium mining in the larger Navajo community. The Diné Network for Environmental Health (DiNEH) project, conducted by the University of New Mexico (UNM) and SRIC, assesses water quality, health and uranium exposure in the Eastern Agency. Dine College is collaborating in an investigation of water quality in well water at the Shiprock Agency. The Navajo birth cohort study conducted by the University of New Mexico, SRIC, the Agency for Toxic Substances and Disease Registry, the Navajo Nation Department of Health and the Navajo Area Indian Health Service, will look at birth outcomes and child development in several Navajo areas. The Partnership for Native American Cancer Prevention, Northern Arizona University, and the University of Arizona are investigating water quality and health effects in the Cameron and Leupp areas by conducting animal studies on uranium in drinking water, and by looking at the effect on hormone levels. Finally, Christine Samuel, a Navajo who is working on her doctorate in the School of Nursing at UCLA, will be looking at uranium content in animals that have grazed in contaminated soil or that have been given contaminated water to drink. Ms. Samuel will also be looking at the garden produce grown with contaminated soil and water. Ms. Samuel's study will also assess contaminants in animal tissue and the possible transfer of contamination to people who consume this meat. Ms. Samuel's study is funded by National Institute of Health. Christine Samuel has finished her sample collection and is now analyzing the results for the sheep and plant materials she collected. All of these studies are the initial steps in understanding the relationship of uranium exposures to health in the population

The Navajo Area Indian Health Service also has a non-occupational health monitoring program and is holding health fairs around the Navajo Nation. Although this program is not a study, it can provide information about disease rates on the Navajo Nation compared to other communities.

3.3.3.22 Editorial changes in the Proposed Plan would increase public confidence.

EPA Response: Thank you for the comment.

3.3.3.23 Regulatory Role: Page 1, column 1, paragraph 1, "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 the support agency for the site activities."

Page 6, column 2, paragraph 1, "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)…The lead and support agencies may also, as appropriate, identify other pertinent advisories,…"

Please clarify the highlighted section of the aforementioned statements by describing New Mexico's Environmental Department (NMED) role as a support agency and their jurisdictional responsibility for activities at the UNC Site. Perhaps it would be helpful to distinguish the various roles of each regulatory entity for both the NECR Mine and the UNC Sites.
EPA Response: The relative roles and responsibilities of the agencies are clarified in the Section 2.2 of this ROD.

3.3.3.24 Page 1, column 1, paragraph 1, "The 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….."

The aforementioned statement requires clarification. Based on the NRC's understanding, the Surface Soil Operable Unit Proposed Plan considers only the final disposition of the NECR mine waste which is independent of final soil reclamation activities and groundwater corrective measures at the UNC Site.
EPA Response: This clarification is reflected in this ROD.

3.3.3.25 Page 1, column 2, paragraph 1; Page 2, column 1, paragraph 1 , "…The U.S. Nuclear Regulatory Commission (NRC) agrees to amend United Nuclear Corporation's license to allow this disposal"

The aforementioned statement is inaccurate and misleading. The mechanism to authorize the disposal of non-11e.(2) byproduct materials (e.g., mine waste) is an amendment to the UNC Church Rock Mill source materials license that was issued by the NRC under Title 10 of the Code of Federal Regulations (CFR) Part 40. UNC, the licensee, will need to submit a request to the NRC to amend its Church Rock Mill source materials license SUA-1475 to allow for the disposal of mine waste within the footprint of the existing tailings cells. This license amendment package, supplemented by the final design for the tailings cover, financial surety, and pertinent environmental reports, will be reviewed by the NRC staff. The public will then have opportunities to comment on the UNC amendment request. The totality of this information will be considered by the NRC prior to any final decision on the licensee's license amendment request.

In accordance with "NRC Regulatory Issue Summary 2000-23 Recent Changes to Uranium Recovery Policy," Attachment 1, "Interim Guidance on Disposal of Non-Atomic Energy Act of 1954, Section 11 e. (2) Byproduct Material in Tailings Impoundments," (Agencywide Documents Access and Management System (ADAMS) Accession No. ML 003773008), the disposal of non-11e.(2) material in the tailings impoundments is subject to specific

considerations. Therefore, in reviewing a licensee request for the disposal of waste that has radiological characteristics comparable to 11e.(2) byproduct material, it is incumbent upon the licensee to: (1) provide documentation showing necessary approvals of other affected regulators (e.g., US EPA, Navajo Nation EPA, State, etc.) for material containing listed hazardous wastes or any other material regulated by another Federal agency or State because of environmental or safety considerations; (2) demonstrate that there will be no significant environmental impact from disposing of this material; (3) provide documentation showing approval by the Regional Low-Level Waste Compact in whose jurisdiction the waste originates as well as approval by the Compact in whose jurisdiction the disposal site is located, for material which would otherwise fall under Compact jurisdiction; and (4) demonstrate that the proposed disposal will not compromise the reclamation of the tailings impoundments by demonstrating compliance with the reclamation and closure criteria of Appendix A of 10 CFR Part 40.

Since mill tailings impoundments are already regulated under 10 CFR Part 40, licensing the receipt and disposal of non-11e.(2) byproduct material (e.g., mine waste) therein will also be done under 10 CFR Part 40. As part of the process, the U.S. Department of Energy (DOE) and the State of New Mexico will need to be informed of the NRC findings and proposed action, with a request to concur within 120 days. A concurrence and commitment from either DOE or the State to take title to the tailings impoundment after closure must be received before granting the UNC license amendment request. Therefore, it is incorrect to simply state that the NRC "agrees to amend" a licensee's license. A more accurate wording would be, that the NRC "agrees to consider the merits of any license amendment request that UNC submits to amend its license to allow this disposal" and a description of the NRC approval process as described above should be included.

EPA Response: This clarification by is reflected in this ROD.

Page 3, column1, paragraph 2; page 20, column 2, paragraph 1, "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 tailings in the covered pits and landfills that make up the UNC Site Tailings Disposal Area ... "

Suggest appropriately describing the Tailings Disposal Area as comprising three covered tailing cells and two covered burrow pits.

EPA Response: This clarification is reflected in this ROD.

3.3.3.26 Preferred Alternative: Page 67, Glossary of Terms, "Preferred Alternative - Proposed remedial alternative that meets NCP evaluation criteria and is supported by regulatory agencies".

In the Glossary of Terms, the NRC does not concur with the definition of "Preferred Alternative" because it states that a Preferred Alternative is that proposed remedial alternative that is "supported by regulatory agencies." This implies that the Preferred

Alternative is the selected option of the NRC which is a mischaracterization of the NRC license amendment process, which would have to be undertaken if the Preferred Alternative is selected by the EPA for implementation by UNC. The NRC does not support any alternative; rather, as described above, the role of the NRC is to evaluate any license amendment that may be submitted to it by UNC. It is the NRC's understanding that the Preferred Alternative in this Proposed Plan was selected by EPA Region 9 in the Non-Time Critical Removal Action Memorandum executed on September 29, 2011 (ADAMS Accession No. ML 12003A095) and is supported by EPA Region 6 as discussed in the Proposed Plan. Therefore, the description of Preferred Alternative in the Glossary of Terms should state that the Preferred Alternative is identified by EPA, the lead agency, in conjunction with NMED, the support agency, and not that it is "supported by regulatory agencies" in general. This would be consistent with 40 CFR 300.430(f)(1)(ii).

EPA Response: This clarification is reflected in this ROD.

3.3.3.27 Permit: Page 3, column 2, paragraph 2; page 4, column 1, paragraph 1, "By combining the 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)."

The presumption is made that the use of the term "permit" excludes the NRC source materials license for the UNC Church Rock Mill site. This should be made explicit with a concluding clause such as, "with the exception of the associated NRC source materials license, which must be amended by UNC as discussed below."

EPA Response: This clarification is reflected in this ROD.

3.3.3.28 Previous Actions: Page 9, column 1, paragraph 1, "In keeping with the MOU, EPA has consulted with the NRC prior to issuing the Surface Soil OU Proposed Plan."

Suggest deleting the highlighted phrase and replacing with "provided the NRC an opportunity to comment."

Page 9, column 2, paragraph 2, "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 .... "

This introductory statement on NRC's licensing action that immediately precedes the discussion on the 1979 dam failure suggests that the event occurred at the UNC Church Rock Mill site while it was licensed by the NRC, which is incorrect. Recommend including a timeline for NMED's licensing authority of the UNC Church Rock Mill site. Please note that on April 19, 1974, New Mexico became an Agreement State with licensing authority granted by the U.S. Atomic Energy Commission.

Page 10, column 1, paragraph 2, "The NRC certified these closure actions in 1989 and released the licensed areas of the mine for unrestricted use."

Please correct the aforementioned statement which may have originated from information presented in the document entitled, "Northeast Church Rock Mine Closeout Plan," January 2004 (ADAMS Accession No. ML051510241). The specific facts were that in October 1989, after the NRC staff reviewed the UNC document entitled, "Tailings Sand Backfill Cleanup Verification Report, Northeast Church Rock Mine, United Nuclear Corporation," April 27, 1989 (ADAMS Accession ML080040301), the NRC determined that UNC had adequately removed remaining byproduct material from the NECR Mine site and that no further action was required by UNC pursuant to Condition No. 33 of its Church Rock Mill source materials license (ADAMS Accession No. ML073650348).

After assuming licensing authority for the Church Rock Mill site in June 1986, the NRC was aware that byproduct material from the site was historically transferred to the NECR Mine site to stabilize mine stapes. Given that there was NRC licensable material and associated equipment at the NECR Mine site resulting from historic milling activities, the NRC required that off-site wind-blown material be addressed as a condition of the source materials license for the UNC Church Rock Mill site. Thus, the NRC became directly involved in the NECR Mine closure activity, providing technical input on aspects related to radiologic surficial contamination since 11 e.(2) byproduct material from the UNC Church Rock Mill operation was formerly staged at the NECR Mine site. However, the NRC never had jurisdictional responsibility for the NECR Mine site nor regulatory authority to require mine close-out activities. Therefore, there was never any area of the mine that was licensed by the NRC or subsequently released for unrestricted use by the NRC.

EPA Response: These clarifications are reflected in this ROD.

3.3.3.29 Conclusions on the UNC Site: Page 13, column 1, paragraph 2, and column 2, paragraph 1, "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 tailings already disposed in the Tailings Disposal Area .... 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 cell .... "

Page 15, column 1, paragraph 3, and column 2, paragraph 2, '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 groundwater .... 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."

Page 22, column 1, paragraph 2; Page 28, column 2, paragraph 2, "Mine waste disposal within the Tailings Disposal Area is not expected to interfere or affect the current groundwater remediation efforts."

Page 24, column 1, paragraph 3, "Based on conservative evaluations of the tailings profiles and model sensitivity analyses ... 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."

Page 28, column 1, paragraph 2; Page 28, column 2, paragraph 1, "Based on conservative evaluations of the tailings profiles and model sensitivity analyses… 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."

Page 35, column 2, paragraph 1, "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 ... 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 ... 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 .... "

In several sections of the Proposed Plan, there are extensive discussions of the conceptual models and preliminary designs that have been presented to date. The NRC considers the conclusions based on these discussions to be premature. Given the numerous assumptions inherent in the conceptual models and preliminary designs, further field investigations and empirical data will need to be collected by UNC to verify certain of these assumptions and the field conditions before a detailed analysis can be conducted. Moreover, since modeling exercises and conceptual designs have not yet been technically vetted by the NRC staff, the NRC refrains from offering a position. The NRC will make any such decision on the effect of the NECR mine waste on the existing tailings disposal cells as part of its review of the related UNC license amendment request.

The NRC will continue to peer review work related to the NECR Mine site, similar to the detailed evaluation recently completed by the NRC staff on the document entitled "Consolidation and Water Storage Capacity Related to Placement of Mine Material on the Existing UNC Mill Site Tailings Impoundments Report," May 2011 (ADAMS Accession No. ML 12222A281).

The NRC fully supports ongoing interagency technical discussions among EPA, NNEPA, NMED, NRC, and DOE in bringing timely resolution to outstanding technical issues and to ensure that the collocation of the NECR mine waste for disposal at the UNC Church Rock Mill site satisfies pertinent regulatory requirements while ensuring the safety and protection of human health and the environment.

EPA Response: EPA acknowledges that NRC will evaluate the completed design when the license application is submitted, and EPA appreciates NRC's willingness to assist EPA and UNC/GE during the design phase. EPA recognizes that additional data and analysis will be required to ensure that the final remedial design is protective. (See response to Section 3.3.2.6).

3.3.3.30 Waste Volume: Page 1, column 2, paragraph 2 "…EPA decided to permanently dispose of approximately 1,000,000 cubic yards of contaminated mine waste from the NECR Mine Site..."

Page 17, column 2, paragraph 2, "…there is an estimated 871,000 cubic yards of mine waste at the NECR Mine Site that has to be addressed…"

The volume of mine waste proposed for disposal is inconsistently stated throughout the document. Suggest utilizing the brief synopsis on page 30, column 1, paragraph 2, to introduce and outline how the 1 million cubic yards of low level threat mine waste was estimated. In addition, recommend including a statement that the disposal option is limited only to mine waste from the NECR Mine site.

EPA Response: These comments have been incorporated into the remedy selected in this ROD. One million cubic yards is used in this ROD to provide a conservative estimate at this time. Additional information will also be collected from the NECR Site during the Remedial Design to better refine the volume estimate.

3.3.3.31 Scope and Role of the Response Action: Page 1, column 1, paragraph 1, "This Surface Soil OU Proposed Plan deals only with a limited aspect of the surface soil remedy at the UNC Site…."

Page 21, column 1, paragraph 2, "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."

Page 21, column 2, paragraph 2, "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 NPL under CERCLA. "

There is no nexus between the proposed remedial action under the Surface Soil Operable Unit Proposed Plan and final soil reclamation activities and groundwater remedial actions at the UNC Church Rock Mill site. The Surface Soil Operable Unit Proposed Plan addresses only the

proposed disposal of low level threat mine waste from the NECR site at the UNC Church Rock Mill site.

The EPA's selection and implementation for collocating NECR mine waste at the UNC Church Rock Mill site is an independent action from final decommissioning activities at the UNC Church Rock Mill site. As described elsewhere in the document, the NRC understands that the EPA's ideal sequence of events is that (1) if the Preferred Alternative in the Surface Soil Operable Unit Proposal Plan is selected and (2) if the associated UNC license amendment request to permit the disposal of mine waste is approved by the NRC, then these activities will occur prior to UNC conducting final reclamation at the UNC Church Rock Mill site pursuant to license termination. However, please note that the Proposed Plan is not a supplement to final reclamation actions at the UNC Church Rock Mill site. This is because surface soil and groundwater remedial actions at the UNC Church Rock Mill site are not components of the Proposed Plan.

EPA Response: These clarifications are reflected in this ROD.

3.3.3.32 Page 32, Figure 6, "Possible placement of mine waste at United Nuclear Corporation Mill Site."

It may not be appropriate at this juncture, to speculate on the final design details of the cover, stormwater diversion channels, and other erosion protection features. Further detailed analyses of various design options and erosion protection requirements are needed. The NRC staff is committed to working with the EPA and other stakeholders to discuss these technical issues and their possible resolution.

Page 31, column 1, "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 compacted to meet a hydraulic conductivity of no more than 1 x 10^{-7} centimeters per second (cm/s)]."

Regarding the use of a liner, based on several inter-agency discussions, it is the NRC's staff understanding that the mine waste would be incorporated such that it is indistinguishable from the existing licensed by-product material already within tailing disposal cells at the UNC Church Rock Mill. Both the DOE and NRC previously expressed reservations for the inclusion of a liner within the existing tailings disposal cells [Adams Accession Nos. ML090500024; ML092100623].

EPA Response: Please see EPA's response to comment 3.3.3.4.

3.3.3.33 Future use/Institutional Controls/Five Year Reviews/Long-Term Surveillance and Maintenance: Page 30, column 2, paragraph 2, "Once all required actions are completed per the terms of the NRC license, it is expected that there would be transfer of the UNC Site to the DOE's Long-Term Surveillance and Maintenance Program…"

Page 32, column 1, paragraph 2, " 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"

Page 33, column 1, paragraph 1, "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…"

Page 33, column 1, paragraph 2; Page 40, column 2, paragraph 1, "The license is an effective institutional control (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 .... "

Page 39, column 1, paragraph 2, "UNC Site restrictions will prohibit the residential, industrial or grazing use and will restrict unauthorized access";

Page 40, column 1, paragraph 2, " Alternative 2 supports the future reuse options…the UNC Site would be maintained and managed under the DOE to provide for continued containment and protectiveness.";

Page 40, column 2, paragraph 2, "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."

Page 41, column 1, paragraph 1, "The Preferred Alternative will require long-term monitoring, Site inspections, and O&M to ensure the Tailings…."
Given the challenges of administrative, engineered and institutional controls, the NRC recognizes that further interagency discussions are required with the EPA, the Navajo Nation, NMED, and other stakeholders to resolve issues related to long-term care of the UNC Church Rock Mill site, to ensure the continued protection and safety of public health and the environment. The NRC will work together with the DOE and the EPA to develop an interagency policy on closure and post-closure issues that will meet the statutory and regulatory missions and requirements of all agencies involved in the NRC-licensed UNC Church Rock Mill site being remediated under UMTRCA since it is also on the National Priority List and being remediated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA).
EPA Response: We appreciate NRC's assistance in ensuring the protection and safety of public health and the environment in connection with the Selected Remedy.

3.3.3.34 Page 45 - 64, Table 1, Preliminary List of Applicable or Relevant and Appropriate Requirements: Please include the relevant NRC regulations enacting UMTRCA Title II - 10 CFR Part 40, Appendix A, Criteria 1, 2, 3, 5, 6, 6A, 9, 10, 11 and 12.

EPA Response: EPA has reviewed the proposed ARARs and incorporated them in Table 1.

REFERENCES

Agency for Toxic Substances and Disease Registry, 2011. Radium, Division of Toxicology and Environmental Medicine ToxFAQs™. July 1999.

Agency for Toxic Substances and Disease Registry, 2011. Radon, Division of Toxicology and Environmental Medicine ToxFAQs™. September 2008.

Begay, Jeremy and Shane V. Wero, 2011, A Cultural Resources Inventory of 27.5 Acres of Land for Reclamation for MWH Global in Churchrock Mine, McKinley County, New Mexico. Report No. DCRM-2011-17 (NNHPD-11-340), Dinetahdoo Cultural Resources Management, Farmington, NM

Canonie Environmental Services Corporation, 1991. Tailings Reclamation Plan as approved by NRC March 1, 1991 License No. SUA-1475 Volumes 1 through 3, prepared for United Nuclear Corporation, Church Rock Facility, Gallup, New Mexico. August 30, 1991.

Canonie Environmental Services Corporation, 1995. As-Built Report, Central Cell Final Reclamation, prepared for United Nuclear Corporation, Church Rock Facility, Gallup, New Mexico. June 20, 1995.

Chester Engineers, 2011. Technical Memorandum Summarizing Two Reports on Zone 3 Tailings Seepage Sourcing and Groundwater recharge, with information Update. August 18, 2011.

Chester Engineers, 2011a. Site-Wide Supplemental Feasibility Study, Parts I and II, Church Rock Site, Church Rock, New Mexico. April 2011

Chester Engineers, 2012. Email correspondence: Zone 1 Question. April 23, 2012.

Chester Engineers, 2012a, Updated Baseline Human Health Risk Assessment – Final, United Nuclear Corporation, Church Rock Site, Church Rock, New Mexico. August 2012.

Chester Engineers, 2013, Annual Review Report – 2012, Groundwater Corrective Action, Church Rock Site, Church Rock, New Mexico, February 2012.

Dwyer, Stephen F., 2011. Evaluation of Consolidation And Water Storage Capacity Related To Placement Of Mine Material on the Existing UNC Mill Site Tailings Impoundment. May 2011.

King, L.J., 2007, Church Rock Uranium Monitoring Project, Presentation Materials for USEPA Community Involvement Conference. June.

MACTEC Engineering and Consulting, Inc., 2006, Phase I Full Scale Hydraulic Fracturing Final Report, United Nuclear Church Rock Facility, New Mexico, June 2011.

New Mexico Environment Department, 2012. Final Review of the Surface Soil Operable Unit Proposed Plan for United Nuclear Corporation Superfund Site. July 9, 2012.

MWH, 2007. Final Removal Site Evaluation Report, Northeast Church Rock Mine Site, prepared for United Nuclear Corporation. October 1, 2007.

MWH, 2008. Supplemental Removal Site Evaluation data tables, Northeast Church Rock Mine Site, prepared for United Nuclear Corporation. February 2008.

Smith Environmental Technologies Corporation, 1996a. As-Built Report, South Cell Final Reclamation, prepared for United Nuclear Corporation, Church Rock Facility, Gallup, New Mexico. April 22, 1996.

Smith Environmental Technologies Corporation, 1996b. As-Built Report, Borrow Pit No. 2 Final Reclamation, prepared for United Nuclear Corporation, Church Rock Facility, Gallup, New Mexico. August 28, 1996.

Smith Environmental Technologies Corporation, 1997. As-Built Report, 1996 Final Reclamation Construction, prepared for United Nuclear Corporation, Church Rock Facility, Gallup, New Mexico. March 28, 1997.

United Nuclear Corporation, 1975, Applicant's Environmental Report on the Church Rock, New Mexico Uranium Mill and Mine, Vol. 1, UNC-ER-1. 1975.

United Nuclear Corporation, 1989. Windblown Tailings Cleanup Verification Report, license No. SUA-1475. December 21, 1989.

United Nuclear Corporation, 1990. Windblown Tailings Cleanup Verification Report, license No. SUA-1475. November 21, 1990.

United Nuclear Corporation, 1993. Mill Decommissioning report, license No. SUA-1475. April 1, 1993.

U.S. Environmental Protection Agency, 1988a. Remedial Investigation United Nuclear Corporation Church Rock Site, Volumes 1 and 2. August 1988.

U.S. Environmental Protection Agency, 1988b. Record of Decision Ground Water Operable Unit. September 30, 1988.

U.S. Environmental Protection Agency, 2008. Third Five-Year Review for the United nuclear Corporation Ground Water Operable Unit, Church Rock, McKinley County, New Mexico. September 17, 2008.

U.S. Environmental Protection Agency, 2009. Engineering Evaluation/Cost Analysis Northeast Church Rock Mine Site, Gallup, New Mexico. May 30, 2009.

U.S. Environmental Protection Agency, 2010. Estimate Waste Cell Configuration at UNC Office Area. November 1, 2010.

U.S. Environmental Protection Agency, 2011a. Northeast Church Rock – Post EE/CA Analysis of Alternatives, Alternative Off-Site Disposal Locations. September 27, 2011.

U.S. Environmental Protection Agency, 2011b. Action Memorandum: Request for a Non-Time-Critical Removal Action at the Northeast Church Rock Mine Site, McKinley County, New Mexico, Pinedale Chapter of the Navajo Nation. September 29, 2011.

U.S. Environmental Protection Agency and U.S. Nuclear Regulatory Commission, 1988. Memorandum of Understanding for Remedial action at the UNC-Church Rock Uranium Mill in McKinley County, New Mexico. Signed August 26, 1988, and published September 28, 1988, 53 Fed. Reg. 37887.

USFilter, 2004. Rationale and Filed Investigation Work Plan to Evaluate Recharge and Potential Cell Sourcing to the Zone 3 Plume, Church Rock Site, Gallup, New Mexico. January 19, 2004.

U.S. Nuclear Regulatory Commission, 1989. Cleanup of Tailings at the Northeast Church Rock Mine. Memorandum for Docket No. 40-8907 from NRC Region IV, Uranium Recovery

Field Office, Denver, Colorado. October 31, 1989.

U.S. Nuclear Regulatory Commission, 2000. NRC Regulatory Issue Summary 2000-23 Recent Changes to Uranium Recovery Policy. November 30, 2000.

ACRONYMS

AEA	Atomic Energy Act of 1954
AOC	Administrative Order on Consent
ARARs	Applicable or Relevant and Appropriate Requirements
AUMs	abandoned uranium mines
BHHRA	Baseline human health risk assessment
bgs	below ground surface
BIA	U.S. Bureau of Indian Affairs
BRAC	Base Realignment and Closure Act
BVDA	Bluewater Valley Downstream Alliance
Canonie	Canonie Environmental Services Corporation
CAP	Corrective Action Plan
CARD	Citizens for Alternatives to Radioactive Dumping
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental, Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
cm/s	centimeters per second
COCs	Contaminants of Concern
CRUMP	Church Rock Uranium Monitoring Project
DiNEH	Diné Network for Environmental Health
DOE	U.S. Department of Energy
DOJ	U.S. Department of Justice
EA	Environmental Assessment
EE/CA	Engineering Evaluation and/Cost Analysis
ECP	emergency contingency plan
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
EPAct	Energy Policy Act
Ft	feet
GE	General Electric Company
HRI	Hydro Resources Inc.
HUD	U.S Housing and Urban Development
his	Indian Health Service
ICs	Institutional Controls
IRA	Interim Removal Action
LTS&M	Long-Term Surveillance and Maintenance
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MASE	Multicultural Alliance for a Safe Environment
mg/kg	milligrams per kilogram
MOU	Memorandum of Understanding
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

NECR	Northeast Church Rock Mine
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NNDWR	Navajo Nation Department of Water Resources
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	Operation and Maintenance
OSWER	EPA Office of Solid Waste and Emergency Response
OU	operable unit
pCi/g	picocuries per gram
pCi/m2s	Picocuries per square meter per second
PRP	Potentially Responsible Party
PTW	Principal Threat Waste
Quivira	Kerr McGee Quivira Mines
Ra-226	Radium 226
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RECA	Radiation Exposure Compensation Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSE	Removal Site Evaluation
RWPRCA	Red Water Pond Road Community Association
SARA	Superfund Amendments and Reauthorization Act
SRIC	Southwest Research and Information Center
TASC	Technical Assistance Services for Communities
TSDF	Off-site Treatment, Storage and Disposal Facility
U.S.C.	United States Code
UAO	Unilateral Administrative Order
UMTRCA	Uranium Mill Tailings Radiation Control Act
UNC	United Nuclear Corporation
UNM	University of New Mexico
URA	Uniform Relocation Assistance and Real Property Acquisitions Act
USGS	United States Geological Survey

GLOSSARY OF TERMS

Administrative Record – The documents that form the basis for the selection of a response action (*see* 40 CFR § 300.800(a)).

Applicable or relevant and appropriate requirements (ARARs) – Applicable requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable.

Relevant and appropriate requirements means those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CER-CLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be relevant and appropriate.

Baseline Human Health Risk Assessment – The Baseline Human Health Risk Assessment estimates what human health risks the Site poses if no action were taken. It provides the basis for taking action at this Site and identifies the contaminants and exposure pathways that need to be addressed by the remedial action. The Baseline Human Health Risk Assessment evaluates the baseline potential risk that might be experienced by human receptors coming into contact with contaminants of concern.

Byproduct Material – The Atomic Energy Act, as revised in 1978 and in 2005 by the Energy Policy Act (EPAct), defines byproduct material in Section 11e.(1) as radioactive material (except special nuclear material) yielded in or made radioactive by exposure to the radiation incident to the process of producing or using special nuclear material.

The definition in Section 11e.(2) is the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content.

The definition in Section 11e.(3) is any discrete source of radium-226 that is produced, extracted, or converted after extraction, before, on, or after the date of enactment of the EPAct for use for a commercial, medical, or research activity; or any material that has been made radioactive by use of a particle accelerator and is produced, extracted, or converted after extraction, before, on, or after the date of enactment of the EPAct for use for a commercial, medical, or research activity.

The definition in Section 11e.(4) is any discrete source of naturally occurring radioactive material, other than source material, that the NRC, in consultation with the Administrator of

the Environmental Protection Agency (EPA), the Secretary of the Department of Energy (DOE), the Secretary of the Department of Homeland Security (DHS), and the head of any other appropriate Federal agency, determines would pose a threat similar to the threat posed by a discrete source of radium-226 to the public health and safety or the common defense and security; and is extracted or converted after extraction before, on, or after the date of enactment of the EPAct for use in a commercial, medical, or research activity.

Carcinogens

For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated using the following equation:

Risk = CDI x SF

where:

Risk = a unitless probability (e.g., 2 x 10-5) of an individual's developing cancer

CDI = chronic daily intake averaged over 70 years (mg/kg-day)

SF = slope factor, expressed as (mg/kg-day)-1.

An excess lifetime cancer risk of $1x10^{-6}$ indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an American individual developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is $1x10^{-4}$ to $1x10^{-6}$.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - CERCLA, commonly known as Superfund, was enacted by Congress on December 11, 1980. CERCLA:

- established prohibitions and requirements concerning closed and abandoned hazardous waste sites;
- provided for liability of persons responsible for releases of hazardous waste at these sites; and
- established a trust fund to provide for cleanup when no responsible party could be identified

The law authorizes two kinds of response actions:

- Short-term removals, where actions may be taken to address releases or threatened releases requiring prompt response.
- Long-term remedial response actions, that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on EPA's NPL.

CERCLA also provides for the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The NCP, codified at Title 40 of the Code of Federal Regulations, Part 300, provides the guidelines and procedures needed to respond to releases and threatened releases of hazardous substances, pollutants, or contaminants. The NCP also includes the NPL.
CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA) in 1986, and there have been other amendments. CERCLA is found at Title 42 of the U.S. Code beginning at Section 6901.

Contaminants of Concern – Those chemicals associated with the Site or Site activities that may present a risk to human health or the environment, and, in particular, those chemicals that are driving the need for action at the Site.

Department of Energy, Office of Legacy Management – The Office of Legacy Management was created in 2003 to manage the long-term responsibilities of closed sites associated with the legacy of World War II and the Cold War. Long-term responsibilities include long-term surveillance and maintenance (LTS&M) as well as physical management of the site. Conditions sometimes permit compatible reuse of the site. Long-term responsibilities also include managing site records and electronic information, overseeing the pension and benefit programs for contractor personnel, and responding to stakeholder inquiries.

Engineering Controls – Engineering controls include capping or other containment systems to prevent exposure to contaminants of concern.

Excess Lifetime Cancer Risk – For carcinogens, risks are generally expressed as the incremental probability of an individual's developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated using the following equation:

Risk = CDI x SF

where:

Risk = a unitless probability (*e.g.,* 2×10^{-5}) of an individual's developing cancer

CDI = chronic daily intake averaged over 70 years (mg/kg-day)

SF = slope factor, expressed as (mg/kg-day)-1.

An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an American individual developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally acceptable risk range for site-related exposures is 1×10^{-4} to 1×10^{-6}.

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.

Institutional Controls (ICs) – Institutional controls are non-engineered instruments, such as administrative and legal controls, that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. For instance, zoning restrictions prevent site land uses, like residential uses, that are not consistent with the level of cleanup.

Long-Term Surveillance and Maintenance (LTS&M) -The site-specific physical or engineering controls, institutions, information, and other mechanisms needed to ensure protection of people and. the environment at Legacy Management custodian sites where cleanup (e.g., landfill closures, remedial actions, removal actions, and facility stabilization) has occurred. The scope of LTS&M includes land-use controls, monitoring systems and information management, and requesting adequate funding to implement specific plans. The term "long-term stewardship" is often used synonymously with LTS&M. The duration of activities is defined in the Long-Term Surveillance Plan.

NRC License – Through the licensing process, the 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) - The National Oil and Hazardous Substances Pollution Contingency Plan, more commonly called the National Contingency Plan or NCP, is the federal government's blueprint for responding to both oil spills and hazardous substance releases. The National Contingency Plan is the result of our country's efforts to develop a national response capability and promote overall coordination among the hierarchy of responders and contingency plans. The NCP is codified at Title 40 of the Code of Federal Regulations, Part 300.

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. The NPL can be found at Title 40 of the Code of Federal Regulations, Part 300, Appendix B.

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 (1×10^{-12} Ci). Picocurie per gram is the measurement of radioactivity per gram of material.

Preferred Alternative –The alternative that is protective of human health and the environment, is ARAR-compliant and affords the best combination of attributes is identified as the preferred alternative in the proposed plan.

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 – Long-term response actions, that permanently and significantly reduce the dangers associated with releases or threats of releases of hazardous substances that are serious, but not immediately life threatening. These actions can be conducted only at sites listed on EPA's NPL.

Remedial Action Objectives (RAOs) – Remedial Action Objectives specify contaminants and media of concern (*e.g.,* soil, air, surface water, or ground water), potential exposure pathways, and remediation goals. Remediation goals establish acceptable exposure levels that are protective of human health and the environment and shall be developed by considering applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws, if available. If ARARs are not available, remediation goals are established using other criteria and other pertinent information as described in the National Oil and Hazardous Substances Pollution Contingency Plan.

Removal Action –Short-term actions taken to address releases or threatened releases requiring prompt 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.

Selected Remedy - In the final step in the remedy selection process, the lead agency shall reassess its initial determination, made in the Proposed Plan, that the preferred alternative provides the best balance of trade-offs, now factoring in any new information or points of view expressed by the State (or support agency) and community during the public comment period. The lead agency shall consider State (or support agency) and community comments regarding the lead agency's evaluation of alternatives with respect to the other criteria. These comments may prompt the lead agency to modify aspects of the preferred alternative or decide that another alternative provides a more appropriate balance. The lead agency, as specified in 40 CFR § 300.515(e), shall make the final remedy selection decision and document that decision in the ROD.

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

Operable Unit – The NCP, 40 CFR Section 300.5, defines an operable unit as a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposure. The cleanup of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the 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 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 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.

TABLE 1

Applicable or Relevant and Appropriate Requirements

Table 1: 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: 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.

Table 1: Applicable or Relevant and Appropriate Requirements.			
Chemical-Specific ARARs and "to be considered" (TBC) Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
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.
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.

Table 1: 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.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.
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.

Table 1: 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.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: 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.

Table 1: 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.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.
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: 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.

Table 1: 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(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.
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.

Table 1: Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Radioactive Material	FEDERAL **License Requirements for Land Disposal of Radioactive Waste** – Regulations at 10 CFR Part 40 Appendix A, Appendix A, Criteria 1, 2, 3, 5, 6, 6A, 9, 10, 11 and 12 § 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.
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.

Table 1: 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. § 20.9.4.9 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.
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: 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: 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: 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: 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: 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.

Table 1: 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** § 19.8.20.2018 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.
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.

Table 1: 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** § 19.8.20.2050 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.
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.

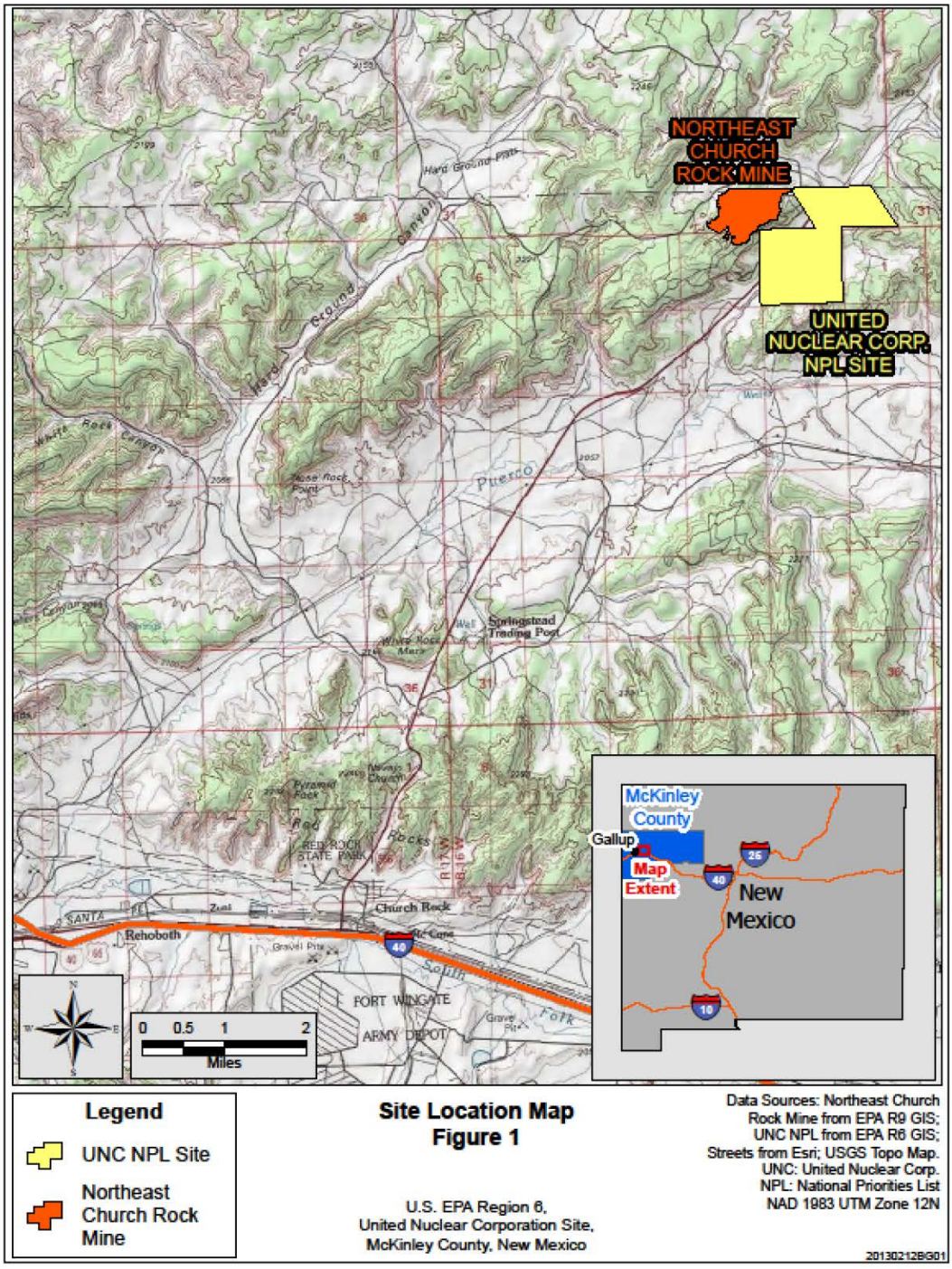
Table 1: Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2060 NMAC	Revegetation: General Requirements – Requires that all land effected by mining shall be revegetated to provide a diverse, effective and permanent vegetative cover of the same aspect 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.
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.

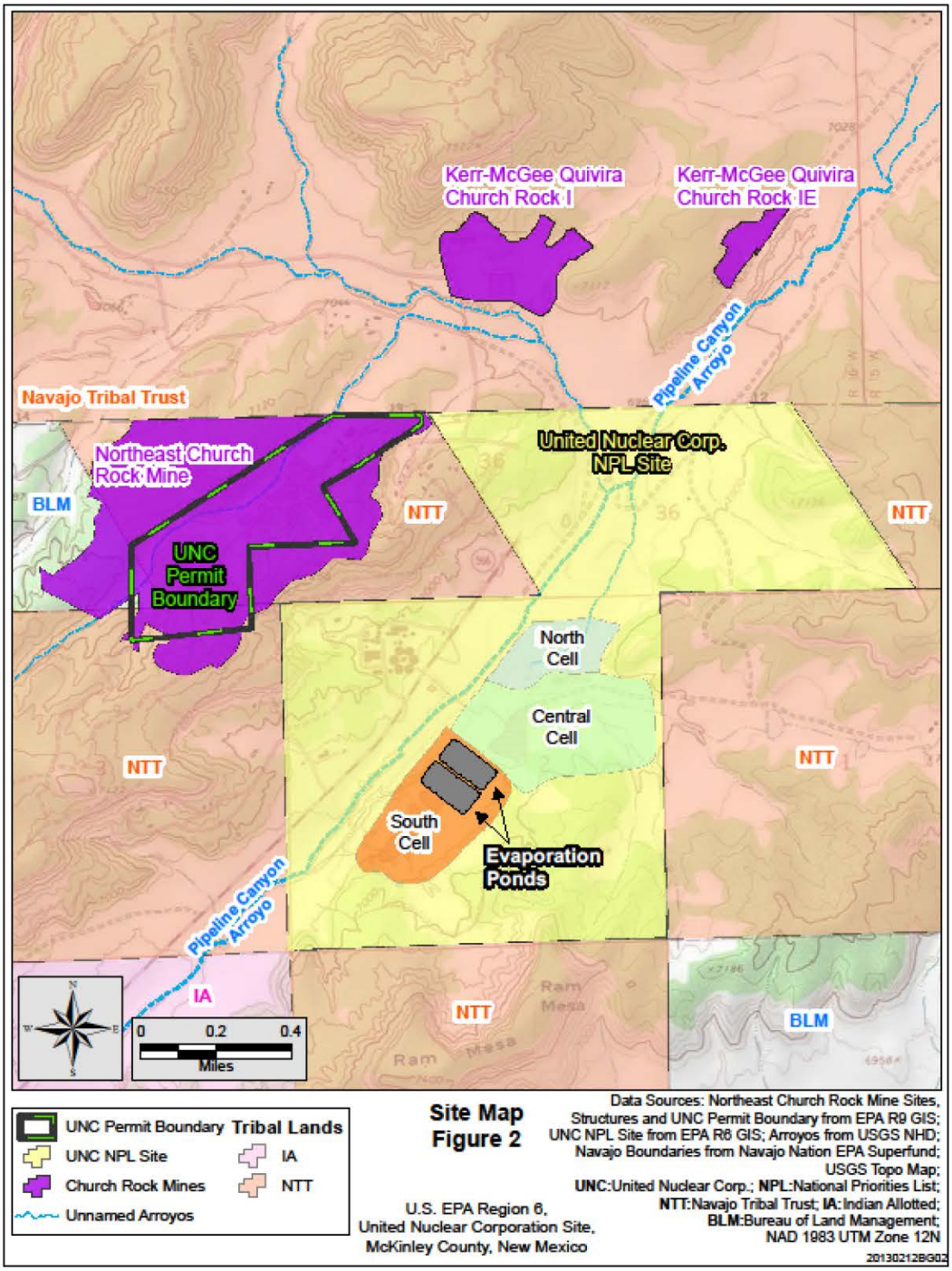
Table 1: Applicable or Relevant and Appropriate Requirements.			
Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Mining	STATE **New Mexico Surface Mining Act Coal Mining Regulations** § 19.8.20.2065 NMAC	Revegetation: Standards 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.

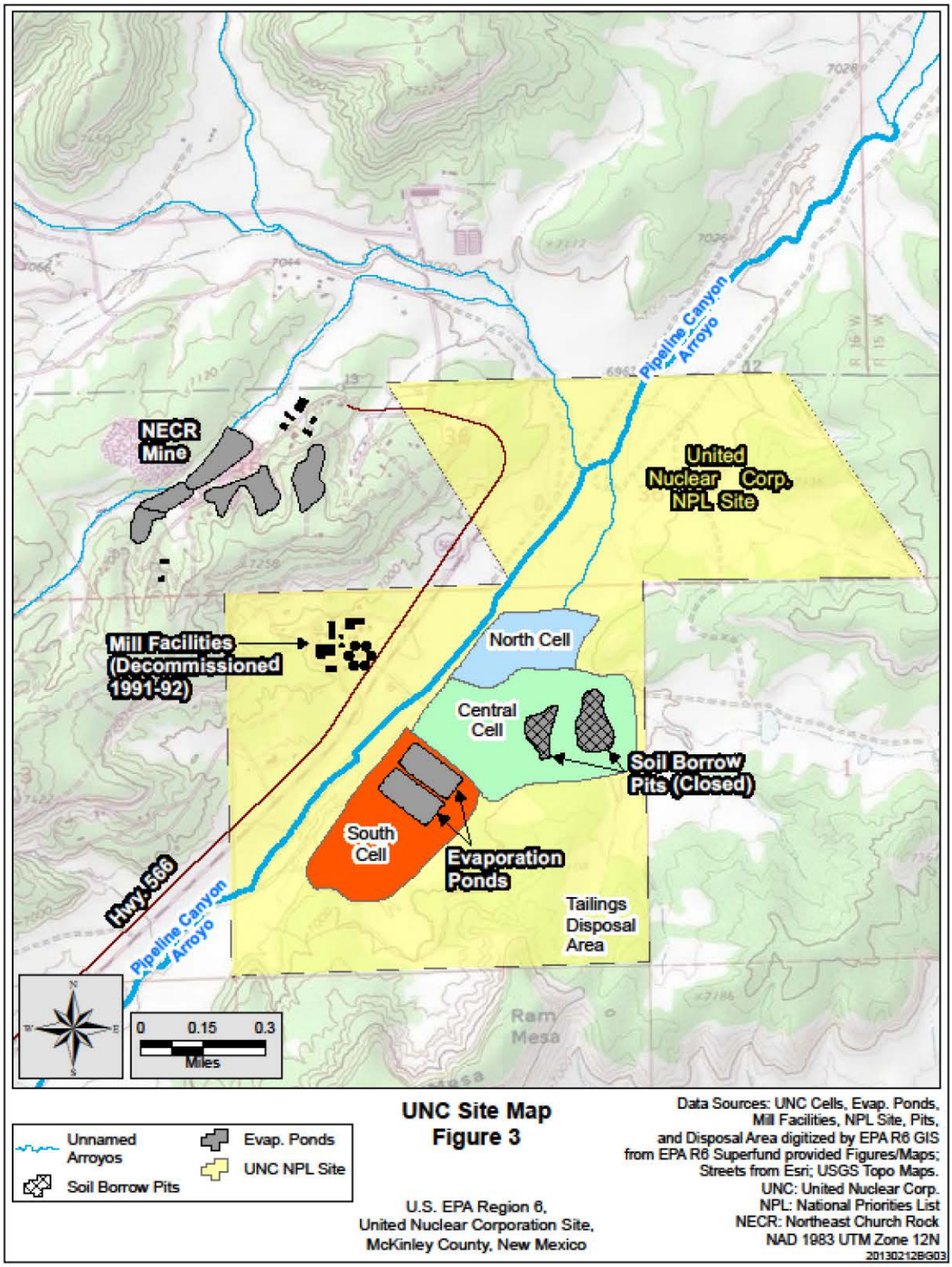
Table 1: Applicable or Relevant and Appropriate Requirements.			
Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Cultural Resources	FEDERAL **The Native American Graves Protection And Repatriation Act** – 25 United States Code (USC) 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

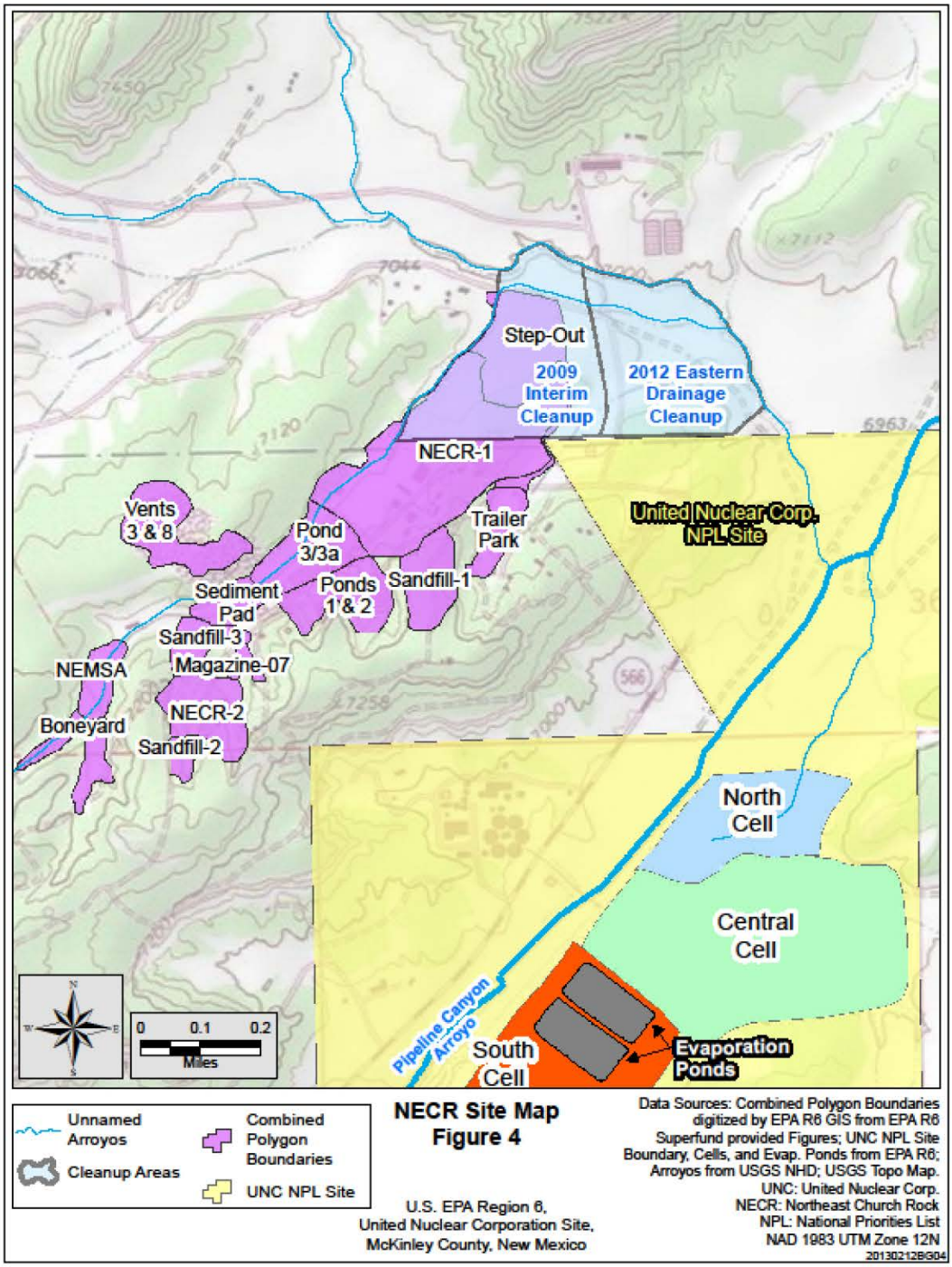
Table 1: Applicable or Relevant and Appropriate Requirements.			
Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Wildlife	STATE NMSA 1978, § 75-6-1	Endangered Plant Species. Provides for the regulation and protection of threatened 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
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.

FIGURES


NORTHEAST CHURCH ROCK MINE
UNITED NUCLEAR CORP. NPL SITE
McKinley County
Gallup
Map Extent
New Mexico
Rehoboth
Church Rock
FORT WINGATE ARMY DEPOT
0 0.5 1 2
Miles
Legend
UNC NPL Site
Northeast Church Rock Mine
Site Location Map
Figure 1
U.S. EPA Region 6,
United Nuclear Corporation Site,
McKinley County, New Mexico
Data Sources: Northeast Church Rock Mine from EPA R9 GIS; UNC NPL from EPA R6 GIS; Streets from Esri; USGS Topo Map.
UNC: United Nuclear Corp.
NPL: National Priorities List
NAD 1983 UTM Zone 12N
20130212BG01


Kerr-McGee Quivira
Church Rock I
Kerr-McGee Quivira
Church Rock IE
Pipeline Canyon
Arroyo
Navajo Tribal Trust
Northeast Church
Rock Mine
BLM
NTT
United Nuclear Corp.
NPL Site
NTT
UNC
Permit
Boundary
North
Cell
Central
Cell
NTT
NTT
South
Cell
Evaporation
Ponds
Pipeline Canyon
Arroyo
IA
NTT
BLM
0
0.2
0.4
Miles
UNC Permit Boundary
UNC NPL Site
Church Rock Mines
Unnamed Arroyos
Tribal Lands
IA
NTT
Site Map
Figure 2
U.S. EPA Region 6,
United Nuclear Corporation Site,
McKinley County, New Mexico
Data Sources: Northeast Church Rock Mine Sites,
Structures and UNC Permit Boundary from EPA R9 GIS;
UNC NPL Site from EPA R6 GIS; Arroyos from USGS NHD;
Navajo Boundaries from Navajo Nation EPA Superfund;
USGS Topo Map;
UNC:United Nuclear Corp.; NPL:National Priorities List;
NTT:Navajo Tribal Trust; IA:Indian Allotted;
BLM:Bureau of Land Management;
NAD 1983 UTM Zone 12N
20130212BG02


NECR Mine
United Nuclear Corp. NPL Site
Pipeline Canyon Arroyo
Mill Facilities (Decommissioned 1991-92)
North Cell
Central Cell
Soil Borrow Pits (Closed)
South Cell
Evaporation Ponds
Tailings Disposal Area
Hwy 566
Ram Mesa
0 0.15 0.3
Miles
Unnamed Arroyos
Soil Borrow Pits
Evap. Ponds
UNC NPL Site
UNC Site Map
Figure 3
U.S. EPA Region 6,
United Nuclear Corporation Site,
McKinley County, New Mexico
Data Sources: UNC Cells, Evap. Ponds, Mill Facilities, NPL Site, Pits, and Disposal Area digitized by EPA R6 GIS from EPA R6 Superfund provided Figures/Maps; Streets from Esri; USGS Topo Maps.
UNC: United Nuclear Corp.
NPL: National Priorities List
NECR: Northeast Church Rock
NAD 1983 UTM Zone 12N
20130212BG03


Step-Out
2009 Interim Cleanup
2012 Eastern Drainage Cleanup
NECR-1
Vents 3 & 8
Pond 3/3a
Trailer Park
United Nuclear Corp. NPL Site
Sediment Pad
Ponds 1' & 2
Sandfill-1
Sandfill-3
NEMSA
Magazine-07
NECR-2
Boneyard
Sandfill-2
North Cell
Central Cell
Pipeline Canyon Arroyo
South Cell
Evaporation Ponds
0 0.1 0.2
Miles
Unnamed Arroyos
Cleanup Areas
Combined Polygon Boundaries
UNC NPL Site
NECR Site Map
Figure 4
U.S. EPA Region 6,
United Nuclear Corporation Site,
McKinley County, New Mexico
Data Sources: Combined Polygon Boundaries digitized by EPA R6 GIS from EPA R6 Superfund provided Figures; UNC NPL Site Boundary, Cells, and Evap. Ponds from EPA R6; Arroyos from USGS NHD; USGS Topo Map.
UNC: United Nuclear Corp.
NECR: Northeast Church Rock
NPL: National Priorities List
NAD 1983 UTM Zone 12N
20130212BG04

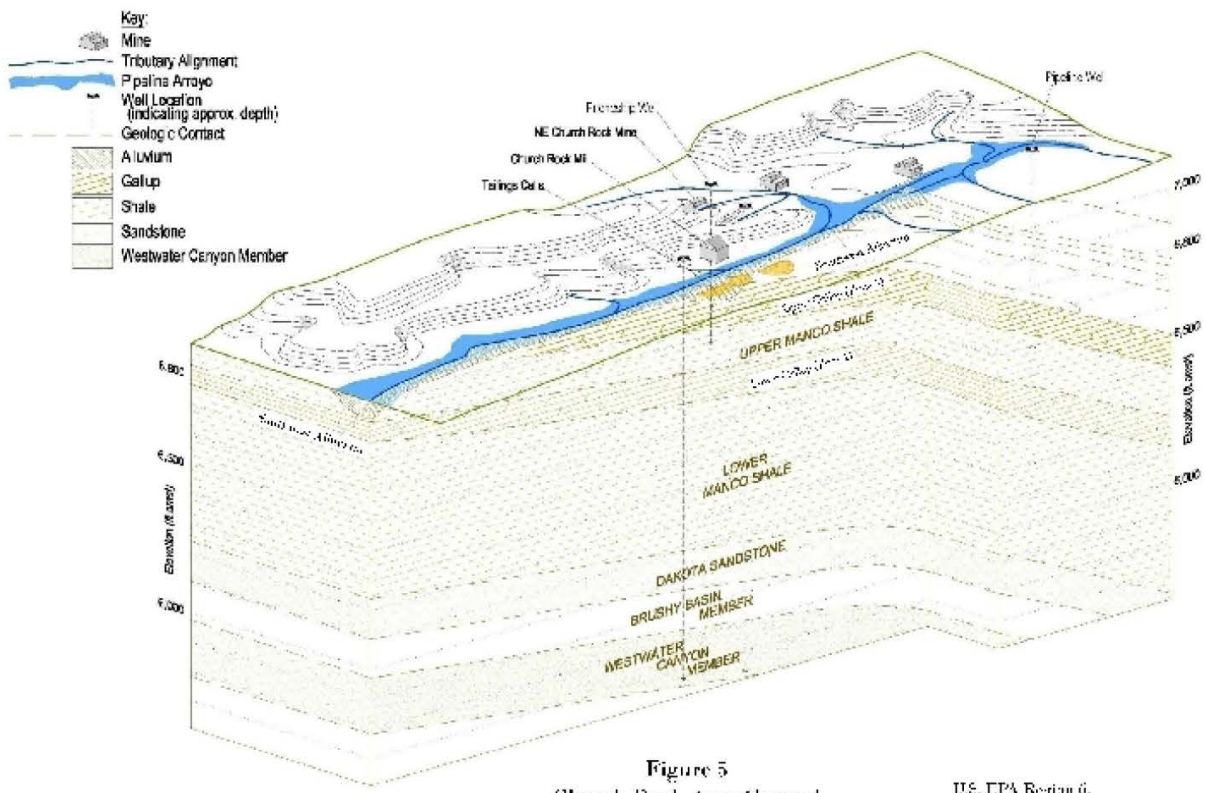


Figure 5
Church Rock Area Ground Water Cross Section

U.S. EPA Region 6,
United Nuclear Corporation Site,
McKinley County, New Mexico

APPENDIX A

2011 Non-Time Critical Removal Action Memorandum

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI AND REGION IX

MEMORANDUM

SUBJECT: **Action Memorandum: Request for a Non-Time-Critical Removal Action at the Northeast Church Rock Mine Site, McKinley County, New Mexico, Pinedale Chapter of the Navajo Nation**

DATE: **September 29, 2011**

FROM: Sara Jacobs, Remedial Project Manager
Arizona & Navajo Site Section (SFD-6-2)
U.S. EPA Region 9

Cynthia Wetmore, Environmental Engineer
Technical Support Section (SFD-8-4)
U.S. EPA Region 9

Katrina Higgins-Coltrain, Remedial Project Manager
Louisiana/New Mexico/Oklahoma Section (6SF-RL)
U.S. EPA Region 6

THROUGH: Claire Trombadore, Section Chief
Arizona & Navajo Sites Section (SFD-6-2)
U.S. EPA Region 9

Donald Williams, Deputy Associate Director
Remedial Branch, (6SF-R)
U.S. EPA Region 6

TO: Clancy Tenley, Assistant Director
Partnerships, Land Revitalization & Cleanup Branch (SFD-6)
U.S. EPA Region 9

Samuel Coleman, Director
Superfund Division, (6SF)
U.S. EPA Region 6

I. PURPOSE

The purpose of this Action Memorandum is to obtain and document United States Environmental Protection Agency ("U.S. EPA") approval of the non-time-critical removal action described herein. The removal action described in this memorandum calls for the excavation of approximately 871,000 cubic yards of waste material from the Northeast Church Rock ("NECR") Mine Site and placement of this waste at a location or a facility that U.S.EPA has determined to be acceptable for the receipt of CERCLA waste under applicable laws. The location selected in this Action Memorandum, and location determined to be suitable in the Engineering Evaluation and Cost Analysis ("EE/CA") issued by U.S. EPA Region 9 on May 30, 2009, is the nearby United Nuclear Corporation ("UNC") Mill Site. Disposal at the UNC Mill Site is contingent upon both modification of the license issued by the U.S. Nuclear Regulatory Commission ("NRC") for the UNC site, and issuance of an appropriate decision document by U.S. EPA Region 6 consistent with the NCP, 40 CFR Part 300. Contingent upon both actions, the NECR Mine wastes will be disposed within the footprint of the existing tailings disposal cells at the UNC Mill Site. In addition, material stockpiled on the NECR mine, including approximately 109,800 cubic yards of waste material from previous removal actions and an estimated 30,000 cubic yards to be excavated during another planned time-critical removal at the Mine Site, will be moved and placed in the same acceptable location.

The UNC Mill Site is listed on the National Priorities List ("NPL"), and placement of waste materials from the NECR Mine Site at the Mill Site is contingent on additional approvals. UNC is currently addressing groundwater contamination at the Mill Site as called for in U.S. EPA's "Record of Decision / United Nuclear Corporation Groundwater Operable Unit" (September 1988) (the "ROD"). UNC also is addressing source control and on-site surface reclamation at the Mill Site under the direction of the NRC, pursuant to the UNC Mill Site facility's NRC license. Disposal of the waste material from the NECR Mine Site at the UNC Mill Site will require an amendment of the UNC facility's NRC license. In addition, since U.S.EPA retains authority under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9601 et seq., the manner in which the NECR Mine Site waste materials will be disposed of at the UNC Mill Site will be documented in an appropriate decision document issued by U.S.EPA Region 6 consistent with the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR Part 300.

The purpose of this action is to mitigate threats to human health and the environment posed by the presence of hazardous substances at the NECR Mine Site. The removal of hazardous substances 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.

The action described in this memorandum was the subject of an EE/CA issued by U.S. EPA Region 9 on May 30, 2009. U.S. EPA provided a 90-day public comment period and received numerous written public comments. During the comment period, U.S. EPA also held one public meeting and two public hearings. After the official public comment period ended, U.S. EPA's continued community involvement efforts included

012846

ten additional community meetings, tours or workshops, many focusing on the EE/CA and the preferred alternative. Following this extensive public involvement process, Region 9 drafted a Responsiveness Summary provided as Attachment III to this Action Memo.

The NECR Mine Site is located on Navajo Nation trust land immediately south of the reservation proper in Pinedale Chapter, McKinley County, New Mexico. The UNC Mill Site is located on fee land held by UNC, which is now an indirect subsidiary of General Electric Corporation ("GE").

II. SITE CONDITIONS AND BACKGROUND

Site Status: Non-National Priorities List
Category of Removal: Non-Time-Critical
CERCLIS ID: NNN000906132
SITE ID: 09PM

A. <u>Site Description</u>

1. Physical Location

The NECR Mine Site is located within Sections 34 and 35 of Township 17 North (T17N), Range 16 West (R16W) and Section 3 of T16N, R16W (MWH, 2004) at the termination of State Highway 566. The NECR Mine Site is situated approximately 16 miles northeast of Gallup, McKinley County, New Mexico. The NECR Mine Site is located within an approximately 125 acre area. The majority of the NECR Mine Site is located on lands held by the United States in trust for the Navajo Nation; mineral rights to this portion were held by UNC under a license from Newmont USA, Ltd.

According to the Red Water Pond Road Community Association, there are eleven households or home sites in the immediate vicinity of the NECR Mine Site, including 48 families and 110 people. Approximately 25 families reside along Pipeline Road north of the UNC Mill Site and approximately 12 families reside along State Rt. 566 south of the UNC Mill Site (Navajo DOJ, December 2008). Several Navajo families have stated they collect herbs and plants from the NECR Mine Site and surrounding area for ceremonial purposes. Apart from the residential areas, the primary land use in the area is grazing for sheep, cattle, and horses.

2. Site Characteristics

The NECR mine is a historic uranium mine that was operated by UNC. Following extensive uranium mineral exploration in the 1950s and 1960s, mining development began at the NECR Mine in 1967 and ended in 1982. While the mine operated, it served as the principal mineral source for the UNC uranium mill. The uranium mill and its adjacent disposal cells make up the United Nuclear Corporation

012847

Superfund Site (the "UNC Mill Site"). Under a U.S. EPA order, UNC is currently addressing groundwater contamination at the UNC Mill Site, as called for in U.S. EPA's ROD. As explained in the ROD, remedial activities addressing source control and on-site surface reclamation are being implemented by UNC under the direction of the NRC, pursuant to the UNC facility's NRC license, and integrated with the U.S. EPA's selected remedy for the groundwater.

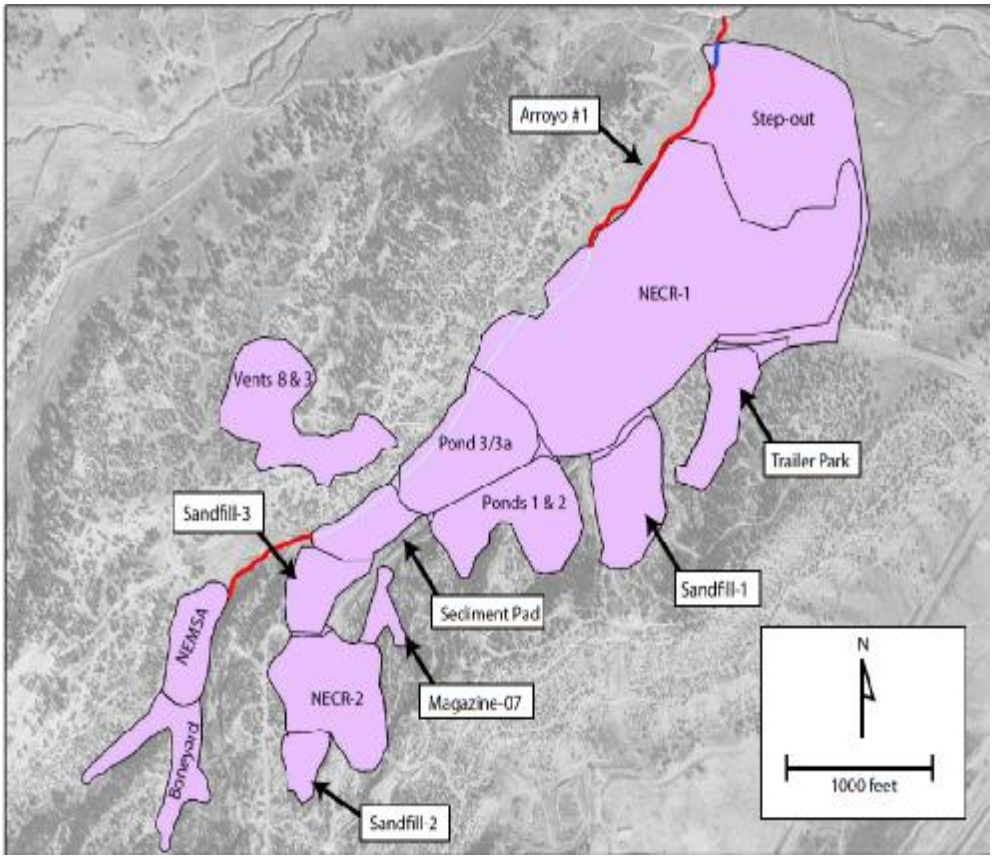
The NECR mine consists of two shafts, two uranium ore waste piles, several mine vent holes and a production well, approximately 1,800 feet deep, used to dewater the mine workings during operations. Operations at the NECR Mine left uranium protore (low grade ore), waste rock, and overburden after the mine was shutdown. The following areas have been identified as former operational areas:

- NECR 1 and NECR 2. NECR 1 and 2 pads held the ore and low-grade ore that were mined from the NECR Mine Site. The stockpiled ore was then transported from NECR 1 and 2 pads to the UNC Mill Site 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 Mine Site.
- NECR-1 "Step-Out Area." This step-out area is adjacent to NECR-1 and includes the former trailer park, former fuel storage area, sediment pond, ion exchange plant, and other areas containing mine wastes. The "Step-Out Area" is located to the north and east of the mine.
- 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 placed in the mine stopes.[1]
- Ponds 1, 2, 3 and 3a, plus surrounding areas affected by mine wastes. The ponds held stormwater and water pumped from the mine during dewatering. The water was subsequently treated in the ponds prior to discharge (under NPDES[2] 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 Site 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.

[1] 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.
[2] National Pollution Discharge Elimination System, part of the Clean Water Act.

012848

- Boneyard. Refuse and discarded equipment from the NECR Mine Site were stored here.
- Non-Economic Material Storage Area (NEMSA). This area was for storage of the mine overburden and low-grade ore (unmarketable materials).



Map showing NECR Mine Site former operational areas described above.

3. Removal Site Evaluation ("RSE") and Supplemental RSE

In 2006, the potentially responsible party ("PRP"),[3] UNC, conducted the RSE at the NECR Mine Site with U.S. EPA and Navajo Nation EPA ("NNEPA") oversight. Samples were collected under U.S. EPA oversight. The RSE report and the Supplemental RSE report were issued in October 2007 and February 2008, respectively.

The RSE investigation included sampling on the NECR Mine Site as well as in areas adjacent to the NECR Mine Site ("Step-Out Areas") both east and west of Red Water Pond Road. Contamination identified west of Red Water Pond Road was removed during two removal actions, including a removal immediately around the residences in 2007, and a removal, including Arroyo #1 in 2009 and 2010. The NECR Mine Site is considered to be a contributing source of the radiological soil contamination east of Red Water Pond Road identified in 2010. However, due to the proximity of the

[3] A potentially responsible party may be held liable for the cleanup of a Superfund site under CERCLA.

012849

contamination east of Red Water Pond Road to residents, and due to the potential for migration, U.S. EPA decided to address this Step-Out Area as a separate time-critical removal action.

The RSE focused on the preliminary Contaminants of Potential Concern ("COPC") identified as Ra-226, in addition to the metals arsenic, molybdenum, selenium, uranium, and vanadium. These contaminants are all hazardous substances under CERCLA. These preliminary COPCs were chosen because these contaminants are commonly associated with the type of uranium "roll-front" deposits that were found at the NECR Mine Site and may be expected to be co-located and proportional where present at uranium mining sites.

The U.S. EPA Superfund Preliminary Remediation Goals[4] (PRGs) for radionuclides (EPA, 2006) and the U.S. EPA Region 9 PRGs for metals and organic constituents (EPA, 2006) were used as the field screening levels (FSL) for these preliminary COPCs, except for Ra-226 and arsenic, during this investigation. The PRGs are risk-based concentrations associated with 10^{-6} cancer risk level or a hazard index of 1 for non-cancer risk, whichever has the lower concentration. Concentrations of COPCs, except Ra-226 and arsenic, were compared to these FSLs to delineate the extent of contamination (*see* Map of NECR Mine Site, above).

All background arsenic results exceeded the arsenic PRG. Therefore, the mean of the background arsenic concentrations (3.7 milligrams per kilogram (mg/kg)) was used as the FSL for arsenic.

The background results for Ra-226 ranged from 0.6 to 1.3 picocurie per gram (pCi/g)[5], with an average of 1.0 pCi/g. For Ra-226, the residential PRG for soil was 0.0124 pCi/g (representing a cancer risk of 10^{-6}). The PRG is below the detection limit of 0.5 pCi/g and below background concentrations for Ra-226. A concentration of 1.24 pCi/g, which corresponds to a $1x\ 10^{-4}$ risk was within the range of background detections. Therefore, an FSL of 2.24 pCi/g was used for Ra-226, which corresponds to a risk of 2×10^{-4} for residential scenarios. The reasons U.S. EPA selected a FSL for Ra-226 of 2.24 pCi/g, corresponding to a risk level of 2×10^{-4}, instead of the 1×10^{-6} point of departure are as follows:

---

[4] PRGs were calculated by U.S.EPA Region 9 using risk assessment guidance from the U.S.EPA Superfund program and can be used for Superfund sites. They are risk-based concentrations derived from standardized equations combining exposure information assumptions with U.S. EPA toxicity data. They are considered by the U.S.EPA to be protective for humans (including sensitive groups) over a lifetime. PRGs correspond to either a lifetime excess cancer risk of $1x\ 10^{-6}$ or a non-cancer hazard index of 1, whichever is more protective. Since 2006, U.S. EPA has harmonized Regions 3, 6 and 9 risk-based screening levels into a single table: "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites." The RSLs are developed using risk assessment guidance from the U.S.EPA Superfund program and are updated as changes in exposure factors or toxicity values occur. The RSL for uranium has changed since the 2006, with the current RSL being 230 mg/kg for residential soil exposure.

[5] Radioactive elements are unstable and become other elements known as "daughters" by giving off 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} 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 Ra-226. This turns out to be about 2.2 decays per minute.

012850

- The 2.24 pCi/g FSL is consistent with the general risk range cited in the NCP (300.430(e) (2)(i);

- The 2.24 pCi/g FSL is distinguishable from the mean background measurement of 1 pCi/g , and therefore measurable in the field; and

- The 2.24 pCi/g FSL is above the analytical detection limit of 0.5 pCi/g and can be quantitatively measured.

Table 4.1. Selected Field Screening Levels

Contaminant of Potential Concern	**Field Screening Level**
Ra-226	2.24 pCi/g
Arsenic	3.7 mg/kg
Molybdenum	390 mg/kg
Selenium	390 mg/kg
Uranium	200 mg/kg[6]
Vanadium	390 mg/kg

Surface Soil Results

Two methods were employed in conducting the field investigation of surface soils. Initially, static gamma measurements were conducted on a random 80-foot triangular grid consistent with the Multi-Agency Radiation Survey and Site Investigation Manual ("MARSSIM"). MARSSIM is a consensus document prepared by the U.S. Department of Defense, the U.S. Department of Energy, the U.S. EPA and the NRC, and provides methodology for performing radiological surveys. Surface soil samples for laboratory analysis were randomly collected from a minimum of 13 of the gamma measurement locations in each operational area and analyzed for the preliminary COPCs. Equivalent Ra-226 concentrations were derived from the gamma survey results by developing correlations using regression analysis between the gamma survey results and co-located surface soil samples analyzed for Ra-226. The results of the gamma radiation surveys indicated that surface soils, within the initial boundaries of each of the on-site areas, contain surface soils with Ra-226 concentrations above the 2.24 pCi/g FSL over the majority of the areas surveyed. Only small fractions of the survey points within the initial boundary areas were below the FSL.

Surface soil samples were collected at the former operational areas listed in section II.A.2 of this memo. Ra-226, uranium, and arsenic exceeded the FSL at many locations, while all results for molybdenum, selenium and vanadium were below their respective FSLs. Ra-226, uranium and arsenic concentrations in surface soil were as follows:

[6] The PRG for uranium in soil has changed since 2006; the current Regional Screening Levels (RSL) is now 230 mg/kg.

012851

• Ra-226 values ranged from 0.8 to 875 pCi/g.

• Uranium values ranged from 0.7 to 3,970 mg/kg.

• Arsenic values ranged from non-detect to 14.9 mg/kg. The data do not show any correlation between arsenic and Ra-226 or uranium concentrations, and there does not appear to be any spatial pattern in concentrations within the survey areas.

• Other stable metals associated with the mineral belt, such as molybdenum, selenium and vanadium, (1) were below their respective FSLs; and (2) appear to be within the range observed in the background area and do not appear to be associated with mining operations. Exceptions to this occurred at only one operational area, NECR-1, where selenium was detected above background, but below FSLs. There were four detections of molybdenum also above background (non-detect is background) but below FSLs at NECR-1.

Subsurface Soil Results

Subsurface soil samples (>0.5 feet below ground surface ("bgs")) were collected from the on-site former operational areas and the Unnamed Arroyo. Subsurface samples were co-located with the surface soil sample locations. Subsurface samples were collected from test pits, from soil borings, and from hand auger holes approximately every 5 feet bgs until native soil was reached. These subsurface samples were analyzed for the preliminary COPCs. The results show that Ra-226, uranium and arsenic exceed the FSLs at some locations, while all results for molybdenum, selenium and vanadium were below their respective FSLs. Ra-226, uranium and arsenic concentrations in subsurface soil were as follows:

• Ra-226 values ranged from 0.6 to 438 pCi/g.

• Uranium values ranged from 0.7 to 760 mg/kg.

• Arsenic values ranged from non-detect (<0.5) to 13.9 mg/kg.

• Molybdenum and vanadium are within the range observed in the background area and below their FSLs and do not appear to be associated with mining operations. Selenium results were below its FSL.

4. Release or threatened release into the environment of a hazardous substance, or pollutant or contaminant

Under U.S. EPA supervision, UNC performed a human health risk assessment ("HHRA"), including a conceptual site model, a screening level HHRA, and a baseline HHRA. The HHRA indicated the need for a response action to control releases and prevent exposure. Actual and threatened releases of hazardous substances from the NECR Mine Site, if not addressed by implementing a Non Time-Critical Removal Action, may continue to present an imminent and substantial endangerment to public health or welfare or the environment.

The HHRA did not identify unacceptable risk for any of the evaluated contaminants except Ra-226 and uranium. Other stable metals associated with the mineral belt, such as molybdenum, selenium and vanadium, were below their respective FSLs and do not appear to be associated with mining operations nor present an agronomic concern. Arsenic while above its FSL, was within the range of background concentrations. Ra-226 and uranium are the contaminants of concern ("COCs").

Radium is formed when uranium and thorium undergo natural decay in the environment. During the decay processes, alpha, beta, and gamma radiation are released. The HHRA indicated that there are three predominant human exposure pathways of concern for uranium and radium. Whole body radiation may be experienced by nearby residents and trespassers on or near the NECR Mine Site itself or at secondary sources (e.g., water or windborne). Radium in the soil may be absorbed by plants and may concentrate in terrestrial organisms. Persons and wildlife may also directly ingest radionuclides which then may be transported to organs or other sites in the body. Radionuclides such as radium, radon and decay products may be inhaled creating alpha sources in the lungs.

The Action Levels listed in the Table 4.2 are selected for the COCs. These Action Levels are selected because the HHRA, based upon future use of the Mine Site for grazing purposes, determined that there were unacceptable risks associated with the concentrations of radium and uranium at the Mine Site.

The Action Level selected for radium-226 (Ra-226) is 2.24 pCi/g and corresponds to a risk of 2×10^{-4} for residential scenarios[7]. The reasons that U.S. EPA selected an Action Level for Ra-226 of 2.24 pCi/g, corresponding to a risk level of 2×10^{-4}, instead of the 1×10^{-6} point of departure,[8] are as follows:

---

[7] U.S. EPA evaluated several different scenarios (current/future maintenance personnel, the hypothetical future livestock grazer, and hypothetical future on-site resident). U.S. EPA also considered multiple exposure pathways (incidental ingestion, inhalation of fugitive dust, consumption of homegrown produce, consumption of homegrown meat/eggs, and external radiation). The selected Action Level is protective for these scenarios and exposure pathways.

[8] To protect human health, U.S.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 contaminants of concern (COC) based on existing ARARs (*see* Section V(A)(4) below for an explanation of ARARs) exceeds 1×10^{-4}, or where remediation goals are not determined by ARARs, U.S.EPA uses the 1×10^{-6} as a point of departure for establishing preliminary remediation goals. This means

012853

- The 2.24 pCi/g Action Level is consistent with the general risk range cited in the NCP (300.430(e) (2)(i);[9]

- The 2.24 pCi/g Action Level is distinguishable from the mean background measurement of 1 pCi/g , and therefore measurable in the field; and

- The 2.24 pCi/g Action Level is above the analytical detection limit of 0.5 pCi/g and can be quantitatively measured.

The Action Level for Ra-226 of 2.24 pCi/g is considered protective because it is in the general risk range consistent with the general risk range cited in the NCP (300.430(e) (2)(I).

The EE/CA determined that the uranium was co-located with the Ra-226 and that by removing the waste that exceeds 2.24 pCi/g of Ra-226, the uranium levels above the RSL of 230 mg/kg would also be removed. Therefore, the Action Level for uranium was selected based on the RSL for uranium, 230 mg/kg. This Action Level is associated with a Hazard Quotient of 1 for residential soil exposure[10]. If the Hazard Quotient is less than one, no adverse health effects are expected from potential exposure[11].

The toxicity values that were used in estimating carcinogenic risks and non-carcinogenic hazards represent a potential source of uncertainty. Exposure assumptions included the consumption of homegrown produce, and meat and eggs obtained from livestock raised in both on-site and off-site areas of the NECR Mine permit. Exposure of human receptors to COPCs through the food chain is typically associated with substantial

---

that accumulative risk level of 1 x 10^{-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 1 x 10^{-6} risk level.

[9] Under the NCP, site cleanup should generally achieve a level of risk within the 10^{-4} to 10^{-6} carcinogenic risk range based on the reasonable maximum exposure for an individual. The cleanup levels to be specified include exposures from all potential pathways, and through all media (e.g., soil, ground water, surface water, sediment, air, structures, biota). The upper boundary of the risk range for carcinogens in the NCP is not a discrete line at $1x10^{-4}$, although U.S.EPA generally uses $1x10^{-4}$ in making risk management decisions. A specific risk estimate around 10^{-4} may be considered acceptable if justified based on site-specific conditions. The Action Level selected for Ra-226 in this Action Memorandum is 2.24 pCi/g and corresponds to an acceptable risk range of 2 x 10^{-4} for residential scenarios. This risk range is consistent with the NCP provisions regarding carcinogenic risk range.

[10] Typically, carcinogenic effects are the only effects that are considered for radionuclides, except for uranium for which both carcinogenic and non-carcinogenic effects are considered. Non-carcinogenic effects are assessed using a Hazard Quotient system where if the Hazard Quotient is less than one, no adverse health effects are expected from potential exposure. Since the RSL for uranium considers both the carcinogenic and non-carcinogenic effects, the RSL limit of 230 mg/kg is considered protective for both.

[11] For non-carcinogenic toxic chemicals, the toxicity assessment is based on the use of reference doses (RfDs) . A reference dose is the concentration of a chemical known not to cause health problems. The estimated potential site-related intake of a compound is compared to the RfD 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.

012854

uncertainty due to the methods and assumptions used in modeling food chain exposures. Consequently, food uptake factors and exposure assumptions tend to err on the protective side. Because the majority of these uncertainties err on the conservative side, the estimated risks presented in the HHRA for NECR most likely represent upper bound estimates.

In EPA's Superfund program, when a contaminant exists in the environment at a concentration that exceeds an Action Level, this means that the concentration is high enough to warrant action or trigger a response under CERCLA and the NCP.

Table 4.2 Selected Action Levels

Contaminant of Concern	**Action Level**
Ra-226	2.24 pCi/g
Uranium	230 mg/kg [12]

Based on the sampling data in the RSE, U.S. EPA has estimated that approximately 871,000 cubic yards of radiological waste exist in the listed former operational areas and an additional 109,800 cubic yards of contaminated soil are stored on the NECR Mine Site after the previous removal actions (see Section II.B). The estimated volume for the planned time-critical removal (documented in a separate, concurrent action memorandum) for the area east of Red Water Pond Road is 30,000 cubic yards of radiological contaminated soil.

In addition to verification sampling for the COCs Ra-226 and uranium, the U.S. EPA will verify by confirmation sampling, after completion of excavation and as a conservative measure, that the levels of all COPCs, including arsenic, molybdenum, selenium and vanadium remain protective of human health and the environment.

Current conditions at the NECR Mine Site present risks due to the lack of an engineered containment system for the waste and the wind and water transport mechanisms that have previously contaminated the NECR Mine Site and the residential areas located north of the NECR Mine Site subjected to the previous removal actions and subject to the upcoming removal actions.

5. National Priorities List Status

The NECR Mine Site is not on the NPL. In 2006, the Navajo Superfund Program conducted a pre-CERCLIS site screening of the NECR Mine Site (CERCLIS ID No. NNN000906132). The UNC Mill Site ceased operations in 1982 and was listed on the NPL in 1983. Under a U.S. EPA order, UNC is currently addressing contamination at the UNC Mill Site as called for in U.S. EPA's ROD. As explained in the ROD, remedial activities addressing source control and on-site surface reclamation are being

[12] The PRG for uranium in soil has changed since 2006; the current Regional Screening Levels (RSL) is now 230 mg/kg.

012855

implemented by UNC under the direction of the NRC, pursuant to the UNC facility's NRC license, and integrated with the U.S. EPA's selected remedy for the groundwater.

B. Other Actions to Date

U.S. EPA ordered three time-critical removal actions related to the NECR Mine Site in the past five years. These actions, which were performed by UNC and U.S. EPA, are described below.

1. 2006 Removal Site Evaluation

In September 2006, U.S. EPA entered into an administrative order on consent ("2006 AOC") with UNC, under which UNC performed a removal site evaluation at the NECR Mine Site, under oversight of U.S. EPA and Navajo Nation EPA.

2. 2007 Residential Removal Action

A time-critical removal action was taken for three home sites where NECR Mine-related contamination was found. U.S. EPA signed the NECR Residential Action Memo on April 18, 2007 and issued a Unilateral Administrative Order on May 4, 2007 ordering UNC to undertake transportation and disposal, while U.S. EPA conducted excavation and sampling components of the removal action.

Beginning on May 7, 2007 and continuing for approximately four weeks, U.S. EPA representatives and the United State Coast Guard ("USCG") Pacific Strike Team performed the NECR home site investigation and cleanup. Using the U.S. EPA-established soil cleanup goal of 2.24 pCi/g Ra-226 for surface soil sampling, removals were conducted for half-acre areas around three home sites. Consistent with the MARSSIM guidance, excavated areas were 100% scanned. All radon levels were below 4.0 pCi/L in the homes and the average soil concentrations were below 2.24 pCi/g consistent with MARSSIM procedures after the removals were completed.

3. 2009/2010 Step-Out Interim Removal Action

U.S. EPA signed the NECR Step-Out Area Interim Removal Action Memorandum on July 23, 2009. In a July 24, 2009 Administrative Order on Consent ("2009" AOC), UNC and GE (collectively "UNC/GE") agreed to undertake the removal action with U.S. EPA oversight. The 2009 removal action used 2.24 pCi/g Ra-226, which is the same soil cleanup goal as the one selected for the 2007 Removal Action.

The Interim Removal Action ("IRA") activities were performed from approximately August 17, 2009 through May 21, 2010. The work included demolition of existing mine buildings and associated concrete slabs located within the NECR-1 footprint. It also included excavation and placement onto the NECR-1 pile of approximately 109,800 cubic yards (cy) of soil from the Step Out Area, including approximately 33,000 cy from the Unnamed Arroyo; excavation and stockpiling of

approximately 4,000 cy of petroleum impacted soil (TPH soil); backfilling and restoration of depressions, culverts, and roads with new imported materials; characterization of Red Water Pond Road from Hwy 566 to the bridge by the Quivira Mine Site; and fencing, seeding and other restoration activities.

In general, all soils with an activity concentration for Ra-226 above 3.0 pCi/g were removed from the Unnamed Arroyo and 4 Zones in the Step-Out area until the average residual activity concentrations were less than 2.24 pCi/g. Removal soils were placed on the NECR-1 pile, which was capped with 6 to 12 inches of clean imported fill. Areas that were excavated to a depth of more than about 1-foot (including the Unnamed Arroyo) were backfilled with imported material.

During this work, in close coordination with U.S. EPA Community Involvement Coordinators, UNC/GE arranged for temporary housing for three households for approximately five months. U.S. EPA also temporarily moved residents from four additional households for approximately two months. UNC/GE retained contractors to carry out temporary housing, construction, transportation and sampling activities.

C. State and Local Authorities Roles

1. State and local actions to date

Consultations with the Navajo Nation and the State of New Mexico in 2005 resulted in U.S. EPA Region 9 taking the lead on the NECR Mine Site. NNEPA sent a letter to U.S. EPA Region 9 dated March 22, 2005, formally requesting that U.S. EPA Region 9 become the lead agency, consistent with a Memorandum of Understanding between Region 9 and the Navajo Nation. Region 9 issued a letter formally accepting NECR Mine Site lead on November 7, 2005.

U.S. EPA will continue to coordinate closely with the Navajo Nation and the State of New Mexico throughout the cleanup process. Both entities will be included as part of a technical design review team of regulatory agencies, including U.S. EPA Regions 6 and 9, NRC, Department of Energy, New Mexico Environment Department, and the NNEPA. Both Navajo Nation and the State of New Mexico have identified requirements that are considered to be applicable or relevant and appropriate requirements ("ARARs") as discussed below under Section V.A.4.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Current conditions at the NECR Mine Site pose the threat of potential future releases of the hazardous substances Ra-226 and uranium. The area of the NECR Mine Site where concentrations of uranium and Ra-226 exceed the Action Level is reasonably well defined (refer to section II.A.2.) Due to the risk of direct human exposure to these

012857

hazardous substances by ingestion or inhalation, there is an imminent and substantial endangerment to the public health or welfare or the environment at or from the NECR Mine Site. The removal action selected in this Action Memorandum is appropriate under the factors set forth in the NCP, 40 CFR § 300.415(b)(2).

1. Actual or potential exposure to hazardous substances or pollutants or contaminants by nearby populations or the food chain

As described in Section II.A.3, high concentrations of Ra-226 have been detected in samples at the NECR Mine Site. Radium is a daughter product formed when uranium and thorium decay. Two of the main radium isotopes found in the environment are Ra-226 and Ra-228. During the decay process, alpha, beta, and gamma radiation are released. Radium may be found in air, water and soil. Radium in the soil may be absorbed by plants.

Analytical results indicate that concentrations of Ra-226 identified in soil and mine waste exceed background, pose an unacceptable excess lifetime cancer risk greater than 1×10^{-4}, and exceed U.S. EPA's Action Level, as explained above in section II.A.4 of this Action Memorandum. Acute inhalation exposure to high levels of radium can cause adverse effects to the blood (anemia) and eyes (cataracts). 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, has stated that radium is a known human carcinogen (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.

Much of the contaminated material at the NECR Mine Site is fine-grained and therefore likely to result in human exposure via inhalation or ingestion. Persons occupying or traversing the NECR Mine Site may be exposed to contaminated dust by inhalation or ingestion of contamination sorbed to particulate matter. Incidences of direct contact with natural and mechanically generated dust during these activities account for known contamination exposure scenarios at the NECR Mine Site. Radium may be entrained in naturally and mechanically generated dust and/or transported on shoes and clothing of residents passing over contaminated areas.

Activities that occur in contaminated areas that may put persons at risk include walking or hiking, livestock grazing, gardening and yard work, and modes of transportation including all-terrain vehicle, motorcycle, or horseback. Persons may drive their vehicles over contaminated areas as well. This activity may also contribute to exposure pathways via dust generation.

Rainfall events may lead to transport of the contamination from the NECR Mine Site. Soil erosion may indicate transport of contamination from the NECR Mine Site constituting a release of hazardous substances and resulting in secondary contamination

012858

sources. In addition, contaminants may migrate during wind events, due to adherence to windborne dust particles.

Without the excavation and removal called for in this action memorandum, contaminated mine waste and soils from the NECR Mine Site may migrate off-site via wind and water transport mechanisms. Some of the radium daughter particles, such as radon, may also adhere to dust particles and migrate as well as migrate off-site during historic surface water flows.

IV. ENDANGERMENT DETERMINATION

Actual and threatened releases of hazardous substances from the NECR Mine Site, if not addressed by implementing a Non-Time-Critical Removal Action, may continue to present an imminent and substantial endangerment to the public health or welfare or the environment.

V. ACTIONS SELECTED AND ESTIMATED COSTS

A. Response Actions

1. Action description

U.S. EPA has decided to address the imminent and substantial threats to the public health or welfare or the environment by taking steps to mitigate the releases of uranium and Ra-226 on the NECR Mine Site that exceed the Action Levels. This Action Memorandum calls for the following removal action elements to address releases of uranium and Ra-226 in mine waste and soils at concentrations that exceed the Action Levels:

- **Repository Design.** Design a repository for the contaminated material excavated and removed from the NECR Mine Site. Design specifications will comply with CERCLA requirements, specifically all ARARs. The design, at a minimum, will include a low permeability layer (liner) and a cap structure that will mitigate direct contact, limit water infiltration, and perform as a radon barrier.
- **Baseline Sampling.** Conduct any additional baseline sampling necessary to assess current site conditions prior to construction and waste disposal.
- **Construction**. Construct a repository that will contain the contaminated mine waste and soil excavated and removed from the NECR Mine Site in accordance with the approved design specifications. This action is contingent on the NRC approval of a license amendment for the UNC Mill Site disposal cells, and on EPA's decision document for the surface contamination at the UNC Mill Site.

012859

- **Excavation**. Excavation at the NECR Site and transportation of waste with concentrations of uranium and Ra-226 that exceed Action Levels to a repository at the UNC Mill Site for co-disposal at the existing Tailings Disposal Cells. This action is contingent on the U.S.EPA decision document for the surface contamination at the UNC Mill Site, and the NRC approval of a license amendment for the UNC Mill Site disposal cells. Depth of excavation will not exceed ten feet, except in areas susceptible to erosion or where placing clean backfill to current grade is not planned, or in areas where principal threat waste will be removed. Excavation within these areas will continue until confirmation sample results are below the Action Levels per MARSSIM procedures.

- **Closure**. Closure of the repository once all NECR Mine Site contaminated waste rock and soil is disposed. Once all contaminated mine waste and soil is excavated from the NECR Mine Site, transported to the repository and disposed in the repository, the repository will be closed and the cap will be put in place.

- **Principal Threat Waste.** Principal threat wastes 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. At the NECR Mine Site, all wastes, containing either 200 pCi/g or more of Ra-226 and/or 500 mg/kg or more of total uranium present a significant risk to human health; therefore, this contaminated material is considered principal threat waste. To treat this Principal Threat Waste, this Action Memorandum calls for reprocessing of the Principal Threat Waste to reclaim metals and radionuclides. If reprocessing technologies are not technically feasible, or are not available within a reasonable time frame as determined by the U.S. EPA, then the Principal Threat Waste will be disposed of in a facility that has been determined by U.S.EPA to be acceptable under the Off-site Rule, 40 CFR § 300.440.

- **Confirmation Sampling**. Conduct confirmation scanning, sampling and analysis to ensure that the action levels have been met in excavated areas.

- **Site Restoration.** Restoration activities will include the backfilling and re-grading of excavation areas for erosion and storm water control. These areas will also be re-vegetated with native species.

- **Institutional Controls**. U.S. EPA will work with the Navajo Nation to implement institutional controls to ensure protectiveness of the NECR Mine Site should waste material be left in place at depths below 10 feet below ground surface.

- **Housing.** Requested funding will include payment for voluntary alternative housing options to residents significantly impacted by disruptions associated with the removal action. The housing payments will be calculated consistent with EPA's April 2002 Superfund Response Actions: Temporary Relocations

012860

Implementation Guidance (OSWER Directive 9230.0-97) and the Uniform Relocation Assistance and Real Property Acquisitions Act ("URA"), 42 U.S.C. §§ 4601 et seq., and its implementing regulations, 49 C.F.R. Part 24.

The repository location selected in this Action Memorandum, and the location determined to be suitable EE/CA, for disposal of the NECR Mine Site wastes containing concentrations of uranium or Ra-226 that exceeds action levels is within the footprint of the existing UNC Mill Site Tailings Disposal Cells. The repository will be used for material that is not considered Principal Threat Waste. Construction of a disposal cell within this area is contingent on NRC approval of a license amendment for the UNC Mill Site disposal cells, and is also contingent on U.S. EPA Region 6's decision document for the surface contamination at the UNC Mill Site. The mine wastes and soils at the NECR Mine Site and the UNC Mill Site are similar and any co-disposal would result in just one disposal cell in the area, instead of two, thereby reducing the footprint of contaminated surface soil in the region.

2. Contribution to remedial performance

This removal action would address the mine waste and soil contamination at the NECR Mine Site, to a depth of at least 10 feet. It is expected that this removal action will remove the threat of direct or indirect contact with or inhalation of hazardous substances from the mine waste and soils at the NECR Mine Site. As noted above, the soils in the area east of Red Water Pond Road will be addressed in a separate removal action.

The EE/CA presented alternatives for surface and near-surface mine waste and soil to be addressed in a non-time-critical removal action only. This removal action does not address contamination that may remain at greater depths. U.S. EPA has recently worked to assess groundwater for the NECR Mine Site and surrounding facilities, including historic releases from these facilities; however, the removal action that is the subject of this memorandum does not address groundwater.

3. Engineering Evaluation/Cost Analysis ("EE/CA")

In May 2009, U.S.EPA released the EE/CA, evaluating removal action alternatives for the mine wastes at the NECR Mine Site. Five alternatives for the removal action were evaluated and compared for effectiveness, implementability and cost in accordance with criteria established by the U.S. EPA. These alternatives included:

1. No Action;
2. Excavation and disposal of all NECR Mine Site wastes at an off-site licensed disposal facility;
3. Consolidation and covering of mine wastes on the NECR Mine Site;
4. Construction of an above-ground, capped and lined repository on the NECR Mine Site; and

012861

5. Consolidation of the mine wastes with a cap and liner at the UNC Mill Site facility, currently under license by the NRC, either on existing tailings cells or in a newly-constructed repository.

The EE/CA also evaluated removal of high-concentration ("principal threat waste") material to an off-site Class I hazardous waste disposal facility, or an alternative appropriate facility.

This Action Memorandum is based on the EE/CA and on the administrative record for this removal action.

The selected alternative is identified as Alternative 5A-above-ground repository on the UNC Mill facility with offsite disposal of principal threat waste. This alternative is selected based on an evaluation of the effectiveness (overall protection of human health and the environment; compliance with ARARs, and other criteria, advisories, and guidance; long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness), implementability (technical feasibility; administrative feasibility; availability of services and materials; and state and community acceptance), and cost of all alternatives. This is summarized below:

Selected Action (Alternative 5A)

- Alternative 5A provides protection of human health and the environment by removing waste (including the principal threat waste), limiting exposure, and limiting migration through the use of a cap and low permeability layer (liner).
- Alternative 5A will be constructed and implemented in accordance with all ARARs.
- Although Alternative 5A does not meet reduction of toxicity, mobility and volume through treatment, the use of a cap and liner reduces mobility by mitigating migration and managing erosion elements, including water and wind. The toxicity and volume of Principal Threat Waste will be reduced if reprocessed.
- Long-term effectiveness and permanence will be assured by proper installation, management, and maintenance of the repository throughout its existence.
- The potential for increased risk exists with the off-site transportation and disposal of the principal threat wastes and will be managed through the proper use of licensed transporters and proper storage during transportation.
- Alternative 5A is easily implementable and will use readily available and common construction equipment, materials and supplies. Repository construction is a proven technology that can be constructed using best management practices.
- Alternative 5A will result in the removal of mine waste such that the NECR mine site will be available for residential use including consumption of homegrown vegetables and grazing land for domestic livestock.
- Alternative 5A is considered cost effective when balancing protection of human health and the environment, future reuse, effectiveness (long-term and short-term), and community, Navajo Nation and State considerations.

012862

Effectiveness and the other alternatives considered

The EE/CA for the NECR Mine Site provides a comparative analysis of the effectiveness of the response alternatives considered for addressing contamination at the NECR Mine Site. Alternative 1, the no action alternative, was eliminated because it does not protect those exposed from the health risk identified in the HHRA. Alternatives 2, 3, 4, and 5 were all found to be effective; however, Alternatives 2 and 5 provide greater protection because they provide for removal of mine waste from the NECR Mine site, including Principal Threat Waste, where Alternative 3 and 4 leave waste at the NECR Mine Site. Alternative 5A provides greater level of short-term protectiveness as compared to Alternative 2 because the majority of the waste material will be transported over a significantly shorter distance, the potential for accidents is reduced due to shorter travel distance, and the remedy construction time is reduced. In addition, the reduced travel and construction time reduces overall cost. When compared to Alternative 2, Alternative 5A provides for a greater short-term effectiveness due to reduced transportation time, reduced risk of traffic accidents, and reduced implementation time.

Implementability and the other alternatives considered

The EE/CA for the NECR Site provides a comparative analysis of the implementability of the removal action alternatives considered. A fundamental part of the implementability determination is acceptance by the State and the local community. Since the Navajo Nation and the local community have said that disposal of the contaminated material on the NECR Mine Site is not acceptable, the various alternatives that called for such disposal (Alternatives 3 and 4) were not favored under this criterion. Moreover, the New Mexico Environment Department, on behalf of the State, supports Alternative 5A. In addition, Alternatives 3 and 4 leave waste on-site, which significantly restricts future reuse options available to the surrounding community, as opposed to Alternative 5A, which removes waste from the site.

Cost and the other alternatives considered

Costs for the Alternatives were not comparable since disposal at a licensed disposal facility would increase cost by a factor of almost seven over the other alternatives. Alternative 2 was estimated to cost $293,600,000, in comparison to Alternative 5A, which was estimated to cost $44,300,000. Alternatives 3 and 4 left the waste on Tribal Land, which was not acceptable to the Navajo Nation. On balance, US EPA selected the least expensive alternative that removed waste from Tribal Lands.

After release of the EE/CA, U.S.EPA received many comments about the proposed action at the June 23, 2009 public meeting and July 7, 2009 public hearing, and in written comments. In response to these concerns, U.S. EPA extended the comment period by 60 days, made the administrative record available at the local Chapter Houses, and held an additional public hearing on August 25, 2009 at a different chapter of the Navajo Nation. All public meetings, hearings, and dates of the comment period and its extension were advertised in the *Gallup Independent* and the *Navajo Times*. In addition,

012863

U.S. EPA has taken an additional 24 months to listen and respond to community, stakeholder and Navajo Nation concerns. During this time, U.S. EPA held an additional ten community meetings and facilitated several mine tours.

4. Applicable or relevant and appropriate requirements ("ARARs")

A complete list of Applicable or Relevant and Appropriate Requirements ("ARARs") are provided as Attachment II. In addition to those ARARs noted in the EE/CA, Region 9 has corrected, modified and added ARARs in response to comments from UNC and from the State of New Mexico. See Responsiveness Summary, provided as Attachment III.

Section 300.415(j) of the NCP provides that removal actions must attain ARARs to the extent practicable, considering the exigencies of the situation.

Section 300.5 of the NCP defines applicable requirements as cleanup standards, standards of control, and other substantive environmental protection requirements, criteria or limitations promulgated under Federal environmental or State environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location or other circumstances at a CERCLA site.

Section 300.5 of the NCP defines relevant and appropriate requirements as cleanup standards, standards of control and other substantive requirements, criteria, or limitations promulgated under Federal environmental or State environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, or contaminant, remedial action, location, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site and are well-suited to the particular site.

Because CERCLA on-site response actions do not require permitting, only substantive requirements of permitting laws that are ARARs must be met. Administrative requirements such as approval of, or consultation with administrative bodies, issuance of permits, documentation, reporting, record-keeping and enforcement are not required for on-site CERCLA actions.

5. Project schedule

U.S.EPA estimates that the removal activities selected in this memorandum may take a total of approximately seven years. U.S.EPA estimates up to three years for design of the removal and to address the concerns described below in Section VII (Outstanding Policy Issues), and up to four years to complete construction, once excavation and transportation of the mine waste begins.

012864

B. Estimated Costs

The total cost for the removal action is estimated to be $44,300,000 based on the estimate provided in the 2009 EE/CA and U.S EPA expects UNC to conduct this removal and disposal of contaminated mine waste and soils under a settlement or a unilateral order. In addition, U.S. anticipates the following extramural costs, which will be eligible for cost recovery:

Cost of the Removal Action paid by the Responsible Party: $44,300,000

U.S. EPA Extramural Cost:[13] $2,960,000

U.S. EPA plans to use special account funding, if available, and other extramural funding sources to fund voluntary housing and oversight work prior to pursuing cost recovery.

U.S. EPA has incurred extramural costs from the past removal actions described in section II.B. In addition to this non-time-critical removal action, U.S. EPA also decided to address a Step-Out Area as a separate time-critical removal action. Based on actual extramural costs incurred for the previous removals and the estimated extramural costs for the time-critical and non-time-critical actions, U.S. EPA estimates the project ceiling to be $5,370,325.

NECR Removal Action Estimated Project Ceiling	
Past extramural costs (actual)[14]	$978,325
2011 Non-time-critical (estimated costs)	$2,960,000
20% Contingency	$592,000
2011 Time-critical removal (estimated costs)	$700,000
20% Contingency	$140,000
TOTAL	$5,370,325

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Given the site conditions, the nature of the hazardous substances documented on site, and the potential exposure pathways to nearby populations described in Sections III and IV above, actual or threatened releases of hazardous substances from the Mine Site,

[13] Extramural costs include construction oversight contractor support (START), contractor technical support (START) and housing.
[14] All past costs have been recovered except an estimated $106,000.

012865

if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to the public health or welfare or the environment.

VII. OUTSTANDING POLICY ISSUES

The selected response action for the NECR Mine Site requires disposal of the NECR Mine wastes at location or a facility that EPA has determined to be acceptable for the receipt of CERCLA waste under applicable laws. Regarding disposal of the NECR Mine Site's contaminated materials at the nearby UNC Mill Site, EPA is working toward a remedy for the surface contamination at the UNC Mill Site under which we intend to accommodate materials from the NECR Mine Site. Disposal at the UNC Mill Site is contingent upon both modification of the license issued by the NRC for the UNC site, and issuance of an appropriate decision document by U.S.EPA Region 6 consistent with the NCP, 40 CFR Part 300. Contingent upon both actions, the NECR Mine wastes will be disposed of within the footprint of the existing tailings disposal cells at the UNC Mill Site.

For the purposes of this response action, U.S.EPA believes that the UNC site and the NECR site may be treated as one facility under CERCLA Section 104(d)(4), 42 USC §9604(d)(4), or that the proposed response action is an on-site action under Section 300.5 of the NCP, 40 CFR §300.5. However, the final determination under CERCLA Section 104(d)(4), 42 USC §9604(d)(4) shall be made as part of the issuance of an appropriate decision document by U.S. EPA Region 6 consistent with the NCP, 40 CFR Part 300.

Based on the determinations herein, for the purposes of the response action selected in this Action Memorandum, the off-site rule (40 CFR §300.440) does not apply, and the permit exemption set forth in CERCLA Section 121(e)(1) does apply. The latter section provides that "No Federal, State, or local permit shall be required for the portion of any removal or remedial action conducted entirely onsite, where such remedial action is selected and carried out in compliance with this section."

No other outstanding policy issues have been identified at this time.

VIII. ENFORCEMENT

U.S. EPA expects UNC to conduct the removal and disposal of contaminated mine waste and soils under a settlement or a unilateral order, and to reimburse U.S. EPA for the costs incurred in oversight of the PRP's work and for any housing costs for nearby residents. The following intramural and extramural costs are also recoverable:

Intramural Costs[15]:

U.S. EPA Direct Costs:	$1,389,000
U.S. EPA Indirect Costs (47.71% of Extramural[16] and Intramural costs)	$2,074,900
Total Intramural Costs:	$3,463,900

The total U.S. EPA extramural, intramural, and indirect costs for this removal action, based on full-cost accounting practices that will be eligible for cost recovery are estimated to be $6,309,094.

IX. Exemption from Statutory Limits

Section 104(c)(1) of CERCLA generally restricts fund- lead removal actions to a total extramural direct cost of $2,000,000. 42 U.S.C. § 9604(c)(1) and to a 12-month period of time. Pursuant to Section 104(c)(1)(A) of CERCLA and 40 C.F.R. § 300.415(b)(5)(i), application of the emergency exemption continues to be appropriate when: (1) there is an immediate risk to public health or welfare or the environment; (2) the response actions are immediately required to prevent, limit, or mitigate an emergency; and (3) such assistance will not otherwise be provided on a timely basis. In this case, Region 9 has estimated that extramural expenditures of over $2.9 million will be needed over the course of the removal action to provide appropriate oversight of the action by the PRP, which is expected to cost over $44 million. The removal action described in this action memorandum is expected to take approximately seven years, including the design and construction phases of the removal. Prior removals at the Site began in 2006. There continues to be an immediate risk posed by the conditions at the Site, including no timely source of non-federal response funds, and this additional expenditure is necessary to abate these threats. Region 9 has conducted the appropriate consultation with OGC and OECA/OSRE regarding this exemption, pursuant to the Superfund Removal Guidance for Preparing Action Memoranda, dated September 2009 at p. 53. See Attachment IV.

[15] Direct costs include direct extramural costs and direct intramural costs. Indirect costs are calculated based on an estimated indirect cost rate expressed as a percentage of site-specific direct costs, consistent with the full cost accounting methodology effective October 2, 2000. These estimates do not include pre-judgment interest, do not take into account other enforcement costs, including Department of Justice costs, and may be adjusted during the course of a removal action. The estimates are for illustrative purposes only and their use is not intended to create any rights for responsible parties. Neither the lack of a total cost estimate nor deviation of actual costs from this estimate will affect the United States' right to cost recovery

[16] See section V.5.B

012867

IX. RECOMMENDATION

This Action Memorandum documents the selected removal action for the NECR Mine Site, McKinley County, New Mexico, developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based on the Administrative Record for the Site including the EE/CA.

Conditions at the Site meet the NCP criteria for a Non-Time-Critical Removal Action. The total project ceiling if approved will be $6,423,900, of which $2,960,000 would come from U.S. EPA extramural funding sources.

Approve: Claire Hombadore acting for 9/29/2011

Clancy Tenley, Assistant Director — Date
Partnership, Land Revitalization & Cleanup Branch (SFD-6)
U.S.EPA Region 9

Approve: Samuel Coleman 29 Sep 2011

Samuel Coleman, P.E., Director — Date
Superfund Division, (6SF)
U.S.EPA Region 6

cc: Sherry Fielding, U.S. EPA, OEM, HQ
Steven Etsitty, Navajo Nation Environmental Protection Agency
David Taylor, Navajo Nation Department of Justice
Steven Spencer, U.S. Department of Interior
Katrina Higgins-Coltrain, U.S. EPA Region 6
Sara Jacobs, U.S. EPA Region 9
Yolande Norman, NRC
Deborah Steckley, DOE
Earle Dixon, New Mexico Environment Department
Dana Bahar, New Mexico Environment Department
Jerry Schoeppner, New Mexico Environment Department

bcc: H. Allen, SFD-9-2
H. Karr, ORC-3
L. Williams, ORC-3
Site File

012868

List of Attachments

Attachment I – Index to Administrative Record

Attachment II– Applicable or Relevant and Appropriate Requirements

Attachment III – Responsiveness Summary

Attachment IV – U.S. EPA HQ Concurrence

012869

Attachment I

INDEX TO THE ADMINISTRATIVE RECORD

Doc ID	Doc Date	Title/Subject	Author	Addressee	Access Code
1128097	7/1/1980	Geology of Church Rock area, NM, w/TL to T Hill fr G Billings 7/31/80	Bearpaw Geosciences Science Applications, Inc - Natural Resources Div	United Nuclear Corp - U N C Mining & Milling	REL
2226943	12/24/1980	Memo: Biological assessment after uranium mill tailings spill, Church Rock, NM, w/appendices [UNC0196471-UNC0197504]	James Ruttenber / Centers for Disease Control - Chronic Diseases Div	Centers for Disease Control	REL
1128090	4/1/1987	Reclamation plan - engineering concepts, w/TLs	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1127959	5/1/1987	Reclamation engineering services - geohydrologic rpt	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1127960	5/1/1987	Hydrogeology of Pipeline Canyon, near Gallup, NM			REL
1128095	7/1/1988	Reclamation plan, amendment 1, w/TL to D Smith fr J Velasquez 7/26/88	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1128093	1/1/1990	As-built rpt - north cell interim stabilization	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1128092	12/1/1990	Response to comments & proposed reclamation plan modifications, v1 - text, tables, figures, w/TL to J Velasquez fr M Timner 11/21/90 & marginalia	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1127961	6/1/1991	Historical water-quality data, Puerco River Basin, AZ & NM	Laurie Wirt / US Geological Survey Barbara Favor / US Geological Survey Peter Van Metre / US Geological Survey		REL
1128088	8/1/1991	Tailings reclamation plan as approved by NRC (Nuclear Regulatory Commission) 3/1/91, v2 (of 3) - tables, figures	Canonie Environmental Technologies Corp	United Nuclear Corp - U N C Mining & Milling	REL
1128089	8/1/1991	Tailings reclamation plan as approved by NRC (Nuclear Regulatory Commission) 3/1/91, v1 (of 3) - text	Canonie Environmental Technologies Corp	United Nuclear Corp - U N C Mining & Milling	REL

1128096	8/1/1991	Tailings reclamation plan as approved by NRC (Nuclear Regulatory Commission) 3/1/91, v3 (of 3) - appendices	Canonie Environmental Technologies Corp	United Nuclear Corp - U N C Mining & Milling	REL
1128091	4/1/1992	As-built rpt addendum - central cell interim stabilization	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1128087	4/1/1992	As-built rpt - south cell interim stabilization	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1127962	4/1/1993	United Nuclear Corp Church Rock Mill decommissioning rpt, v1, w/TL to R Hall fr E Morales 4/13/93	United Nuclear Corp		REL
1128262	1/1/1994	Radioactivity in the environment - case study of Puerco & Little Colorado River Basins, AZ & NM	Laurie Wirt / US Geological Survey		REL
1128094	6/1/1995	As-built rpt addendum - central cell final reclamation	Canonie Environmental Services, Inc	United Nuclear Corp - U N C Mining & Milling	REL
1128263	1/1/1996	Effects of uranium-mining releases on groundwater quality in Puerco River Basin, AZ & NM (USGS water-supply paper 2476)	P Van Metre / US Geological Survey		REL
1128099	4/1/1996	As-built rpt - south cell final reclamation	Smith Environmental Technologies Corp	United Nuclear Corp - U N C Mining & Milling	REL
1128100	3/1/1997	As-built rpt - 1996 final reclamation construction	Smith Environmental Technologies Corp	United Nuclear Corp - U N C Mining & Milling	REL
1127986	1/19/2004	Rationale & field investigation workplan to evaluate recharge & potential cell sourcing to zone 3 plume, w/TL to M Purcell fr R Blickwedel	U S Filter Engineering & Construction	General Electric Co	REL
1127967	5/25/2004	Design, performance, & sustainability of engineered covers for uranium mill tailings	Jody Waugh / S M Stoller Corp		REL
1128469	9/21/2007	Memo: Final polrep (polrep #2), Northeast Church Rock Residential 2	Harry Allen / Environmental Protection Agency - Region 9	Peggy DeLaTorre / Environmental Protection Agency - Region 9	REL
1128470	9/21/2007	Memo: Polrep #1 - Northeast Church Rock Residential 2	Harry Allen / Environmental Protection Agency - Region 9	Peggy DeLaTorre / Environmental Protection Agency - Region 9	REL
1128412	10/1/2007	Final removal site evaluation rpt, w/o tables & appendices	Montgomery Watson Harza	United Nuclear Corp	REL

2141248	10/1/2007	Final removal site evaluation rpt, appendix B: Laboratory data rpts & data validation results only (compact disc only)	Montgomery Watson Harza	United Nuclear Corp	REL
1128460	2/29/2008	Draft supplemental removal site evaluation rpt, w/apps A-B & TL to A Bain fr T Leeson, & w/o app C	Montgomery Watson Harza	United Nuclear Corp	REL
1128116	4/25/2008	Ltr: Recommendations & summary of hydrogeologic analysis evaluation of gw flow in zone 3 for design of pumping system to intercept & recover impacted groundwater - UNC Church Rock Tailings Site, Gallup, NM (AO docket #CERCLA 6-11-89), w/attchs	Mark Jancin / N A Water Systems James Ewart / N A Water Systems	Myron Fliegel / Nuclear Regulatory Commission Mark Purcell / Environmental Protection Agency - Region 6	REL
2230867	12/1/2008	Ltr: Confirmation of government-to-government consultation on 12/5 re draft revsied EE/CA for site, w/marginalia	David Taylor / Navajo Nation Dept of Justice - Office of the Attorney General	Harrison Karr / Environmental Protection Agency - Region 9	REL
2198562	1/1/2009	Fact Sheet: US EPA completes 3rd 5-year review of current groundwater remedy (United Nuclear Corp Church Rock Superfund Site)	Environmental Protection Agency - Region 6		REL
2198580	1/23/2009	Comments on advance draft EE/CA	United Nuclear Corp	Environmental Protection Agency - Region 9	REL
2199045	2/18/2009	Ltr: Limits of proposed interim removal action, w/attchs	Lance Hauer / General Electric Co	Andrew Bain / Environmental Protection Agency - Region 9	REL
2198582	2/23/2009	Ltr: Nuclear Regulatory Commission comments on EE/CA, w/attch & env	Rebecca Tadesse / Nuclear Regulatory Commission - Div of Waste Management & Environmental Protection	Andrew Bain / Environmental Protection Agency - Region 9	REL
2199052	3/26/2009	Ltr: Response to interim action workplan dated 11/20/08 & 2/18/09 ltr re evaluating limits of proposed action	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2199044	4/3/2009	Ltr: Comments on interim removal action workplan	Freida White / Navajo Nation Environmental Protection Agency - Superfund Program	Andrew Bain / Environmental Protection Agency - Region 9	REL

2199046	4/22/2009	Ltr: Response to comments on interim removal action workplan	Lance Hauer / General Electric Co	Andrew Bain / Environmental Protection Agency - Region 9	REL
2199065	4/24/2009	Ltr: Access for non-intrusive survey work associated with interim action workplan granted to US EPA & General Electric	David Taylor / Navajo Nation Dept of Justice	Andrew Bain / Environmental Protection Agency - Region 9	REL
1128436	5/1/2009	Interim removal action plan construction storm water pollution prevention plan (SWPPP) - (redline version with comments), w/appendices, w/o figure	Montgomery Watson Harza	United Nuclear Corp	REL
2199084	5/4/2009	Newsclip: Navajo awaiting decision on Churchrock cleanup	Kathy Helms / Gallup Independent (Newspaper)		REL
1127964	5/21/2009	Estimation of emissions for NECR EE/CA	Cynthia Wetmore / Environmental Protection Agency - Region 9		REL
2189728	6/11/2009	Public Notice: Public availability of EE/CA for removal action at site, & public comment period (Navajo Times, p C-5)	Environmental Protection Agency - Region 9		REL
2195693	6/11/2009	Public Notice: Public availability of EE/CA for removal action at site, & public comment period (Gallup Independent newspaper)	Environmental Protection Agency - Region 9		REL
2240724	6/11/2009	Northeast Churchrock Mine Engineering Evaluation/Cost Analysis (EE/CA) for Non-Time Critical Removal Administrative Record Index	Environmental Protection Agency - Region 9		REL
2198581	6/22/2009	Ltr: Comments on EE/CA	Nadine Padilla / Multicultural Alliance for a Safe Environment	Andrew Bain / Environmental Protection Agency - Region 9	REL
2207119	6/23/2009	(Redacted, FOIA Ex 6) Comment forms fr 6/23/09 EE/CA public info meeting		Environmental Protection Agency - Region 9	REL
1128431	7/1/2009	Interim removal action health & safety plan (HASP) - draft text	M W H Americas, Inc	United Nuclear Corp	REL
2198585	7/1/2009	Ltr: Improvement of public awareness & participation in decision-making process on Church Rock mine & mill site remediation plan, w/env	Jonathan Block / New Mexico Environmental Law Center	Andrew Bain / Environmental Protection Agency - Region 9	REL

1122762	7/7/2009	Transcript - Removal public meeting, Pinedale Chapter	Justine Hannaweeke / NONE		REL
2198591	7/7/2009	Memo: Comments on EE/CA at public hearing 7/7/09, w/marginalia	Bluewater Valley Downstream Alliance	Environmental Protection Agency - Region 9	REL
2207120	7/7/2009	(Redacted, FOIA Ex 6) Comment forms fr 7/7/09 & 8/25/09 EE/CA public meetings.		Environmental Protection Agency - Region 9	REL
2233694	7/7/2009	(Redacted, FOIA Ex 6) Memo: Comments on EE/CA		Environmental Protection Agency - Region 9	REL
2198583	7/9/2009	Email: Transmits DOE comments on EE/CA, w/history, attch (Review commentsJuly7 (3).doc), & forward to A Bain fr R Bush 7/13/09	Michael Widdop / US Dept of Energy	Richard Bush / US Dept of Energy Michael Widdop / US Dept of Energy	REL
2195694	7/11/2009	Public Notice: Extension of public comment period for EE/CA for removal action at site (Gallup Independent newspaper)	Environmental Protection Agency - Region 9		REL
1128298	7/16/2009	Remarks of Navajo Nation President J Shirley on 30th anniversary of Church Rock Uranium Mill Tailings tragedy	Joe Shirley / Navajo Nation Office of the President & Vice President		REL
2195692	7/16/2009	Public Notice: Extension of public comment period for EE/CA for removal action at site (Navajo Times, p B-2)	Environmental Protection Agency - Region 9		REL
2233850	7/16/2009	Public Notice: Extension of public comment period for EE/CA for removal action at site (Navajo Times), w/proof of publication dated 7/21/09	Environmental Protection Agency - Region 9		REL
2188453	7/23/2009	Action Memo: Request for time-critical removal action at Northeast Church Rock Step-Out Area, McKinley County, NM, Navajo Nation Reservation, w/attchs & w/o enforcement addendum (00 Action Memo AM006)	Andrew Bain / Environmental Protection Agency - Region 9	Elizabeth Adams / Environmental Protection Agency - Region 9	REL
2188456	7/24/2009	Administrative settlement agreement & order on consent (AOC) for interim removal action, docket # 2009-11, w/apps A-C (00 AOC 003)	Environmental Protection Agency - Region 9		REL

2199048	7/24/2009	Ltr: Request for pre-approval to begin initial site activities associated with interim removal activity, w/attch	Lance Hauer / General Electric Co	Andrew Bain / Environmental Protection Agency - Region 9	REL
2199041	7/24/2009	Interim removal action workplan, w/appendices	Montgomery Watson Harza	United Nuclear Corp	REL
2199068	7/24/2009	Memo: Comments on 7/17/09 interim removal action workplan & 7/23/09 action memo	Freida White / Navajo Nation Environmental Protection Agency - Superfund Program	Andrew Bain / Environmental Protection Agency - Region 9	REL
2199049	8/3/2009	Ltr: Interim removal AOC submittal of proposed temporary relocation plan (housing plan), w/attch	Lance Hauer / General Electric Co	Andrew Bain / Environmental Protection Agency - Region 9	REL
2199073	8/6/2009	Interim removal action construction documents (revised), w/TL to A Bain fr L Hauer, w/o compact discs	Montgomery Watson Harza	United Nuclear Corp	REL
2199206	8/6/2009	Interim removal action construction documents (revised), w/TL to A Bain fr L Hauer (compact discs only)	Montgomery Watson Harza	United Nuclear Corp	REL
2199074	8/7/2009	Ltr: Monthly rpt #1 for interim removal action, covering 7/24-7/31/09, w/attchs	James Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2228937	8/13/2009	Compact Disc: Environment, Safety & Health (ES&H) manual, version 1.0 rev 8 (Adobe pdf format)	MACTEC, Inc		REL
2199055	8/14/2009	Ltr: Approval of interim removal action construction plan, with modifications	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2199056	8/14/2009	Ltr: Comments on interim removal action HASPs	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2199057	8/15/2009	Ltr: Approval of interim removal action temporary relocation plan (housing plan), with modifications	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
1128432	8/21/2009	Interim removal action health & safety plan (HASP) - tables 1-5	M W H Americas, Inc	United Nuclear Corp	REL
1122763	8/25/2009	Transcript - Removal public meeting, Church Rock Chapter	Justine Hannaweeke / NONE		REL
2199083	8/26/2009	Newsclip: Navajo EPA giving some guidance on uranium - state looks to Dine for advice	Kathy Helms / Gallup Independent (Newspaper)		REL

2199081	8/27/2009	Newsclip: Uranium's legacy - Red Water Pond Rd residents prepare for relocation	Kathy Helms / Gallup Independent (Newspaper)		REL
2199082	8/27/2009	Newsclip: Is it safe to live here? - Northeast Churchrock Mine cleanup plan under fire	Kathy Helms / Gallup Independent (Newspaper)		REL
1127963	9/1/2009	Conceptual cover profile evaluation	Stephen Dwyer / Dwyer Engineering, L L C	United Nuclear Corp	REL
1125028	9/4/2009	Web Page: Polrep #1 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
2198573	9/8/2009	Ltr: Comments on EE/CA - transmits presentation overheads, w/encl	Johnnye Lewis / Univ of New Mexico - Community Environmental Health Program	Andrew Bain / Environmental Protection Agency - Region 9	REL
1120277	9/9/2009	Comments on EE/CA, w/TL to A Bain fr R McAlister	General Electric Co		REL
1122643	9/9/2009	Ltr: Comments on EE/CA	Patrick Antonio / Navajo Nation Environmental Protection Agency - Water Quality/ NNPDES Program	Andrew Bain / Environmental Protection Agency - Region 9	REL
2198576	9/9/2009	Ltr: Comments on proposed EE/CA, w/exhibits A & B & env	Stephen Etsitty / Navajo Nation Environmental Protection Agency	Andrew Bain / Environmental Protection Agency - Region 9	REL
2198574	9/9/2009	Ltr: Comments on EE/CA, on behalf of NM Environmental Justice Working Group	Richard Moore / Southwest Network for Environmental & Economic Justice	Andrew Bain / Environmental Protection Agency - Region 9	REL
2198575	9/9/2009	Ltr: Comments on EE/CA	Chris Shuey / Southwest Research & Information Center	Andrew Bain / Environmental Protection Agency - Region 9	REL
2198584	9/9/2009	Ltr: EE/CA review	Katie Sweeney / National Mining Assn	Andrew Bain / Environmental Protection Agency - Region 9	REL
2199075	9/10/2009	Ltr: Monthly rpt #2 for interim removal action, 8/09, w/attchs, w/o attch 3	James Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
1125029	9/11/2009	Web Page: Polrep #2 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
2223548	9/11/2009	Ltr: Final health & safety plan (interim action AOC submittal), w/encls	Lance Hauer / General Electric Co	Andrew Bain / Environmental Protection Agency - Region 9	REL

2223549	9/15/2009	Ltr: Interim action AOC submittal - asbestos abatement workplan, certificate of accreditation, & laboratory rpt for tile samples, w/attchs	Lance Hauer / General Electric Co	Andrew Bain / Environmental Protection Agency - Region 9	REL
1125030	9/16/2009	Web Page: Polrep #3 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
1125031	9/25/2009	Web Page: Polrep #4 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
2199085	9/25/2009	Ltr: Request for additional government-to-government consultation for EE/CA	Keith Takata / Environmental Protection Agency - Region 9	Stephen Etsitty / Navajo Nation Environmental Protection Agency	REL
2199058	9/29/2009	Ltr: Approval of interim removal action asbestos abatement workplan, with modifications	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2199106	10/1/2009	Navajo Superfund Program site screen form for Vent Hole 8 (dated 9/29/08, approved 10/1/09), w/attch	Eugene Esplain / Navajo Nation Environmental Protection Agency - Superfund Program		REL
2223517	10/5/2009	Ltr: Transmits ltr fr T Nez to L Yoshii dated 9/7/09 & requests assistance with responding, w/attch, TL to D Richmond, et al 10/27/09, & marginalia	Tom Udall / US Senate - Office of Tom Udall	Laura Yoshii / Environmental Protection Agency - Region 9	REL
2223550	10/7/2009	Ltr: Workplan for final status survey of unnamed arroyo, interim removal action, w/attchs	Toby Leeson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2199076	10/9/2009	Ltr: Monthly rpt #3 for interim removal action, 9/09, w/attchs	James Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
1128420	10/13/2009	Mtg Agenda: Stakeholder workshop draft agenda, 11/3-11/5	Luis Garcia-Bakarich / Environmental Protection Agency - Region 9		REL
2241262	10/13/2009	(Redacted, FOIA Ex 6) Email: Site cleanup activities & local environmental info, w/attchs (Stakeholder Conference Draft Agenda.doc, EtsittyNECR092509.pdf, & NSP_Screen_Vent_Hole_8.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL

1128422	10/16/2009	Request for assistance fr Navajo Nation chapter officials & members in identifying people whose homes were built with contaminated materials fr uranium mining	Navajo Nation Environmental Protection Agency		REL
2241263	10/16/2009	(Redacted, FOIA Ex 6) Email: Transmits PDF version of Navajo EPA flyer, w/history & attch (Navajo EPA Contaminated Structures Program Flier.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2223552	10/22/2009	Ltr: IRA (Interim Removal Action) status survey sampling grid & excavation schedule for step-out areas, w/attchs	Toby Leeson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2230857	10/22/2009	Mtg Overheads (17): Northeast Church Rock Mine cleanup - Navajo Nation & US EPA consultation	Environmental Protection Agency - Region 9		REL
1125032	10/24/2009	Web Page: Polrep #5 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
2198579	10/29/2009	Ltr: Response to comments on EE/CA	Keith Takata / Environmental Protection Agency - Region 9	Richard Moore / Southwest Network for Environmental & Economic Justice	REL
2223553	10/30/2009	Ltr: Workplan for addressing petroleum impacted soils, w/attchs	Jed Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2223558	11/1/2009	Vegetation & wildlife evaluations / revegetation recommendations (draft), 2009 evaluations & planning - Pinon-Juniper Community baseline & reference area, w/TL to A Bain fr J Thompson 11/10/09	Cedar Creek Assoc, Inc		REL
2223521	11/4/2009	Red Water Pond Rd availability session, 11/4/09 - community concerns			REL
2199060	11/9/2009	Ltr: Thanks & followup to participation in availability session - transmits meeting notes, w/TL to D Richmond & C Tenley, w/o attchs (concurrence page)	Environmental Protection Agency - Region 9	Teddy Nez / Red Water Pond Road Community Assn	REL
2199061	11/10/2009	Ltr: Thanks & followup to participation in listening session - transmits meeting notes, w/o attchs	Clancy Tenley / Environmental Protection Agency - Region 9	Teddy Nez / Red Water Pond Road Community Assn	REL

2199062	11/10/2009	Ltr: Response to ltr fr T Nez - meeting on 11/4 & followup ltr, w/o encl	Keith Takata / Environmental Protection Agency - Region 9	Tom Udall / US Senate - Office of Tom Udall	REL
1128372	11/11/2009	Mtg Notes: Red Water Pond Rd listening session, 11/4/09	Teddy Nez / Red Water Pond Road Community Assn		REL
2199077	11/11/2009	Ltr: Monthly rpt #4 for interim removal action, 10/09, w/attchs	James Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2223556	11/13/2009	Ltr: Riprap material quality data, for revised interim removal action contruction plan, w/attchs	James Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2223554	11/13/2009	Ltr: Workplan for evaluating petroleum impacted soils, w/attch	Jed Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
1125033	11/16/2009	Web Page: Polrep #6 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
2241264	11/17/2009	(Redacted, FOIA Ex 6) Email: Transmits interim removal action monthly rpt #4 & provides summary & link to vegetation & wildlife survey rpt, w/attch (NECR IRA Monthly Rpt 4-Oct 09_Final.PDF)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
1128441	11/24/2009	Map: Figure 8 - surface & subsurface background gamma radiation measurements, Northeast Church Rock - Quivira Mines	Weston Solutions, Inc		REL
2223559	12/4/2009	Ltr: (Draft) vegetation & wildlife evaluations / revegetation recommendations - EPA approval with modifications	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2241265	12/8/2009	(Redacted, FOIA Ex 6) Email: Interim removal action workplan summary	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2241268	12/8/2009	(Redacted, FOIA Ex 6) Email: Transmits 12/4/09 approval ltr for wildlife & vegetation rpt, & total petroleum hydrocarbon workplan dated 11/13/09, w/attchs (IRA_VegRpt_ApprovModif_12-04-09fin.pdf & NECR TPH Work Plan 11-13-09.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL

2241269	12/8/2009	(Redacted, FOIA ex 6) Email: Summary of site health & safety plan - transmits draft HASP & tables, w/attchs (NECR IRA HASP Final RLSO.doc & MWH NECR IRA HASP Tables.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2241270	12/8/2009	(Redacted, FOIA ex 6) Email: Discusses storm water pollution prevention plan (SWPPP), w/o attch (NECR SWPPP Final RLSO.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2241266	12/9/2009	(Redacted, FOIA Ex 6) Email: Retransmittal of interim removal action plan construction storm water pollution prevention plan, 5/09 (redline version) - will send HASP in subsequent email, w/attch (NECR SWPPP Final RLSO.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2223555	12/10/2009	Ltr: Monthly rpt #5 for interim removal action, 11/09, w/attchs	James Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
1128438	12/15/2009	Map: Interim removal action step out area fencing plan	Montgomery Watson Harza		REL
1128440	12/15/2009	Maps (2): Removal site evaluation fr Red Water Pond Rd, results of static gamma measurements & soil analytical results (draft)	Montgomery Watson Harza		REL
2225244	12/18/2009	Ltr: Response to request re 1979 Church Rock tailings impoundment incident, w/o encls	Jane Gardner / General Electric Co	Harrison Karr / Environmental Protection Agency - Region 9	REL
2224519	12/21/2009	Ltr: Government to government consultation on mine cleanup alternatives	Laura Yoshii / Environmental Protection Agency - Region 9	Joe Shirley / Navajo Nation Office of the President & Vice President	REL
1128374	12/25/2009	RWPR community strategic plan, updated			REL
2241258	12/29/2009	(Redacted, FOIA Ex 6) Email: Transmits RSE (removal site evaluation) drawings & preliminary data, w/attchs (041Attachment A - RWPR RSE Drawings.pdf & Weston Mine Screen - Arroyos-Quivera-RWPR.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL

2241267	12/29/2009	(Redacted, FOIA Ex 6) Email: NECR work / Red Water Pond Rd data, w/attch (20091215-2009 NECR IRA Restoration-fencing Map.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2223520	1/1/2010	Red Water Pond Rd Community Assn strategic plans	Red Water Pond Road Community Assn		REL
1128405	1/4/2010	Map: Step Out area survey data - interim removal action (figure 1, rev C), 11 x 17 in, 1 in = 100 ft	M W H Americas, Inc		REL
2241271	1/5/2010	(Redacted, FOIA Ex 6) Email: Step out area survey data - draft 80-ft gamma survey results requested by Teddy Nez, w/attch (20100104-STEP OUT AREA VERIFICATION DATA_PRELIMINARY.xls)	Sara Jacobs / Environmental Protection Agency - Region 9	Red Water Pond Road Community Assn	REL
2223505	1/8/2010	Ltr: Monthly rpt #6 for interim removal action, 12/09, w/attchs	James Thompson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2241272	1/11/2010	(Redacted, FOIA Ex 6) Email: Transmits monthly rpt #6 for interim removal action, 12/09, w/attch (NECR IRA Monthly Rpt 6-Dec 09_Final.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2223508	1/19/2010	Ltr: Workplan for bedrock sampling & analysis, interim removal action, w/attchs	Toby Leeson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2223482	1/21/2010	Ltr: Amendment to workplan for evaluating petroleum impacted soils, w/attchs	Toby Leeson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2215630	1/25/2010	Final removal site evaluation rpt, Red Water Pond Rd, w/appendices (compact disc only)	Montgomery Watson Harza	United Nuclear Corp	REL
2221296	1/26/2010	Final removal site evaluation rpt, Red Water Pond Rd, w/appendices, w/o compact disc	Montgomery Watson Harza	United Nuclear Corp	REL
1128275	2/1/2010	Settlement/water issues related to placement of additional material on existing tailings impoundment, w/appendix	Stephen Dwyer / Dwyer Engineering, L L C	United Nuclear Corp	REL
2224442	2/1/2010	Vegetation & wildlife evaluations / revegetation recommendations, 2009 evaluations & planning - Pinon-Juniper Community baseline & reference area	Cedar Creek Assoc, Inc		REL

1128274	2/12/2010	Ltr: UNC mill site disposal evaluation	Randall McAlister / General Electric Co	Keith Takata / Environmental Protection Agency - Region 9	REL
2233871	2/12/2010	Ltr: UNC mill site disposal evaluation, w/encls	Randall McAlister / General Electric Co	Keith Takata / Environmental Protection Agency - Region 9	REL
1128373	2/13/2010	Overheads (2): Model of responses to community concerns about health & environmental effects of uranium legacy	Teddy Nez / Red Water Pond Road Community Assn		REL
2230342	3/1/2010	Health & environmental impacts of uranium contamination in Navajo Nation - EPA progress in implementing 5-year cleanup plan (3/10 progress rpt)	Environmental Protection Agency		REL
2241273	3/9/2010	(Redacted, FOIA Ex 6) Email: 3/10 meeting & update re interim removal action, Red Water Pond Rd & EE/CA status, w/attch (Uranium Health & Risk Workshop.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Red Water Pond Road Community Assn	REL
1128371	3/10/2010	Map: RWPR area - known & potential exposure pathways			REL
2241274	3/26/2010	(Redacted, FOIA Ex 6) Email: Revegetation schedule & transmittal of 3/30/10 workshop flyer, w/history & attch (Uranium Health & Risk Workshop.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
1128409	3/30/2010	Mtg Notice: Uranium health & risk workshop at Church Rock Chapter House	Environmental Protection Agency - Region 9		REL
2224515	3/30/2010	Mtg Notes: Notes fr question & answer session, health & risk workshop held 3/30/10	Environmental Protection Agency		REL
2224443	4/1/2010	Ltr: Amendment to workplan for evaluating petroleum impacted soils (TPH workplan amendment) - EPA approval with modifications	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL

2224444	4/5/2010	Ltr: Responses to EPA comments on amendment to workplan for evaluating petroleum impacted soils	Toby Leeson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2241275	4/5/2010	(Redacted, FOIA Ex 6) Email: Response to request for risk assessment - transmits final removal site evaluation rpt, w/attch (UNC NECR RSE Final Report Oct2007.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2223543	4/6/2010	Ltr: Transmits video surveys taken fr mine shafts & vents 2/08, & table providing summary of technician observations, w/table, w/o compact discs (DVDs)	Lance Hauer / General Electric Co	Andrew Bain / Environmental Protection Agency - Region 9	REL
2241290	4/8/2010	(Redacted, FOIA Ex 4) Modification of contract for community involvement - final modification #4 to EP109000100	Environmental Protection Agency - Region 9	Red Water Pond Road Community Assn	REL
1125034	4/9/2010	Web Page: Polrep #7 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
1128375	4/15/2010	Conceptual planning for NECR mine reclamation/restoration	Teddy Nez / Red Water Pond Road Community Assn		REL
1128415	4/22/2010	Task order info - technical assistance to Red Water Pond Rd Community Assn	Environmental Protection Agency - Region 9	Innovative Technical Solutions, Inc	REL
2224518	4/26/2010	Ltr: Offer of briefing for members of Navajo Nation Resources Committee on EPA progress implementing 5-year plan to address uranium mining impacts	Clancy Tenley / Environmental Protection Agency - Region 9	George Arthur / Navajo Nation Council - Resources Committee	REL
1128368	4/28/2010	Email: Phil Bluehouse would be okay to facilitate 5/13 conceptual planning meeting, w/history	Teddy Nez / Red Water Pond Road Community Assn	Sara Jacobs / Environmental Protection Agency - Region 9	REL
2224516	4/29/2010	Ltr: Response to National Remedy Review Board recommendations for site	Andrew Bain / Environmental Protection Agency - Region 9	Amy Legare / Environmental Protection Agency - National Remedy Review Board	REL
2241276	4/29/2010	(Redacted, FOIA Ex 6) Email: Update re Red Water Pond Rd area, w/attchs (Health and Risk Workshop-Q&A Notes.doc & NECR Planning Workshop Flyer.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL

1128369	4/30/2010	Email: 5/13 planning workshop - transmits background info, w/attchs (9)	Sara Jacobs / Environmental Protection Agency - Region 9	Philmer Bluehouse / Bluehouse Peacemaking Service	REL
2223535	5/1/2010	Ltr: Authorized placement of backfill sands in mine stopes, w/encls	Jane Gardner / General Electric Co	Harrison Karr / Environmental Protection Agency - Region 9	REL
1128376	5/3/2010	Email: 5/13 planning workshop - transmits additional info, w/history & attch (Ted Speech on Conceptual Planning May.doc)	Teddy Nez / Churchrock Mine Area Community Assn	Sara Jacobs / Environmental Protection Agency - Region 9 Philmer Bluehouse / Bluehouse Peacemaking Service	REL
1128378	5/5/2010	Email: 5/13 planning workshop - confirms receipt of material, w/history	Philmer Bluehouse / Bluehouse Peacemaking Service	Sara Jacobs / Environmental Protection Agency - Region 9	REL
2241259	5/7/2010	(Redacted, FOIA Ex 4) WVN #12 - work variance notification for Subtask 12, community involvement	Environmental Protection Agency - Region 9		REL
1128308	5/13/2010	Mtg Notice: NE Church Rock planning workshop - Introduction to process & application of Dineh peacemaking model	Philmer Bluehouse / Bluehouse Peacemaking Service	Churchrock Chapter, Navajo Nation	REL
1128307	5/13/2010	Mtg Notice: NE Church Rock planning workshop, 5/13/10	Navajo Nation Environmental Protection Agency Environmental Protection Agency - Region 9	Churchrock Chapter, Navajo Nation	REL
1128370	5/13/2010	Mtg Notice: 5/13/10 planning workshop re Red Water Pond Rd area	Environmental Protection Agency - Region 9		REL
2220236	6/1/2010	Northeast Church Rock Mine interim removal action completion rpt	Montgomery Watson Harza	United Nuclear Corp General Electric Co	REL
2220237	6/1/2010	Compact Disc: Northeast Church Rock Mine interim removal action completion rpt (Adobe PDF format)	Montgomery Watson Harza	General Electric Co United Nuclear Corp	REL
1128451	6/10/2010	Mtg Notes: Questions, action items, & answers fr 6/10/10 mtg with Road Water Pond Road Community Assn	Philmer Bluehouse / Bluehouse Peacemaking Service	Environmental Protection Agency - Region 9	REL

2224445	6/30/2010	TL: Interim removal action completion rpt	Toby Leeson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
2223481	7/1/2010	Petroleum investigation results & bioventing pilot study plan, w/TL to A Bain fr T Leeson 7/26/10, w/o appendix C	Montgomery Watson Harza	United Nuclear Corp General Electric Co	REL
2233876	7/15/2010	TL: Package to update Appendix H of interim removal action completion rpt	Toby Leeson / Montgomery Watson Harza	Andrew Bain / Environmental Protection Agency - Region 9	REL
2228936	7/22/2010	Compact Disc: Petroleum investigation results & bioventing pilot study plan (Adobe pdf format)	Montgomery Watson Harza	United Nuclear Corp General Electric Co	REL
1128273	7/27/2010	Email: Forwards & discusses 3/9/10 email & ltr re mill site disposal of mine spoils, w/history	Andrew Bain / Environmental Protection Agency - Region 9	Cynthia Wetmore / Environmental Protection Agency - Region 9	REL
1127175	9/7/2010	Mtg Agenda: Proposed agenda for tours & meeting with Navajo EPA staff 9/20-9/21/10, Spokane Indian Reservation, Wellpinit, WA			REL
1128387	9/7/2010	Email: Discusses & transmits proposed agenda for mtg with Navajo Nation EPA on 9/20/10 - 9/21/10, w/attch & forward to S Jacobs fr D Barton, 7/5/11	Randy Connolly / Spokane Tribe of Indians	Svetlana Zenkin / Environmental Protection Agency - Region 9	REL
1128302	10/1/2010	Ltr: Responses to EPA comments on Bioventing Study Plan	Toby Leeson / M W H Americas, Inc	Andrew Bain / Environmental Protection Agency - Region 9	REL
1128452	10/1/2010	Ltr: Discusses & transmits US EPA response to Red Water Pond Road Assn's 2006 resolution, w/attch	Claire Trombadore / Environmental Protection Agency - Region 9	Red Water Pond Road Community Assn	REL
1128453	10/4/2010	Mtg Agenda: 10/4/10 RWPRCA mtg with stakeholders re free, prior, & informed consent, uranium health & risk rpt back	Sara Jacobs / Environmental Protection Agency - Region 9		REL

2243082	10/4/2010	(Redacted, FOIA Ex 6) Email: Transmits correct mtg agenda for 10/4/10 RWPRCA mtg with stakeholders re free, prior, & informed consent, uranium health & risk rpt back, & response documents, w/history & attchs	Sara Jacobs / Environmental Protection Agency - Region 9	Red Water Pond Road Community Assn	REL
1125035	10/5/2010	Web Page: Polrep #8 - continuation of interim removal action	Andrew Bain / Environmental Protection Agency - Region 9		REL
2223542	10/27/2010	Ltr: Notice of new EPA project manager for site (S Jacobs)	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2234455	10/27/2010	Email: Notice of new EPA project manager for site (S Jacobs), w/reply to A Bain fr R McAlister 10/29/10	Andrew Bain / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
1128259	11/1/2010	Handwritten Notes: Estimate waste cell configuration at UNC office area, w/map (9/3/10)	Cynthia Wetmore / Environmental Protection Agency - Region 9	File / NONE	REL
1124621	11/1/2010	2010 revegetation monitoring	Clear Creek Assoc		REL
1124688	11/1/2010	Conceptual plan for uranium mine cleanup and community restoration (final)	Red Water Pond Road Community Assn		REL
2239633	11/5/2010	TL: Electronic copies of project documents on 4 compact discs	Lance Hauer / General Electric Co	Cynthia Wetmore / Environmental Protection Agency - Region 9	REL
1128136	11/9/2010	Email: Summary of 10/5 site visit, & followup to community concerns, w/history & attch (Proposed Test Pit Locations.pdf)	Lance Hauer / General Electric Co	Claire Trombadore / Environmental Protection Agency - Region 9	REL
1128126	11/9/2010	Map: Recommended locations for excavation of geophysical anomalies (removal site evaluation), w/marginalia	United Nuclear Corp		REL
1128127	11/9/2010	Email: Followup to 10/5 community concerns, w/history, w/o attch (Proposed Test Pit Locations.pdf)	Lance Hauer / General Electric Co	Claire Trombadore / Environmental Protection Agency - Region 9	REL
2243083	11/9/2010	(Redacted, FOIA Ex 6) Email: Acknowledges receipt of follow-up to 10/5/10 community concerns & will be in touch after reviewing it, w/history	Claire Trombadore / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL

1128311	11/10/2010	Email: Proposed draft agenda for 12/2 community mtg - transmits mtg notice, w/attch (RWPond Scoping Flyer 12_10.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Philmer Bluehouse / Bluehouse Peacemaking Service Teddy Nez / Red Water Pond Road Community Assn	REL
1128312	11/10/2010	Public Notice: Red Water Pond Rd area planning mtg, 12/2/10	Environmental Protection Agency - Region 9		REL
1128125	11/19/2010	Email: Transmits ltr with preliminary comments on 6/10 interim removal action completion rpt, w/o attch (UNC-GEletter_Nov19-2010preliminarycompletionreportcomments.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
1128134	11/19/2010	Ltr: Preliminary comments on interim removal action completion rpt - items requiring immediate & near-term action, w/attchs & email TL	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
1128124	11/19/2010	Ltr: Preliminary comments on interim removal action completion rpt - items requiring immediate & near-term action, w/attchs	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
1124624	11/19/2010	Ltr: Preliminary comments on interim removal action preliminary completion rpt, w/attchs	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2243084	11/24/2010	(Redacted, FOIA Ex 6) Email: Informs of work activity at NECR following week & discusses dinner/mtg scheduled for 12/2/10	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
2243081	11/25/2010	(Redacted, FOIA Ex 6) Mtg Agenda: Meeting with stakeholders - uranium health & risk rpt back, 12/2/10	Resident / Red Water Pond Road Community		REL

1128135	11/29/2010	Email: Transmits ltr response to EPA preliminary comments on NECR interim removal action completion rpt & revegetation monitoring rpt, w/attchs (NECR Report 10.pdf & Response to 11-19-2010 Letter.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128123	11/29/2010	Email: Transmits ltr with response to EPA preliminary comments on NECR interim removal action completion rpt & revegetation monitoring rpt, w/o attchs (NECR Report 10.pdf & Response to 11-19-2010 Letter.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128256	11/29/2010	Email: Transmits ltr response to EPA preliminary comments on interim removal action completion rpt & revegetation monitoring rpt, w/attchs (NECR Report 10.pdf & Response to 11-19-2010 Letter.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1124623	11/29/2010	Ltr: Initial response to preliminary comments on interim removal action completion rpt, w/attch	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128255	11/30/2010	Email: Confirms approval of proposed plan to complete field work this week (ref US EPA preliminary comments on NECR IRA completion rpt), w/history	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
1128457	11/30/2010	RWPRCA conceptual plan for uranium mine cleanup & community restoration	Red Water Pond Road Community Assn		REL
2243085	11/30/2010	(Redacted, FOIA Ex 6) Email: Transmits 12/2/10 stakeholders mtg agenda & 11/30/10 RWPRCA conceptual plan for uranium mine cleanup & community restoration, w/attchs	Teddy Nez / Red Water Pond Road Community Assn	Andrew Bain / Environmental Protection Agency - Region 9	REL
1128252	12/1/2010	Table: IRA (interim removal action) 12/10 surveys	General Electric Co		REL
1128251	12/1/2010	Map: IRA (interim removal action) gamma status, 1/10, & areas with elevated gamma 12/10			REL

2225247	12/2/2010	Stormwater construction site inspection rpt - interim removal action	Jed Thompson / Montgomery Watson Harza		REL
1128253	12/4/2010	Table: Gamma spectroscopy run data, 12/1-12/2 sample dates	A V M Environmental Services, Inc		REL
1128247	12/7/2010	Email: Assessment of use of mill site well water for dust control - transmits MWH risk analysis, w/attch (NECR Uranium Risk Memorandum rev12-06-10.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128249	12/7/2010	Email: Transmits stormwater construction site inspection rpt for interim removal action, w/attch (20101202-NECR-IRA_swppp_inspection.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128250	12/7/2010	Email: Results of evaluation - transmits sample results & figure, w/attchs (NECR IRA Dec 10 Survey Areas.pdf, Necr add areas survey.xlsx, & NECR Dec 2010 Samples.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1124622	12/7/2010	Memo: Risk analysis of mill sites well water used for construction dust control, w/attchs	Toby Leeson / M W H Americas, Inc Bruce Narloch / M W H Global, Inc	Sara Jacobs / Environmental Protection Agency - Region 9	REL
2241261	12/9/2010	(Redacted, FOIA Ex 4) Email: Project management for community involvement - transmits SOW & work variance notification, w/history, forward to S Jacobs fr S Zenkin 1/31/11 & attchs (Subtask_12 - NECR.pdf & WVN #12.pdf)	Rachel Hess / Innovative Technical Solutions, Inc	Svetlana Zenkin / Environmental Protection Agency - Region 9	REL
1128257	12/17/2010	Stormwater construction site inspection rpt - interim removal action, w/attchs	Rick Spitz / MACTEC, Inc		REL
1128254	12/21/2010	Email: Transmits stormwater construction site inspection rpt for interim removal action (ref UNC NECR SWPPP inspection rpt), w/attchs (12-17-2010_SCSIR.PDF, 12-20-10 Nface channel.jpg, 12-20-10 Z2 rillhill.jpg, & 12-20-10borrow.jpg)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL

1128301	1/7/2011	Ltr: Supplemental removal site evaluation workplan - E drainage, w/attchs	Toby Leeson / M W H Americas, Inc	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128280	1/13/2011	Maps (3): Interim removal action follow-up, figures 1, 2 & 3 (draft) - survey results	Montgomery Watson Harza	United Nuclear Corp	REL
1128282	1/17/2011	Storm water construction site inspection rpt (SWPPP inspection rpt) - interim removal action, w/attchs	Rick Spitz / MACTEC, Inc		REL
1128279	1/18/2011	Email: Summary of additional interim removal actions at mine site during 11/10 & 12/10, w/attch (NECR Additional IRA Figures 1-18-11.pdf)	Toby Leeson / M W H Global, Inc	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128281	1/18/2011	Email: Transmits storm water construction site inspection rpt (SWPPP inspection rpt) for interim removal action & photos, w/attchs (01-17-2011 SCSIR.pdf, 01-17-11 borrow.JPG, 01-17-11 Nface channel.JPG, & 01-17-11 rillhill.JPG)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1127174	1/31/2011	Ltr: Congratulations on reappointment & offer to participate in briefing 2/16 or 2/17	Clancy Tenley / Environmental Protection Agency - Region 9	Stephen Etsitty / Navajo Nation Environmental Protection Agency	REL
1128284	1/31/2011	Storm water construction site inspection rpt (SWPPP inspection rpt) - interim removal action, w/attchs	Rick Spitz / MACTEC, Inc		REL
1128316	2/1/2011	Bioventing pilot study results (text, tables & figures)	Montgomery Watson Harza	General Electric Co United Nuclear Corp	REL
1128314	2/1/2011	Bioventing pilot study results (text only)	Montgomery Watson Harza	General Electric Co United Nuclear Corp	REL
1128318	2/1/2011	Appendices - bioventing pilot study results	Montgomery Watson Harza	United Nuclear Corp General Electric Co	REL
1128283	2/3/2011	Email: Transmits storm water construction site inspection rpt (SWPPP inspection rpt) for interim removal action, & photos, w/attchs (01-31-2011 SCSIR.pdf, 01-31-11 rillhill.JPG, 01-31-11 borrow.JPG, & 01-31-11 Nface channel.JPG)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL

1128286	2/14/2011	Conceptual plan for uranium mine cleanup and community restoration, 2/10 version (rev 2/14/11)	Red Water Pond Road Community Assn		REL
2241260	2/14/2011	(Redacted, FOIA Ex 6) Email: Response to draft agenda - transmits conceptual plan, w/history & attch (FrPaul 02-14-2011 RWPRCA_Conceptual_plan_130-2011 West-Tradit.doc.pdf)	Teddy Nez / Red Water Pond Road Community Assn	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128303	2/15/2011	Overheads: US Northeast Church Rock remedy selection (presentation to Navajo EPA)	Environmental Protection Agency - Region 9		REL
1127965	2/17/2011	Ltr: Reasons Crescent Junction, UT facility not available for disposal of NECR site waste	Donald Metzler / US Dept of Energy - Grand Junction Projects Office	Cynthia Wetmore / Environmental Protection Agency - Region 9	REL
1128269	2/17/2011	Email: Transmits ltr giving reasons Crescent Junction, UT facility not available for disposal of NECR site waste, w/attch (NECRMineWasteResponse.pdf)	Kym Bevan / S & K Aerospace, L L C	Cynthia Wetmore / Environmental Protection Agency - Region 9	REL
1128322	2/28/2011	Stormwater construction site inspection rpt (SWPPP inspection rpt) - interim removal action	Rick Spitz / MACTEC, Inc		REL
1128315	3/1/2011	Email: Transmits final bioventing pilot study (email 2 of 3), w/attch (NECR Final Bioventing Report 2-24-1 text, tables & figures.pdf)	Lance Hauer / General Electric Co	Michele Dineyazhe / Navajo Nation Environmental Protection Agency Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128317	3/1/2011	Email: Transmits appendices for bioventing bioventing pilot study results (email 3 of 3), w/attch (NECR Final Bioventing Report Appendices.pdf)	Lance Hauer / General Electric Co	Michele Dineyazhe / Navajo Nation Environmental Protection Agency Sara Jacobs / Environmental Protection Agency - Region 9	REL

1128313	3/1/2011	Email: Transmits final bioventing pilot study rpt (email 1 of 3), w/attch (NECR Final Bioventing Report 2-24-1 text only.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128320	3/1/2011	Overheads: Mill site repository technical meeting, March 2011	General Electric Co		REL
1128276	3/6/2011	Email: Call-in info for mtg - transmits PowerPoint file (ref NECR waste consolidation at UNC technical meeting), w/o attch (NECR Presentation 03-08-11.ppt)	Lance Hauer / General Electric Co	Earle Dixon / NM Environment Dept Michele Dineyazhe / Environmental Protection Agency - Region 9	REL
1128319	3/6/2011	Email: Transmits PowerPoint presentation for mill site repository mtg (ref NECR waste consolidation at UNC technical mtg - presentation & call info), w/attch (NECR Presentation 03-08-11.pdf)	Lance Hauer / General Electric Co	Earle Dixon / NM Environment Dept Michele Dineyazhe / Navajo Nation Environmental Protection Agency	REL
1128321	3/15/2011	Email: Transmits stormwater construction site inspection rpt (SWPPP inspection rpt) for interim removal action, w/attchs (02-28-2011 SCSIR.pdf, 02.28.11 rillhill.JPG 02.28.11, borrow.JPG 02.28.11, Nface channel.JPG, & 02.28.11 rilling.JPG)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128323	3/22/2011	Email: Transmits worker monitoring data (response to request for additional interim removal action air monitoring data), w/attch (NECR IRA Monitoring Memo 3-22-2011.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128324	3/22/2011	Memo: Personnel monitoring routines & results fr NECR IRA (interim removal action) project, w/attchs	MACTEC, Inc	Lance Hauer / General Electric Co	REL
1128128	4/1/2011	Newsclip: EPA awaits Quivira data, NECR cleanup decision in fall	Kathy Helms / Gallup Independent (Newspaper)		REL
1128129	4/1/2011	Fact Sheet: Mine waste cleanup work - community update	Environmental Protection Agency - Region 9		REL
1128389	4/1/2011	Stormwater construction site inspection rpt re NECR interim removal action project, 4/1/11, w/attchs	Rick Spitz / MACTEC, Inc	Lance Hauer / General Electric Co	REL

1128304	4/5/2011	Ltr: Response to bioventing pilot study results rpt for site, prepared by MWH & dated 2/11	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
1128306	4/5/2011	Ltr: Response to supplemental removal site evaluation workplan, East drainage, NECR site, MWH, dated 1/7/11	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2240722	4/8/2011	Northeast Churchrock Mine Superfund Site, Residential Site #1 Removal Administrative Record Index	Environmental Protection Agency - Region 9		REL
2240723	4/8/2011	NE Churchrock Quivira Mines Superfund Site, Residential Site #2 Removal Administrative Record Index	Environmental Protection Agency - Region 9		REL
2241287	4/8/2011	(Redacted, FOIA Ex 4) Email: Final Modification #4 to EP109000100 - task 5 incorporated, w/attch	Carrie Evans / Environmental Protection Agency - Region 9	Teddy Nez / Red Water Pond Road Community Assn	REL
1128380	4/11/2011	Email: Discusses & transmits updated plan for test trenches & standard operating procedures (SOPs), w/attchs	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128382	4/14/2011	Email: Transmits stormwater construction site inspection rpt, dated 4/1/11, w/attchs	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
2243086	4/14/2011	(Redacted, FOIA Ex 6) Email: Response to request for contact info & more info re upcoming clean-up near property, w/history	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Coyote Canyon Chapter, Navajo Nation	REL
2243087	4/22/2011	(Redacted, FOIA Ex 6) Email: Discusses upcoming & ongoing assessment work at NECR & Quivira mines & transmits 4/11 fact sheet, w/o attch (NECR and Quivira Fact Sheet-April 2011.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
1127966	5/1/2011	Evaluation of consolidation & water storage capacity related to placement of mine material on existing UNC Mill site tailings impoundment	Stephen Dwyer / Dwyer Engineering, L L C	United Nuclear Corp	REL
2241283	5/2/2011	(Redacted, FOIA Ex 6) Email: Resending new fact sheet, w/history & attch (NECR4_11_Final.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL

1128464	5/6/2011	Table 2 - NECR water well sampling data	C Tiballi / NONE		REL
1128466	5/6/2011	Photos (2): Fill around SE corner of fence around step out area	Bill Sass / Ecology & Environment, Inc		REL
2241284	5/6/2011	(Redacted, FOIA Ex 6) Email: Friendship well safe for livestock use - transmits table for well 14T-586, w/attch (Table 2.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Resident / Red Water Pond Road Community	REL
1128270	5/13/2011	Email: Mine site figures for 5/25 site meeting, w/attchs (NECR Supplemental RSE Figures.pdf & Fig 1 Proposed Test Trench Locs.pdf)	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9 Cynthia Wetmore / Environmental Protection Agency - Region 9	REL
1128325	5/13/2011	Map: Figure 1, Proposed test trench locations	Montgomery Watson Harza		REL
2241285	5/19/2011	(Redacted, FOIA Ex 6) Email: Response to concerns about potential erosion issues at SE corner of fence around step out area (ref Quivira Field Update for Thursday, 5/5/11), w/attchs (after2a.JPG & after2b.JPG)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
1128288	5/24/2011	Mtg Agenda: UNC Churchrock Mill Site meeting re risk assessment draft rpt & site-wide supplemental FS	Katrina Higgins-Coltrain / Environmental Protection Agency - Region 6		REL
1128287	6/1/2011	Email: Discusses conceptual cover profile evaluation rpt, w/o attch (Dwyer report ET 9-9-09.pdf)	Lance Hauer / General Electric Co	Cynthia Wetmore / Environmental Protection Agency - Region 9	REL
1128386	6/1/2011	Final slide presentation for NMED informational briefing, 6/11 - Gallup, NM, United Nuclear Corp & Northeast Church Rock Superfund sites	Environmental Protection Agency - Region 6 Environmental Protection Agency - Region 9		REL
1128390	6/1/2011	Stormwater construction site inspection rpt re NECR interim removal action project, 6/1/11, w/attchs	Rick Spitz / MACTEC, Inc	Lance Hauer / General Electric Co	REL
1128461	6/1/2011	Regional screening level (RSL) summary table, 6/11	Environmental Protection Agency		REL

1128290	6/2/2011	Email: Discusses & transmits reply to NRC comment dated 5/18/11, w/o attch (Reply_NRC_Comment_dated_5-18-11.pdf)	Stephen Dwyer / Dwyer Engineering, L L C	Cynthia Wetmore / Environmental Protection Agency - Region 9 Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128133	6/2/2011	Memo: Reply to comment in email dated 5/18/11, w/attch	Stephen Dwyer / Stephen F Dwyer (Engineer)	Zahira Cruz / Nuclear Regulatory Commission	REL
2241286	6/3/2011	(Redacted, FOIA Ex 6) Email: NECR vent hole 8 screening, & fencing issue, w/attch (NSP_Screen_Vent_Hole_8_.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Resident / Red Water Pond Road Community	REL
1128305	6/13/2011	Newsclip: Radioactive waste dump in Gallup's backyard	Kathy Helms / Gallup Independent (Newspaper)		REL
1128384	6/20/2011	Ltr: Proposes additional erosion control measures in interim removal action construction areas at site, w/encl	Jed Thompson / Montgomery Watson Harza	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1128383	6/21/2011	Email: Discusses & transmits SWPPP inspection rpt, dated 6/1/11, & ltr fr MWH proposing additional erosion control measures in interim removal action construction areas at site, dated 6/20/11, w/attchs	Lance Hauer / General Electric Co	Sara Jacobs / Environmental Protection Agency - Region 9	REL
2241289	6/21/2011	(Redacted, FOIA Ex 6) Email: Follow up coordination / proposed Skype call on 7/7, w/attchs 1 & 2 (NECR2_epa_polrep_2.htm, NECR2_epa_polrep_1.htm), w/o attch 3 (Final NECR HS Trip Rpt.pdf)	Sara Jacobs / Environmental Protection Agency - Region 9	Residents / Red Water Pond Road Community	REL
1128299	6/28/2011	Mtg Agenda: Meeting between NMED (Environment Dept) & EPA Regions 6 & 9 on NECR & UNC Superfund site			REL
1128385	6/28/2011	Email: Transmits final slide presentation for NMED informational briefing, 6/11, w/attch	Katrina Higgins-Coltrain / Environmental Protection Agency - Region 6	Sara Jacobs / Environmental Protection Agency - Region 9	REL
1127128	7/7/2011	Ltr: Feedback on how Navajo Nation input is being considered, & confirmation of support in finalization of action memo	Jane Diamond / Environmental Protection Agency - Region 9	Stephen Etsitty / Navajo Nation Environmental Protection Agency	REL

1128300	7/7/2011	Ltr: Approval of additional erosion control measures in interim action construction areas	Sara Jacobs / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL
2241288	7/29/2011	(Redacted, FOIA Ex 6) Email: Response to email sent to Navajo Nation EPA - explains community funding direct contract with Red Water Pond Rd Community Assn, w/forward to S Jacobs 9/9/11 & history	Dana Barton / Environmental Protection Agency - Region 9	Resident / Red Water Pond Road Community	REL
1128260	8/1/2011	Memo: Present worth calculations	Cynthia Wetmore / Environmental Protection Agency - Region 9	File / NONE	REL
1128261	8/18/2011	Ltr: Technical memo summarizing 2 rpts on Zone 3 tailings seepage sourcing & groundwater recharge, w/attchs	James Ewart / Chester Engineers Mark Jancin / Chester Engineers	Katrina Higgins-Coltrain / Environmental Protection Agency - Region 6 Yolande Norman / Nuclear Regulatory Commission	REL
1128428	8/29/2011	Ltr: Clarification of commitments re EE/CA alternative 5A	Randall McAlister / General Electric Co	Clancy Tenley / Environmental Protection Agency - Region 9	REL
1128393	9/1/2011	Draft regional groundwater assessment of impacts fr historic releases of NECR mine & UNC mill facilities, Navajo Nation, w/o app A	Engineering/Remediation Resources Group, Inc Environmental Protection Agency - Region 9		REL
1128309	9/1/2011	Ltr: Follow up to 7/7/11 ltr & 8/12/11 conference call re site & summarizes EPA responses to key comments raised by Navajo Nation	Jane Diamond / Environmental Protection Agency - Region 9	Stephen Etsitty / Navajo Nation Environmental Protection Agency	REL
2240729	9/1/2011	Fact Sheet: Site cleanup - community update	Environmental Protection Agency - Region 9		REL
1128388	9/2/2011	Email: Responds to summary of lines of evidence supporting that tailings in cells are unsaturated & transmits 8/18/11 technical memo summarizing 2 rpts on Zone 3 tailings seepage sourcing & groundwater recharge, w/history & attch	Cynthia Wetmore / Environmental Protection Agency - Region 9	Lance Hauer / General Electric Co	REL

1128272	9/6/2011	Email: Will plan to evaluate optimal drainage configuration (ref UNC - Follow up on tailings seepage evaluations), w/history	Lance Hauer / General Electric Co	Cynthia Wetmore / Environmental Protection Agency - Region 9	REL
2241300	9/8/2011	Geophysical anomaly trenching rpt	Montgomery Watson Harza	United Nuclear Corp	REL
1128490	9/12/2011	Ltr: Clarification of 2 points raised in ltr re GE commitments related to proposed removal action	Clancy Tenley / Environmental Protection Agency - Region 9	Randall McAlister / General Electric Co	REL
2240727	9/16/2011	Northeast Churchrock Mine Superfund Site Step-Out Interim Removal Administrative Record Index	Environmental Protection Agency - Region 9		REL
2240728	9/16/2011	NE Churchrock Quivira Mines Superfund Site Removal Administrative Record Index	Environmental Protection Agency - Region 9		REL
1128485	9/19/2011	SOW for technical assistance to Red Water Pond Road Community Assn (revised)	Environmental Protection Agency - Region 9		REL
1128501	9/20/2011	Ltr: General overview of matters discussed at 9/8/11 mtg re NECR site cleanup, w/o encl	Jane Diamond / Environmental Protection Agency - Region 9	Ben Shelly / Navajo Nation Office of the President & Vice President	REL
1128500	9/26/2011	List of US EPA guidance documents consulted during development & selection of response action for site	Environmental Protection Agency - Region 9		REL
2240730	9/27/2011	Memo: Post-EE/CA analysis of alternatives - alternative off-site disposal locations	Environmental Protection Agency - Region 9		REL
2240731	9/29/2011	Action Memo: Request for non-time-critical removal action at site	Environmental Protection Agency - Region 9		REL
2240738	9/27/2011	Northeast Churchrock Mine Superfund Site Drainage East of Red Water Pond Rd Removal Administrative Record Index	Environmental Protection Agency - Region 9		REL
1128381		Standard operating procedure 16 - Geotechnical sample collections & analysis	Lance Hauer / General Electric Co	Environmental Protection Agency - Region 9	REL
1128377		Speech on conceptual planning	Teddy Nez / Red Water Pond Road Community Assn		REL
2224514		Map: Tribal trust, BLM & state land (Northeast Church Rock vicinity)			REL

Attachment II

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs) TABLE

In the Engineering Evaluation and Cost Analysis ("EE/CA"), U.S. EPA addressed the Applicable or Relevant and Appropriate Requirements ("ARARs") for the proposed Actions at the Site. This attachment contains a discussion of how the ARARs are selected, and lists the ARARs laid out in the EE/CA as well as the additional ARARs identified as a result of comments received by U.S. EPA during the Public Comment Period on the EE/CA.

Applicable or relevant and appropriate requirements (ARARs) cover both federal and state environmental requirements and are used to: (1) evaluate the appropriate extent of Site cleanup; (2) scope and formulate alternatives; and (3) guide the implementation and operation of a selected action. Section 300.415(j) of the NCP requires that "removal actions pursuant to CERCLA Section 106, shall "to the extent practicable, considering the exigencies of the situation, attain ARARs under federal or state environmental or facility siting laws." The U.S. EPA Region 9 requested and received ARARs from the State of New Mexico and the Navajo Nation EPA for consideration in this EE/CA (see table provided as Attachment II for a complete list of the ARARs for this removal action).

Terms and Definitions

The following are explanations of the terms and definitions used throughout this ARARs discussion. Applicable requirements are clean-up standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site (52 Federal Register [FR] 32496, August 27, 1987). Relevant and appropriate requirements are clean-up standards, standards of control, or other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well-suited to the particular site (52 FR 32496). Portions of a requirement may be relevant and appropriate even if the entire requirement is not. Information to be considered includes non-promulgated advisories or guidance issued by federal or state government that are not legally binding and do not have the status of potential ARARs. They are considered in the absence of federal or state ARARs, or when such ARARs are

012898

not sufficiently protective. An example of information to be considered is the U.S. EPA Region 9 PRGs that provide guidance to assess human health implications during a removal action.

Under the description of ARARs set forth in the NCP, state and federal ARARs are organized under the following three categories:

> Chemical-specific ARARs are usually health- or risk-based standards that limit concentrations of chemicals found in or discharged to the environment. They govern the extent of site remediation by providing either actual clean-up levels or the basis for calculating such levels. Chemical-specific ARARs may also be used to indicate acceptable levels of discharge in determining treatment and disposal requirements and to assess the effectiveness of future remedial alternatives. For example, state water quality standards apply to a site where treatment effluent is discharged to a surface water body.
>
> Location-specific ARARs set restrictions on chemical concentrations or the conduct of activities solely because they are in special locations (53 FR 51394). In determining the use of location-specific ARARs for selected remedial actions at CERCLA sites, the jurisdictional prerequisites of each of the regulations must be investigated. In addition, basic definitions and exemptions must be analyzed on a site-specific basis to confirm the correct application of the requirements. For example, federal and state regulations concerning groundwater may apply at a site where a removal action may impact groundwater quality.
>
> Action-specific ARARs set controls or restrictions on particular kinds of activities related to the management of particular wastes or materials (53 FR 51437). Selection of a particular response action at a site will invoke the appropriate action-specific ARARs that may specify particular performance standards or technologies as well as specific environmental levels for discharged or residual chemicals. For example, the federal noise regulations apply at a site where construction and heavy equipment activities are occurring.

Identification and evaluation of ARARs is an iterative process that continues throughout the response process. As a better understanding is gained of Site conditions, contaminants, and response alternatives, the lists of ARARs and their relevance to the removal action may change.

Other Considerations and Assumptions

The following additional considerations and assumptions were made during the ARAR identification process.

Occupational Safety and Health Administration (OSHA)

OSHA has promulgated standards for protection of workers who may be exposed to hazardous substances at Resource Conservation and Recovery Act (RCRA) or CERCLA sites (29 CRF Parts 1910.120 and 1926.65). The U.S.EPA requires compliance with

012899

OSHA standards in the NCP (40 Code of Federal Regulations [CFR] 300.150), but not through the ARAR process. Therefore, OSHA standards are not considered ARARs. Although the requirements, standards, and regulations of OSHA are not ARARs, they will be complied with during the removal action.

Uranium Mill Tailing Radiation Control Act (UMTRCA)
UMTRCA programs are categorized under Title I and Title II. Title I addresses specific inactive Uranium processing sites and Title II addresses active sites that are required to have a license from NRC. Under UMTRCA, the U.S.EPA was directed to devise standards for both the control Engineering Evaluation/Cost Analysis and cleanup remedial actions. The NECR mine site is not a listed site under Title I of UMTRCA nor would NECR mine wastes be classified under Title II. However, UMTRCA requirements may be ARARs under certain circumstances, as reflected in the ARARs table attached as an Appendix to this Attachment.

Acronyms

BMP	Best Management Practice
CAA	Clean Air Act
CFR	Code of Federal Regulations
CWA	Clean Water Act
ESA	Endangered Species Act
Mrem/yr	Milli-Roentgen-Equivalent-Man/Year
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NMAC	New Mexico Administrative Code
NMSA	New Mexico Statutes Annotated
NN	Navajo Nation
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Commission
RCRA	Resource Conservation and Recovery Act
SMCRA	Surface Mining Control and Reclamation Act
TBC	To Be Considered
UMTRCA	Uranium Mill Tailings Radiation Control Act
USC	United States Code

Table A-1 Chemical-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Solid Wastes	FEDERAL **Resource Conservation and Recovery Act (RCRA) of 1976, as amended –** Subtitle D, 42 USC 6901 et seq.	Regulates disposal of solid waste. Per 42 USC 6903(27), RCRA does not regulate "source, special nuclear, or byproduct material" as defined in the Atomic Energy Act, but may apply to other wastes, including ores containing uranium in concentrations less than 500 ppm.	Substantive requirements may be applicable to wastes that are subject to the Act
Hazardous Wastes	FEDERAL **Resource Conservation and Recovery Act (RCRA) of 1976, as amended –** Subtitle C, 42 USC 6901 et seq.	Provides for "cradle-to-grave" regulation of hazardous wastes. Per 42 USC 6903(27), RCRA does not regulate "source, special nuclear, or byproduct material" as defined in the Atomic Energy Act. Per 40 CFR 261.4(b)(7), wastes derived from the extraction, beneficiation and processing of ores are not hazardous wastes. EPA does not anticipate encountering RCRA hazardous wastes during this removal action. However, if hazardous wastes (e.g., buried drums containing solvents) are discovered, RCRA hazardous waste requirements would be ARARs.	Substantive requirements may be applicable if wastes that are subject to the Act are encountered
Soils	FEDERAL **Surface Mining Control and Reclamation Act of 1977 (SMCRA), as amended --** And regulations at 30 CFR Parts 816 and 817	Establishes a program for regulating surface coal mining and reclamation (mandatory uniform standards). Includes minimization of impacts on fish, wildlife, and related environmental values. Revegetation requirements (e.g., 30 CFR 816.111) may be relevant & appropriate to protect against erosion.	Substantive requirements may be relevant and appropriate
Hazardous Materials	FEDERAL **Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended –** And regulations at 40 CFR Part 192, Subparts A-E	Protect the public and the environment from uranium mill tailings. Some requirements (e.g., 40 CFR 192.02, 192.12, 192.32) may be ARARs.	Substantive requirements may be applicable to activities involving uranium mill tailings, and/or activities on UNC NPL site, if any; may be relevant and appropriate to other activities
Other	FEDERAL **Code of Federal Regulations (CFR), Title 10, Part 20** NRC Regulations – Standards for Protection Against Radiation; Subpart D – Radiation Dose Limits	Establishes standards for protection against ionizing radiation resulting from activities conducted under licenses issued by the NRC	Substantive requirements may be applicable or relevant and appropriate if source, byproduct or special nuclear material is encountered
Air	FEDERAL **Clean Air Act (CAA) –** National Emission Standards for Hazardous Air Pollutants (NESHAPs) that apply to radionuclides, Title 40 CFR Part 61, Subpart H.	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 may be relevant and appropriate to activities during the removal action. These requirements may become applicable if DOE takes over long-term maintenance of the facility in the future.

Table A-1 Chemical-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Other	FEDERAL **EPA Directive on Protective Cleanup Levels for Radioactive Contamination at CERCLA sites.** OSWER Directive 9200.4-18	Provides guidance for cleanup levels for CERCLA sites with radioactive contamination. Cleanup of radionuclides are governed by risk established in the NCP when ARARS are not available or sufficiently protective.	TBC
Water	NAVAJO NATION **Navajo Nation Pollutant Discharge Elimination System Program –** applicable regulations	Protection of NN watershed from discharges of pollutants from any point source	Substantive requirements may be applicable to activities on reservation and tribal trust land
Solid Wastes	NAVAJO NATION **Navajo Nation Solid Waste Act –** Subchapter 2 – Prohibited Act Subchapter 5 – Enforcement	Protect the health, safety, and preserve the resources of the NN. Regulates solid waste but exempts mine tailings and waste rock. Some requirements are applicable to salts.	Substantive requirements may be relevant and appropriate if regulated salts are encountered during removal action
Air	NAVAJO NATION **Navajo Nation Air Pollution Prevention and Prevention Act –** Air Quality Control Programs – Permits, 2004; Code of Regulations for air emissions, Rules and Regulations.	Outlines Best Management Practices (BMPs) to control dust that would be generated during earth moving activities. Details the BMPs to control excessive amounts of particulates.	Substantive requirements may be applicable to activities on reservation and tribal trust land
Water	NAVAJO NATION **Navajo Nation Clean Water Act –** Title 4 Navajo Nation Code.	Establishes water quality standards; prevention of pollutant discharges. Standards protect fish, wildlife, and domestic, cultural, agricultural, and recreational uses of water.	Substantive requirements may be applicable to activities on reservation and tribal trust land
Hazardous Waste	STATE Hazardous Waste Act **20.4 NMAC** – Hazardous Waste Regulations	Establishes criteria for the classification of hazardous waste and for the treatment, storage, and disposal of hazardous waste. The state Act incorporates most Federal RCRA regulations, including the definition of solid waste, which excludes "source, byproduct or special nuclear material." New Mexico's definition of hazardous waste also excludes wastes from the extraction, beneficiation, and processing of ores and minerals.	Substantive requirements may be applicable or relevant and appropriate, if wastes that are subject to the Act are encountered.
Solid Waste	STATE Solids Waste Act **20.9 NMAC** – Solid Waste Regulations	Establishes criteria for the handling of solid waste . The state Act incorporates most Federal RCRA regulations, including, as noted above, the definition of solid waste, which excludes "source, byproduct or special nuclear material."	Substantive requirements may be applicable or relevant and appropriate, if wastes that are subject to the Act are encountered.
Water	STATE **20.6.2 NMAC** – New Mexico Water Quality Ground and Surface Water Protections	Establishes water quality standards and regulations to prevent or abate water pollution from discharges, including surface water and groundwater.	Substantive requirements may be relevant and appropriate to surface runoff on reservation or tribal trust land, and may be applicable to protecting groundwater and surface runoff on non-tribal lands

012902

Table A-1 Chemical-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Water	STATE **20.6.4 NMAC** – New Mexico Standards for Interstate and Intrastate Surface Waters	Establishes water quality standards that consist of the designated use or uses of surface waters, water quality criteria necessary to protect the use or uses, and an anti-degradation policy.	Substantive requirements may be relevant and appropriate to surface runoff on reservation or tribal trust land, and may be applicable to surface runoff on non-tribal lands
Other	STATE **20.3.14 NMAC –** New Mexico Standards for Protection Against Radiation	Establishes standards for protection against radiation resulting from extraction, transport, transfer and storage of naturally occurring radioactive materials in the oil and gas industry.	Substantive requirements may be relevant and appropriate
Other	STATE **20.3.4 NMAC** – Standards for Protection Against Radiation	Establishes standards for protection against ionizing radiation resulting from activities conducted pursuant to licenses or registrations issued by the Department	Substantive requirements may be relevant and appropriate

Table A-2 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, Title50 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

Table A-2 Location-Specific ARARs and TBC Information			
Media	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Wildlife	NAVAJO NATION **Navajo Nation Endangered Species List –** Resource Committee Resolution RCAU-103-05	Regulates the protection of Navajo Nation threatened and endangered species or critical habitat of such species	Substantive requirements applicable if protected species are identified within area to be disturbed on reservation or tribal trust land
Cultural Resources	STATE **NMSA 1978 –** New Mexico Cultural Properties Act	Requires the identification of cultural resources, assessment of impact on those resources that may be caused by the proposed remedy, and consultation with the State Historic Preservation Officer	Substantive requirements applicable to response actions on non-tribal lands in New Mexico

012904

Table A-3 Action-Specific ARARs and TBC Information			
Media/ Activity	**Requirement**	**Requirement Synopsis**	**Status and Rationale**
Hazardous Materials	FEDERAL **Federal Hazardous Materials Transportation Law (formerly Hazardous Materials Transportation Act) –** 49 CFR Parts 171, 172, 173	Provides protection against the risks to life, property, and the environment that are inherent in transportation of hazardous materials in commerce	Substantive requirements applicable to transportation of materials subject to the Act, including radionuclides
Water	FEDERAL **EPA Guidance for Developing Best Management Practices for Storm Water –** Publication EPA/832/R-92006	Guidance for developing stormwater BMPs for industrial facilities	TBC
Water	FEDERAL **CWA** – Section 402, National Pollutant Discharge Elimination System (NPDES) Stormwater discharges (40 CFR parts 122, 125).	On-site and off-site discharges from site are required to meet the substantive CWA requirements, including discharge limitations, monitoring and best management practices	Substantive requirements may be applicable
Water	FEDERAL **CWA** – Section 404, dredged or fill material, 33 CFR parts 320--330, 40 CFR 230.	Regulates discharge of dredge or fill material into waters of the U.S.	Substantive requirements may be applicable to activities impacting waters of the U.S.
Air	STATE **20.2 NMAC** – Air Quality	Establishes ambient air quality standards, performance standards for specific sources of air pollutants, and specifies monitoring methods	Substantive requirements may be relevant and appropriate to sources on reservation or tribal trust land; may be applicable to sources on non-tribal lands in New Mexico
Mining	STATE **19.10 NMAC –** Regulation of Non-Coal Mining	Establishes requirements for mine reclamation and close-out plans	Substantive requirements may be relevant and appropriate
Wildlife	STATE **19.21.2 NMAC** – New Mexico Wildlife Conservation Act **NMSA 178** Sections 17-2-37 thru 17-2-46	Regulates taking of endangered plant species	Substantive requirements may be applicable if protected species are identified within area to be disturbed on non-tribal lands; may be relevant and appropriate on reservation or tribal trust land

012905

Attachment III

RESPONSIVENESS SUMMARY

A. OVERVIEW

The Northeast Church Rock (NECR) Mine is located in the Pinedale Chapter of the Navajo Nation and was operated by the United Nuclear Corporation (UNC) from 1968 to 1982. UNC is now an indirect subsidiary of General Electric (GE) and will be referred to in this document as UNC/GE. The 125 acre former uranium mine site is located primarily on tribal trust land and included two mine shafts, vent holes, wastewater processing ponds, roads, wells, and support buildings.

The Red Water Pond Road residential community lies between the NECR Mine and the Quivira Mine, another former uranium mine which was operated by the Kerr McGee Corporation. In addition, the UNC Mill Site, a Superfund Site co-regulated by U.S. EPA Region 6 and the U.S. Nuclear Regulatory Commission (NRC), is located across Highway 566, less than a mile away from the community.

Operations at the NECR Mine left uranium protore (low grade ore), waste rock, and overburden after the Mine was shut down. Uranium and its decay product radium are of primary concern at the NECR Mine Site. Radium is present in significantly elevated concentrations in soil and sediment. Because the contaminants have been transported via wind and water processes to areas around or adjacent to the site, humans, plants and animals may experience exposures through the food chain, air or surface water.
In May of 2009, U.S. EPA issued an Engineering Evaluation/Cost Analysis (EE/CA) in which U.S. EPA evaluated several alternatives for cleanup of the NECR Mine Site. U.S. EPA's preferred alternative (5A) addressed the soil contamination at the NECR Mine and specified that some of the mine waste would be co-disposed at the nearby UNC Mill Site Tailings Disposal Cell, while the higher-risk "principal threat waste" would be sent to an off-site facility for re-processing. This Responsiveness Summary is issued in conjunction with EPA's Action Memorandum: Request for a Non-Time-Critical Removal Action at the Northeast Church Rock Mine Site, McKinley County, New Mexico, Pinedale Chapter of the Navajo Nation ("Action Memorandum").

U.S. EPA held an initial public information meeting on June 23, 2009 and a public hearing on July 7, 2009. Based on comments received during the original comment period, U.S. EPA extended the end of the comment period on the EE/CA from July 13, 2009 to September 9, 2009. An additional public hearing was held on 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*. In addition, U.S. EPA has taken a further 24 months to listen to community, stakeholder and Navajo Nation

concerns during which time U.S. EPA held an additional ten community meetings and facilitated mine tours.

In addition to community involvement activities, U.S. EPA used the last two years to conduct research to further investigate issues brought up in the comment period. For example, U.S. EPA conducted additional research and developed a report discussing groundwater pathways and water quality impacts due to the historical mining and milling activities in the area.[1] U.S. EPA also further investigated the feasibility of using fourteen alternative disposal sites.[2] U.S. EPA requested and reviewed dozens of additional documents related to the closure of the UNC Mill Site to investigate concerns raised about the behavior of the UNC Mill Tailings in response to the proposed loading with NECR mine waste. Further, U.S. EPA requested that UNC/GE prepare a report modeling the behavior of the Mill Site Tailings for a wide range of scenarios with a sensitivity analysis of the model assumptions.[3] Finally, U.S. EPA continued investigation efforts in a drainage from the mine site east of Red Water Pond Road and fenced the area where contamination was found. This area, which is within the Navajo Nation Reservation, will be addressed pursuant to a separate Time Critical Action Memorandum.

U.S. EPA received numerous comment letters from various community groups, stakeholders, and other Federal, State and Tribal agencies: Red Water Pond Road Community Association (RWPRCA), Navajo Nation Environmental Protection Agency (NN EPA), U.S. Department of Energy (DOE), New Mexico Environment Department (NMED), New Mexico Energy, Minerals, and Natural Resources Department (EMNRD), Southwest Research and Information Center (SRIC), Bluewater Valley Downstream Alliance (BVDA), National Mining Association (NMA), U.S. Nuclear Regulatory Commission (NRC), Southwest Network for Environmental & Economic Justice (SNEEJ), Multicultural Alliance for a Safe Environment (MASE), New Mexico Environmental Law Center, University of New Mexico's College of Pharmacy and United Nuclear Corporation-General Electric (UNC/GE). U.S. EPA also received multiple comments at the three public hearings. All written comments as well as transcripts of the public hearings are posted on the Northeast Church Rock Mine webpage at www.epa.gov/region09/NECR. Due to the similarity and the volume of comments, U.S. EPA has combined similar comments and its responses in this responsiveness summary.

This responsiveness summary includes the following sections:

- Background on Community Involvement
- Summary of Comments Received During the Public Comment Period and Agency Responses
  - Part I: Summary and Response to Community Concerns
  - Part II: Comprehensive Response to Specific Comments

[1] *Draft Regional Groundwater Assessment of Impacts from Historic Releases of the NECR Mine and UNC Mill Facilities, Navajo Nation report* dated September 2011.
[2] *Alternative Off-site Disposal Locations Memo* dated September 2011.
[3] *Evaluation of Consolidation and Water Storage Capacity Related to the Placement of Mine Material on the existing UNC Mill Site Tailings Impoundment* dated May 2011.

012907

- Clarifications
- Acronyms
- Appendices

B. BACKGROUND ON COMMUNITY INVOLVEMENT

U.S. EPA first became aware of community efforts to address contamination at this site in 2003 when the Church Rock Chapter of the Navajo Nation initiated the Church Rock Uranium Monitoring Project (CRUMP). Information collected from this grass roots field effort raised awareness of the NECR Mine Site and in 2005, the Navajo Nation requested U.S. EPA to take the lead on the mine site cleanup efforts.

Data was collected in 2006 as part of the Removal Site Evaluation. In 2007, U.S. EPA conducted a residential cleanup action at several of the surrounding nearby homesites where contamination was found in the yards. In response to the residential removal action, the residential community organized and formed the Red Water Pond Road Community Association (RWPRCA), which has been the primary community group providing input to U.S. EPA on the NECR Mine Site removal actions.

The RWPRCA, a non-profit organization, now receives funding from U.S. EPA to help facilitate distribution of information from U.S. EPA to local residents and chapter officials through community meetings and document distribution, and to help bring concerns of the local community about activities related to the NECR Mine Site to U.S. EPA's attention in a timely manner. The RWPRCA estimates that 250-300 individuals are living within two miles of the NECR Mine Site.

012908

C. SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AGENCY RESPONSES

Part I: Summary of Community Comments and Response to Community Concerns

The major concerns expressed by residents during the public comment period are summarized below.

I-1. Alternative Selection – The residential community generally was in support of Alternative 2, disposal of all mine waste at an off-site facility significantly removed from the local community. A number of organizations as well as the Navajo Nation government submitted comments supporting the residential community in this goal. Several organizations raised this decision as an environmental justice issue and a number of residents gave compelling testimony at the public hearings about the harmful impacts of uranium mining activities on their families and way of life, including symptoms of post traumatic stress disorder.

U.S. EPA Response: U.S. EPA acknowledges the long-term detrimental impacts uranium mining has had and continues to have on the cultural, psychological, and physical health of this and other Navajo communities. While U.S. EPA understands the desire to remove all mining related contamination, including the mill tailings, from the immediate area, U.S. EPA does not consider that action to be justified under EPA's criteria for selecting removal actions.

U.S. EPA considers three principal criteria in selecting Superfund removal actions, including effectiveness, cost, and implementability. All alternatives evaluated in the EE/CA, except "no action," are implementable and effective in protecting human health and the environment in terms of eliminating direct contact with the contaminants. However, the costs of these alternatives varied greatly, since off-site disposal would increase costs by a factor of almost seven. Alternative 2 was estimated to cost $293,600,000, in comparison to Alternative 5A, which was estimated to cost $44,300,000. Alternatives 3 and 4 left the waste on Tribal Land, which was not acceptable to the Navajo Nation. The U.S. EPA-selected alternative of co-disposal of NECR mine waste at the UNC Mill Site is effective and protective of human health and the environment. This alternative is much more cost-effective than removing all mine waste from the area. On balance, U.S. EPA selected the least expensive alternative that removed waste from Tribal Lands.

I-2. Off-site disposal – The residents and the Navajo Nation requested that U.S. EPA evaluate additional off-site disposal options to determine if the cost of this alternative could be reduced to be more comparable with the proposed alternative.

012909

U.S. EPA Response: EPA evaluated ten disposal sites in addition to those discussed in the EE/CA based on the comments received from the community, Navajo EPA and other stakeholders during the public comment period. The potential disposal locations evaluated by EPA fell into four categories:

1) an on-site facility exempted from the off-site rule,
2) a licensed facility able to accept low-level waste,[4]
3) a current UMTRCA site which has waste similar to that being disposed, and
4) an off-site location where a licensed facility could be built.

The first category, an on-site facility, is legally and technically implementable. The second category is also legally and technically implementable; however, the cost is prohibitive given the volume of mine waste and the travel distance to the currently licensed facilities. Disposal at a current UMTRCA facility (Category 3) is implementable if the final closure cover is not in place and the license has not been revoked to accept additional waste. Approval from DOE/NRC in the form of a license amendment or a new license would be needed to bring waste to an UMTRCA site not currently licensed to accept such waste. Constructing a new facility (Category 4) would require either an NRC license or a Resource Conservation and Recovery Act (RCRA) permit or both, which is a lengthy and uncertain process. Once a location was identified, it could take decades for the necessary license and/or permit to be issued and a facility constructed. In summary, there were only two disposal sites that would be considered implementable in the near future: the UNC Mill Site and the NECR Mine Site. Details of the evaluation can be found in the *Alternative Off-site Disposal Locations Memorandum,* which is posted on the Northeast Church Rock Mine webpage at www.epa.gov/region09/NECR.

I-3. Public Comment Process – Both the community and several organizations submitted comments that the public comment process was inadequate in terms of the 30 day time period, the location and number of hearings, the availability of the associated documents and interpreters outside the public meetings, and the outreach.

U.S. EPA Response: In response to these concerns, U.S. EPA extended the comment period by 60 days, made the administrative record available at the local Chapter Houses, and held an additional public hearing on August 25, 2009 at a different chapter of the Navajo Nation. The additional public hearing and extension of the comment period were advertised in the *Gallup Independent* and the *Navajo Times*. In addition, U.S. EPA has taken a further 24 months to listen, address, and respond to community, stakeholder and Navajo Nation concerns.

I-4. Expand Cleanup Efforts to Surrounding Area – Several comments stated that the community is surrounded by multiple mine sites and associated contamination and requested concurrent cleanup of the entire area, including all

[4] The first two categories also were considered in the EE/CA.

012910

mines and impacted roads, arroyos, and home sites rather than addressing these issues consecutively. The community commented that it wants a well coordinated and comprehensive approach to cleanup of the larger area, regardless of the multiple jurisdictional issues and agencies involved, which the community finds confusing and frustrating. Other areas identified as areas of concern by certain community members included the Pinedale area, the HRI mine in Section 17, and the Rio Puerco.

U.S. EPA Response: U.S. EPA agrees that there are opportunities to address cleanup of other mines and contaminated areas in the region concurrently with the ongoing efforts to clean up the NECR mine. U.S. EPA has initiated a time critical removal action for the nearby Quivira mine sites. U.S. EPA ordered Rio Algom, the potentially responsible party for the Quivira mine sites, to immediately improve the security and stability of the mine sites and to chip seal the Red Water Pond Road which was determined to be contaminated during its use as a haul road from the mine. In addition, Rio Algom has characterized the nature and extent of the Quivira mine and is preparing a Removal Site Evaluation study summarizing the results of the investigation. The report is expected in the fall of 2011. U.S. EPA also has funded further assessments of the local arroyos and several areas of concern such as a local stock pond and cornfield that the community brought to our attention.

The Navajo Nation is the lead on investigations related to the cleanup of the HRI mine site in Section 17 and has investigated potential impacts in the Pinedale area. Further information as to the status of this investigation can be obtained from the Navajo Nation EPA at 1-800-314-1846.

The Navajo Nation EPA also has a contaminated structures project to assess potential contamination of home sites as well. To request that a specific Navajo home site be assessed, contact the Navajo Nation EPA at 1-800-314-1846. Previous investigations using targeted monitoring wells conducted by the USGS in 1990-1991 showed that the alluvium groundwater beneath the Rio Puerco had been impacted by mining operations. A review of the historic groundwater data from current livestock wells in the alluvium beneath the Rio Puerco did not show an impact associated with the mining, but the lack of an observed impact may be associated with the livestock location from the Rio Puerco and length of well. The impact to the Rio Puerco is discussed in the *Draft Regional Groundwater Assessment of Impacts from Historic Releases of the NECR Mine and UNC Mill Facilities, Navajo Nation report* and is posted on the Northeast Church Rock Mine webpage at www.epa.gov/region09/NECR.

I-5. Housing for Impacted Community Members – A number of local residents requested temporary housing for the entire community during NECR removal actions. Residents expressed frustration with the process and decision criteria for providing residents with temporary housing and described it as discriminatory. A community member submitted a document indicating that there are 11 households in the immediate vicinity of the NECR mine based on the public services

012911

definition of households, including 48 families and 110 people. A community member also requested a central coordinator to help facilitate temporary housing.

U.S. EPA Response: At the time of the public comment period, U.S. EPA was conducting a concurrent time critical Interim Removal Action (IRA) removing contaminated soil that had migrated from the mine site onto the reservation lands north of the NECR mine. U.S. EPA temporarily placed the removed materials back on the mine site until implementation of the final action to be selected in the EE/CA.

As a result of the temporary housing concerns related to the IRA, U.S. EPA held a follow up listening session for the community in Gallup, NM on November 9, 2009 at the annual Navajo Abandoned Uranium Mine Stakeholders Meeting. While three households had been provided with temporary housing during the IRA initially, the nearby residents presented compelling evidence as to the disruption the current cleanup activities were causing to their daily lives. U.S. EPA re-evaluated the housing impacts of the action and provided voluntary temporary housing to an additional 33 residents during the remainder of the IRA. A total of fifty-five people were provided with voluntary temporary housing during this effort.

Similarly, U.S. EPA will offer voluntary housing alternatives to households determined to be significantly disrupted by the current removal action. U.S. EPA will meet with households individually to discuss voluntary housing alternatives. The U.S. EPA Community Involvement Coordinator will facilitate these housing discussions with community members and is U.S. EPA's designated central coordinator. Additionally, U.S. EPA has funded technical assistance for the community through a U.S. EPA contract called Technical Assistance Services for Communities (TASC). Southwest Research and Information Center, a non-profit organization, has been sub-contracted through the TASC and is available to assist community members with evaluating housing options offered by U.S. EPA.

I-6. Community Funding – The president of the RWPRCA requested funding for the community to help coordinate their input into the removal actions since they are the most affected by the decisions. The RWPRCA also proposed creation of an outreach educational program on the effect of uranium waste to show the rest of the Navajo Nation what is being done at NECR and how its results will affect clean-up efforts at other waste sites in the Navajo Nation and the Grants Mineral Belt.

U.S. EPA Response: U.S. EPA agrees that in order to effectively proceed on any of the described removal actions, U.S. EPA should provide for active participation and engagement of the affected community, which requires time and resources. To address the resource need, the RWPRCA obtained non-profit status and U.S. EPA was able to award the RWPRCA a contract for community relations services on April 29, 2010. The scope of work for this contract involves activities such as facilitating monthly community meetings where information about the U.S. EPA

012912

removal projects can be shared and residents have the opportunity to discuss their concerns. Other activities include advertising public meetings, distributing information to community members, observing field work activities and reporting concerns back to U.S. EPA and NN EPA, and participating on telephone calls or in person meetings as requested by U.S. EPA to discuss information pertinent to the community.

Additionally, at the request of the RWPRCA, U.S. EPA has funded the Technical Assistance Services for Communities (TASC), a program to provide technical assistance to communities affected by hazardous waste sites regulated by the Superfund program. This program provides outside experts to explain hazardous waste issues and to help the community review and provide comments on EPA's plans for cleaning up the contaminated site. As noted above, Southwest Research and Information Center has been sub-contracted through the TASC for this service.

U.S. EPA supports the idea of an outreach educational program on the effects of uranium waste and work conducted at NECR and how its results will affect cleanup efforts at other waste sites in the Navajo Nation and the Grants Mineral Belt. U.S. EPA is available to continue discussions with the community regarding the creation of such a program.

I-7. Job Opportunities – There was interest from the community in training and employment of local residents to participate in the mine cleanup activities. Navajo Nation Department of Justice supported individual members of the NECR community in their job opportunity requests. Navajo Nation Department of Justice stated: "GE/UNC should hire local individuals as clean-up workers, subject to proper training on health and safety protection."

U.S. EPA Response: U.S. EPA expects that the selected alternative will provide economic opportunities for the local community and looks forward to helping facilitate this process. U.S. EPA has obtained a preliminary commitment from UNC/GE to hire local employees that have the necessary skills and training. To assist residents in obtaining these skills, U.S. EPA is working on potential application of a national Superfund Job Training Initiative or SuperJTI at NECR. This multi-week training program includes the technical and other training skills needed for this specific project. U.S. EPA is committed to bringing the necessary training skills to local communities through the SuperJTI or other appropriate training opportunities before construction activities begin on the removal action. UNC/GE, in a letter to U.S. EPA dated August 29, 2011, committed to giving first preference to qualified local Navajo labor.

I-8. Area Wide Groundwater Concerns – The local community was supported by interest groups and the Navajo Nation in the request that further evaluation and understanding of the area-wide impacts to groundwater from local mining activities be conducted prior to the NECR surface soil cleanup. The commenters asserted that it was inappropriate to limit the NECR cleanup to consideration of

012913

surface soils only. There was also a request to include the Pinedale wells in the groundwater assessment.

U.S. EPA Response: U.S. EPA agreed to perform an analysis of mining impacts to local groundwater in response to the public concerns. U.S. EPA evaluated the potential pathways for all historic releases associated with the local mining operations including mine dewatering, mine water discharge, the 1979 spill from the UNC Mill Site, and seepage from the mill tailings disposal cells. Based on the analysis, U.S. EPA identified wells most expected to have been impacted due to location and depth, including two wells in the Pipeline Arroyo, two wells in the Gallup formation and two in the Westwater Canyon member (where mining took place). In 2010, U.S. EPA collected groundwater samples from and compiled historical monitoring data from these wells from Navajo Department of Water Resources to better evaluate the impacts to groundwater of the UNC mining and milling activities. The results of this investigation are in the *Draft Regional Groundwater Assessment of Impacts from Historic Releases of the NECR Mine and UNC Mill Facilities, Navajo Nation report* , which is posted on the Northeast Church Rock Mine webpage at www.epa.gov/region09/NECR.

Based on U.S. EPA's analysis, the three major water sources in the NECR Mine and UNC Mill area - the Alluvium groundwater, the Upper Gallup Sandstone Member aquifer, and the Westwater Canyon Sandstone Member aquifer - have shown impacts to water quality associated with the mining operations. Water quality in the groundwater has generally improved since the cessation of mining and milling operations. Current water quality is considered poor due to the total dissolved solids (TDS) concentrations that are normal for the region. Uranium concentrations and radium-226/228 are below federal health levels of concern, with the exception of an anomalous result from one Alluvium well, and the plume for the historical Tailing Disposal cells seepage, which is under investigation and enforcement by U.S. EPA Region 6.

Although the Pinedale wells would not be hydrologically connected to any NECR/UNC mine releases, U.S. EPA and NN EPA have been broadly gathering information for many livestock wells within the Navajo Nation to assess whether the water is safe to drink, including testing for radionuclides such as uranium and radium-226. A list of livestock wells found to be contaminated with levels of uranium or radionuclides that are unsafe to drink can be found at http://www.epa.gov/region9/superfund/navajo-nation/pdf/NN-Contaminated-Water-List.pdf. This list will be updated as results from additional well sampling are included.

I-9. Alternative 5A Design – There were numerous concerns expressed by the community, the Navajo Nation, and other organizations about the details of the design of the disposal cells for the proposed alternative, especially if the cells were to be placed on the existing mill tailings cells. These concerns included questions about the performance and design of the specific cover and liner system

012914

that would be used, the uncertainty of volume estimates due to the depth of waste in the ponds, potential impacts to the tailings cells, the potential for water being squeezed out of the tailings due to the increased load, concern about stability of the mill cells due to construction debris from both the mine site and mill site, and the height and placement of the new cells. The residents emphasized that if the proposed alternative to consolidate the NECR waste on the UNC Mill site was to be selected, they would want to see a liner and a robust, redundant, state-of-the art cover. In addition, several community members discussed the urgency of moving quickly to address the health risk that has been present for so long and had questions about the timeline for making and implementing a cleanup decision. They also wanted assurances that the funding would be available to complete the project.

U.S. EPA Response: U.S. EPA and the other regulatory agencies involved in the NECR cleanup share the community's concerns that the design of the NECR disposal cells be robust enough to protect any migration of contamination to the surrounding land, air, surface water, or groundwater. Typically, detailed analysis of specific design issues is not performed as part of the EE/CA process for alternative selection. Rather, the design process follows selection of an alternative. Because of the strong concerns about the above-referenced technical issues raised by the community, interest groups, and the Navajo Nation, U.S. EPA conducted additional research and modeling prior to alternative selection in the Non Time Critical Action Memorandum. As a result of this additional work, U.S. EPA discovered that there was not enough room on the UNC Mill Site to construct a new cell for the NECR waste without impacting the current groundwater remediation efforts. Therefore, all analysis for Alternative 5A assumed the waste would be placed in a cell above the UNC mill tailings.

Cover/Liner Design Concerns: Significant advancements in cover design have occurred since the design of the UNC mill tailings cells. Bringing NECR waste to the UNC mill tailings cell provides the opportunity to improve upon the existing cover. During the design phase, U.S. EPA will evaluate new technologies such as evapotranspiration covers, to improve water management in an effort to ensure that no precipitation enters the NECR waste or UNC mill tailings. The NRC will have the final approval authority on the proposed design for Alternative 5A because it is the licensing authority for the UNC Mill facility. However, to address this design concern of the community, the Action Memorandum provides that a low permeability layer (liner) will be placed below the NECR waste to provide an additional level of protection against water intrusion into the more radioactive tailings cells. See response to Part II, Questions 2 and 3, for more detailed information.

'Squeezing" Concerns: To address this concern, U.S. EPA reviewed additional documentation related to the current and historical status and behavior of the UNC Mill Tailings. In addition to our own research, U.S. EPA requested that UNC/GE prepare a report modeling the behavior of the Mill Site Tailings under a wide range of scenarios with a sensitivity analysis of the model assumptions. A

012915

copy of the modeling report titled "*Evaluation of Consolidation and Water Storage Capacity Related to the Placement of Mine Material on the existing UNC Mill Site Tailings Impoundment*" dated May 2011 is posted on the Northeast Church Rock Mine webpage at www.epa.gov/region09/NECR. Based on our research and the modeling results, U.S. EPA concludes that water will not be squeezed from the mill tailings due to the loading with NECR waste material under any scenario. See Section II, Question 4 for more detailed information.

Debris Concerns: Closure of the Mill Site and disposal of the debris was closely regulated by the NRC. U.S. EPA obtained the Mill Decommission Report prepared by UNC dated April 1993, which included documentation of the content and placement of the debris including a detailed description with maps and photographs. This document can be found at www.epa.gov/region09/NECR. Based on this documentation, it is clear that the debris was placed in lifts, flattened, mixed and covered with soil and compacted, which resulted in a stable cell with negligible settling over the almost 20 years since disposal. Consequently, U.S. EPA has assurance that the additional weight of the NECR waste will not have any negative consequences on the stability of the tailings cells.

Volume Estimates: Typically, volume estimates for excavations are subject to variations and can be off by plus or minus 50%. While UNC/GE estimated a volume of NECR waste of approximately 500,000 cubic yards, U.S. EPA used a more conservative approach in the EE/CA and estimated a volume of 900,000 cubic yards. Specifically, U.S. EPA stated in the EE/CA that the remedy "would excavate to a maximum depth of 10 feet." This limit removes some of the uncertainties in the volume estimates since the horizontal extent of the contamination is well defined.

Alternative 5A is able to accommodate this potential variation in volume. The major factor influencing the ultimate height of the NECR waste and new cover is whether the NECR waste is placed on all three existing cells, or is limited to one or two cells. U.S. EPA anticipates that the NECR waste and new cover will add up to ten feet to the current surface height of the existing cells. The new cells will be designed to fit into the landscape visually.

Timeline: U.S. EPA acknowledges that residents have been living with the Mine Site and associated contaminants for several decades and wants to expedite cleanup and disposal as much as possible. Although U.S. EPA delayed making a cleanup decision in order to allow substantial additional consultation with the community and the Navajo Nation, U.S. EPA is now moving forward and anticipates approximately three years for the planning and design phase followed by four years of active construction. Therefore, the earliest project completion would likely be in 2018.

Project Funding: U.S. EPA anticipates that UNC/GE will conduct the removal action under an order on consent with U.S. EPA.

I-10. Ongoing Monitoring of the NECR Mine Site and UNC Mill Site – Community members requested long-term monitoring of the air, water, land, vegetation, and fencing with annual reporting back to the local residents. Some commenters expressed concern about maintenance of the fencing and cells over the long term given the long half-life of some of the uranium by-products and the limited lifetime for the cell design of 200 - 1,000 years. Several residents expressed concern about air monitoring for all cleanup activities and that the monitoring conducted during the IRA (occurred during the hours of construction and not over the entire 24-hour period that residents are concerned about potential exposure. The community requested continuous air monitoring during the removal action. Residents raised concerns about the ability to control dust over the entire area of the mill site once the existing cover is disturbed and the trucks are in use.

USEPA Response: U.S. EPA Region 6 is required by statute to perform five year reviews at the Mill Site to assess the continuing protectiveness of the cleanup and ensure that there is no exposure to people or the environment. The reviews will address exposure concerns from the air, land, water, vegetation, and include cover and fencing inspections. The five year review process also includes community outreach and involvement to ensure that the local community has the opportunity for input into the review and is aware of the results. If residents become aware of access issues such as downed fencing, they may contact the U.S. EPA to alert them to the problems for prompt attention outside the five year review process.

Additionally, after disposal of the NECR Mine Waste, the UNC Mill site will be returned to the Department of Energy's Long Term Stewardship program, under a general license with the NRC for monitoring and maintenance, which will add an additional level of long term management and oversight.
Although five-year reviews are not required by statute or by policy for removal sites, U.S. EPA has the discretion to conduct a five year review at the NECR Mine Site, if warranted. Since five year reviews are being performed at the UNC Mill site, at a minimum, U.S. EPA Region 9 plans on working with U.S. EPA Region 6 to incorporate a site inspection of the NECR Mine Site during the UNC Mill Site five year reviews.

Air monitoring during construction: Air monitoring takes place during the construction work hours because this is the time when the greatest amount of dust typically is generated due to the earth disturbing activities. Since wind speeds typically die down at night and there are no earth moving activities taking place, if the air monitoring was conducted over a 24-hour period, the nighttime results could potentially lower the average particulate results and mask potential problems that are occurring during daytime construction. However, for the removal action, during windy conditions, U.S. EPA will consider running air

012917

monitors over a 24-hour time period in addition to the monitors running during construction hours to confirm these assumptions, if appropriate.
Monitoring for gamma radiation is conducted on a 24-hour schedule. This monitoring detects any radiation coming off site, including radiation carried by dust. Based on air and radiation monitoring conducted during the IRA (see Question #4), U.S. EPA did not see any results that were unsafe for residents or workers.

I-11. Health Concerns - Many residents expressed concerns about the health and safety of families, including the children and elderly living near the mine site. The health of livestock and the safety of cultural uses of the local plants and herbs were also a concern. The community requested a comprehensive health study to better understand the impacts of mining on the health of the community.

U.S. EPA Response: As discussed above, U.S. EPA acknowledges the long-term detrimental impacts uranium mining has had and continues to have on the well-being of this residential community. The proposed actions would remove contamination from the Mine Site to health protective levels that are near natural background. Once this is completed, a period of re-vegetation will occur at the Mine Site to restore the land to permit grazing. After this period, it would be safe and appropriate to use plants and herbs from the site.

Additionally, there are several investigations ongoing to address potential health effects of past and continuing exposures from uranium mining in the larger Navajo community. The DiNEH project, conducted by the University of New Mexico (UNM) and SRIC, assesses water quality, health and uranium exposure in the Eastern Agency. Dine College is collaborating on investigating water quality of well water in the Shiprock Agency. The Navajo birth cohort study, conducted by University of New Mexico, SRIC, the Agency for Toxic Substances and Disease Registry, Navajo Nation Department of Health and the Navajo Area Indian Health Service, will look at birth outcomes and child development in several Navajo areas. The Partnership for Native American Cancer Prevention, Northern Arizona University, and the University of Arizona are investigating water quality and health effects in the Black Hills area by conducting animal studies on uranium in drinking water and looking at the effect on hormone levels. Finally, Christine Samuel, a Navajo Ph.D. candidate in the School of Nursing at UCLA, will be looking at uranium content in animal grazed and garden produce grown in contaminated soil or watered with contaminated water. The study will also assess both the tissue content and the possible transfer to people who consume the animals. The study is funded by National Institute of Health and is anticipated to start this fall. These studies are the initial steps in further determining the correlation between uranium exposure and health outcomes in people and looking for potential effects in the population.

The Navajo Area Indian Health Service also has a non-occupational health monitoring program and is holding health fairs around the Navajo Nation.

Although this program is not a study, it can provide information about disease rates on the Navajo Nation compared to other communities.

I-12. Traffic Impacts – The residents living near the Mine Site raised concerns about the potential impacts and risks of truck traffic to the residents, livestock, and roads. Several comments were made regarding needed improvements to the Pipeline Road which passes through the UNC property boundary and often floods. There were also questions about the specific details of waste transportation for the various alternatives.

U.S. EPA Response: The safety of the local community, their livestock, and anyone working in or visiting the area is the highest priority for U.S. EPA. A traffic plan will be developed with input from the Navajo Nation and local community. The traffic plan will be designed to minimize impacts to commuters, pedestrians, livestock, and other road users. Once construction has begun, U.S. EPA will be available to respond to traffic safety or other concerns raised by the community and will ensure that the traffic plan is modified as appropriate. The alternatives for the use of existing roads, including the development of temporary roads or other transport mechanisms for the purpose of the NECR cleanup, will be evaluated during the detailed design process.

U.S. EPA acknowledges the frequent flooding on Pipeline Canyon Road in the vicinity of mill cells and on the UNC Mill site property. The requested improvements are not currently required by U.S. EPA nor incorporated into the Action Memorandum. During the December 2, 2009 public meeting, and in a subsequent letter to U.S. EPA dated August 29, 2011, UNC/GE demonstrated willingness to make improvements to the Pipeline Canyon Road voluntarily. U.S. EPA will work with GE to ensure that these improvements address the concerns of the community such as flooding and that there are appropriate opportunities for community input.

I-13. Revegetation – There were a number of comments expressing concern over the ineffectiveness of other revegetation efforts and questioning the revegetation plans and process for the NECR mine site and surrounding areas.

U.S. EPA Response: U.S. EPA is committed to continuing to work with the local community and the Navajo Nation to refine the seed mix and revegetation process. Expert botanists have estimated that revegetation efforts take approximately five years before they resemble the surrounding areas if there are no stresses such as grazing of the area being restored. The success of the restoration and revegetation efforts would be reviewed as part of the ongoing monitoring process so that any problems identified could be addressed at that time.

I-14. Examples - A commenter asked if there were examples similar to the NECR/UNC site.

U.S. EPA Response: With respect to similar uranium mine soil site examples, U.S. EPA has conducted several cleanups on the Navajo Nation conducted by Region 9:

- Skyline Mine (Oljato Chapter) - currently Region 9 is conducting an on-site consolidation remedy as a time critical removal action;
- Bluewater/Haystack Mountain area - in 1991 and 1992, Region 9 conducted on-site consolidation remedies as a time critical removal action at six AUM sites.

In other Regions, U.S. EPA has uranium mine and mill sites on the National Priority List in which the uranium mine wastes were consolidated and capped on site, rather than moved to another facility:

- Midnite Mine, located on the Spokane Tribe reservation (Region 10);
- Lucky Lass/White King Mines (Region 10);
- Monticello Mill in which an evapotranspiration cover was placed on top of the mill tailings (Region 8); and
- Homestake Mill (Region 6).

Part II: Comprehensive Response to Specific Legal and Technical Questions

II-1. Alternative Selection - In addition to the local community's comments in favor of Alternative 2, U.S. EPA received numerous comments on all alternatives evaluated under the EE/CA from other stakeholders. The Navajo Nation and other community groups (SRIC, SNEEJ, BVDA and MASE) voiced support of the local community preference for Alternative 2. UNC/GE expressed preference for disposal on the NECR Mine Site, citing that closure in place is the accepted, protective practice for mine sites. The NMA also supported on-site closure and added that if the remedy is equally protective, what is the benefit to choosing the more expensive alternative. While the NMA commented that community acceptance was elevated to higher importance than other factors, the BVDA commented that there was not enough consideration of community acceptance. SRIC commented that alternatives 3 and 4 were unacceptable and that the analyses of alternatives 2 and 5 were deficient. The NMA commented that there was insufficient evaluation of significant differences between the impacts of alternatives and the EE/CA did not explain how alternatives were chosen and/or evaluated. DOE supported EPA's preferred alternative in order to minimize the proliferation of small disposal sites. NRC also supported EPA's preferred alternative.

U.S. EPA Response: U.S. EPA appreciates the thoughtful and varied responses to the alternatives proposed and our analysis of the alternatives. As stated earlier, U.S. EPA considers three principal criteria in selecting Superfund removal actions, including effectiveness, cost, and implementability. All alternatives considered in the EE/CA, except "no action," are implementable and effective in protecting human health and the environment in terms of eliminating direct

012920

contact with the contaminants. However, the costs of these alternatives varied widely since off-site disposal would increase costs by a factor of almost seven. Alternative 2 was estimated to cost $293,600,000, in comparison to Alternative 5A, which was estimated to cost $44,300,000. Alternatives 3 and 4 left the waste on Tribal Land, which was not acceptable to the Navajo Nation. Although Alternative 5A is still significant in cost and is not the least expensive alternative by any means, it is considered cost effective when balancing cost, implementability and protection of human health and the environment, as well as future reuse and community, Navajo Nation and State considerations.

II-2. Disposal Cell Liner – In contrast to the comments from the community expressing a preference for a robust cover and liner system, UNC/GE commented that inclusion of a liner is unnecessary due to the climate, soil type, and other characteristics of the site. Specific concerns about the liner puncturing or creating a "bath tub" effect leading to excessive loading and decreased stability of the cell were also raised by a community member and DOE. NMED/EMNRD commented that the a new disposal cell bottom, if separate from the Tailings Disposal Cells, should be double lined with a leak detection and leachate recovery system.

U.S. EPA Response: A well designed containment system evaluates all components of the system in relationship to the environment, such as climate, soil type, waste type, etc. At the UNC Mill cell, there is no leachate generation; however, with a poorly designed and constructed cover, water could infiltrate through the waste. Although U.S. EPA is confident that a cover can be designed and constructed to successfully prevent infiltration at the UNC Mill Site, U.S. EPA is proposing that in addition to the cover, a low permeability layer (liner) made of natural materials consistent with RCRA Subtitle D requirements be placed between the existing waste and the NECR waste. This liner would be sloped to eliminate a "bathtub effect" and constructed with natural materials, not synthetic, to eliminate the sudden failure risk associated with punctures and rips. This type of liner would add an additional layer of protection without compromising the stability of the disposal cell. The final design must be approved by the NRC as part of the license amendment process.

II-3. Disposal Cell Cover – Many commenters, including UNC/GE, DOE, NMED/EMNRD, SRIC, BVDA, and SRIC and community members addressed cover design concerns. SRIC expressed concerns about the behavior of older cover designs and problems with plant root penetration described in the Stoller research and report at http://www.infomine.com/publications/docs/Waugh2009.pdf. BVDA and community members also expressed their concerns about the performance over time of the NECR Mill Site cover and other mill covers currently in place. All commenters on this issue concurred that the proposed alternative would be an opportunity to upgrade the current mill tailings cover system and incorporate the use of current technologies such as evapotranspiration covers as appropriate. NMED/EMNRD discussed requirements for the cover to eliminate water

012921

infiltration and meet other specific performance criteria similar to the performance as a cover at least three feet in thickness. Per their requirements, the cover for the cell would have to be designed to eliminate, to the maximum extent practicable, water infiltration, Store and release sites for Mine Sites in New Mexico are typically installed to meet this requirement. Such covers allow for the growth of self-sustaining vegetation and a rooting medium sufficient to support such growth. A cover system with less than 3 foot of cover can be installed if: 1) it can be demonstrated to perform as well as a 3 foot cover; or 2) a thinner soil cover with an underlying liner may also satisfy this requirement.

U.S. EPA Response: The understanding of containment systems has evolved dramatically since the UNC Mill Site was closed in the early 1980s. In the 1990s and early 2000s, the Alternative Landfill Cover Demonstration (performed at Sandia labs funded by DOE) investigated the performance of various landfill cover systems, including alternatives that may be well suited for arid and semi-arid climates. Also in the 1990s, the DOE started assessing the performance of some of its older disposal cells and established its Environmental Sciences Laboratory (operated by S.M. Stoller Corporation for the DOE), which assessed cover performance including the "Stoller Report" referenced above. A key finding in this assessment is that the containment system should be compatible with the environment in which it is placed. U.S. EPA agrees that co-disposal at the Mill Site will provide an opportunity to bring the containment system currently at the Mill Site up to state-of-art standards. U.S. EPA will work with stakeholders during the design phase to make use of the broad current knowledge and understanding of design and construction of containment systems in the design for the Mill Site.

II-4. Potential Groundwater Impacts of Disposal Cells–Residents, SRIC, BVDA, and the Navajo Nation raised concerns about the potential effects of the proposed alternative on groundwater. NMED/EMNRD, DOE and community members commented that groundwater monitoring would be necessary to verify that there were no effects on groundwater due to implementation of the proposed remedy. The Navajo Nation also wanted assurance that the additional weight added to the Mill Site tailings would not exacerbate current problems with the existing groundwater plume due to historical releases at the UNC Mill. One resident requested information about what was being done to decontaminate the existing groundwater plume.

U.S. EPA Response: U.S. EPA Region 6 currently oversees a comprehensive groundwater monitoring program around the UNC Mill Site disposal cells. This program includes quarterly sampling of about 40 wells within the three water-bearing formations: Alluvium, Zone 1 and Zone 3 located in the Upper Gallup. In addition, there are numerous wells adjacent to the cells that have gone dry, but also could be monitored post construction. The current groundwater monitoring program will continue, and additional wells, if needed, can be added to the program.

In response to the concern about additional weight exacerbating the existing groundwater contamination at the UNC Mill Site, U.S. EPA reviewed additional documentation related to the current and historical status and behavior of the UNC Mill Tailings. During the operation of the UNC Mine, wet tailings were discharged into the pits where the disposal cell at the UNC Mill Site is currently located. At that time, the contaminated fluid from the tailings seeped into the underlying formation, causing the current contaminated plumes at the UNC Mill Site. Based on well data and modeling, the tailings are no longer leaking.

In specific response to the concern that an additional load could "squeeze out" residual water from the exiting tailings, U.S. EPA requested UNC/GE to prepare a report modeling the behavior of the Mill Site tailings under a wide range of scenarios with a sensitivity analysis of the model assumptions. GE developed a model specifically for this site using existing data from the time of disposal, updated for every year since closure to the present time, taking into account the movement of water due to gravity, soil suction and evapotranspiration. GE then added a load to the model equal to or greater than that expected when the NECR waste is added to the cell and a new cover is placed. The model was run under multiple scenarios representing different locations within the tailings cells and varying from typical soil profiles to worst case. The report concluded that even under the most extreme conditions, the existing tailings in the Mill Tailing Disposal Cells would not be "squeezed' out when the load of the NECR waste is added. A copy of the modeling report titled Evaluation *of Consolidation and Water Storage Capacity Related to the Placement of Mine Material on the existing UNC Mill Site Tailings Impoundment* dated May 2011 is posted on the Northeast Church Rock Mine webpage at www.epa.gov/region09/NECR.

II-5. Action Level/Background Determination – Both GE and the National Mining Association submitted comments on the determination of the background level of 1 pCi/g and the associated cleanup or action level of 2.24 pCi/g. Both parties commented that these values were inappropriate, incorrectly calculated, and unreasonably low. Commenters also raised specific concerns related to consistency with cleanup and background levels at other similar sites and NRC's previous determination of background for the NECR Mine Site, inconsistency with UMTRCA cleanup regulations, and the use of the mean background level rather than the upper tolerance limit.

U.S. EPA Response: The proposed action level takes into account the residential land use, radiation preliminary remediation goals (rad-PRG), and the presence of background radium. U.S. EPA uses site specific remediation goals for carcinogens, including radionuclides, at levels that represent an excess upper bound lifetime cancer risk between 10^{-4} to 10^{-6}.

Representative reference locations were selected and twenty-five background soil samples were collected with an additional two duplicates for quality control as per the proposed work plan submitted by GE and approved by U.S. EPA. These soil samples were analyzed for several elements including radium-226.

012923

The mean radium concentration of this background data set is 1.0 pCi/gm; the 95 percent upper confidence of the mean is 1.1 pCi/gm and the 95th percentile is 1.3 pCi/gm. The radium-226 precision is +/- 0.1 pCi/gm. The residential PRG assuming some proportion of home grown food is 1.24 pCi/gm representing the upper end of the risk range of 10^{-4}. Since the upper end of the residential risk range and the background concentration are similar, there are few practical options for selection of the action level. The action level could be selected at background, which would be represented by the 95th percentile of the background population or 1.3 pCi/g. However, there are analytical limitations for field instruments to determine such a small relative difference with a limited spread of the background population. Increasing the action level to 1 over the 10^{-4} residential risk of 1.24 pCi/gm resulted in a value of 2.24 pCi/gm, which could be effectively measured in the field to facilitate cleanup while still keeping relative risk as low as practical.

The proposed action level of 2.24 pCi/gm equates to a residential risk of 1.8 x 10^{-4}, which should be rounded to 2 x 10^{-4}. Since the action level value of 2.24 pCi/gm and the residential risk value of 2 x 10^{-4} are similar, some writers erroneously rounded the 2.24 to 3.

The NRC, under the Uranium Mill Tailings Radiation Control Act (UMTRCA), has adopted a standard of 5 pCi/g for radium-226 plus background based on site-specific considerations for mill sites, such as all mill sites remaining under Federal control. While this standard is generally within the EPA's risk range for that specified land use, it would be higher than is appropriate for proposed future land uses at NECR, and the lower value selected by EPA is achievable[5]. The proposed action level also is consistent with NRC's less than 15 mrem/yr effective dose equivalent for the proposed land use at NECR.

II-6. Stormwater Regulatory Compliance– The NN EPA Water Quality/ NPDES Program submitted comments related to stormwater discharges. The program was concerned about compliance with NN Surface Water Quality Standards, the multi-sector general permit for stormwater including submission of a Notice of Intent (NOI), and the potential for adverse impacts of the proposed remedy to surface water quality or regulatory and administrative processes already in place at the Mill Site.

U.S. EPA Response: U.S. EPA has identified as ARARs the following regulatory standards: (1) Navajo Nation Pollutant Discharge Elimination System Program – applicable regulations; (2) Navajo Nation Clean Water Act – Title 4 Navajo Nation Code; (3) 20.6.2 NMAC – New Mexico Water Quality Ground and Surface Water Protections; and (4) 20.6.4 NMAC – New Mexico Standards for Interstate and Intrastate Surface Waters. U.S. EPA intends to ensure that the

[5] See also the materials referenced in Attachment II, Applicable or Relevant and Appropriate Requirements (ARARs) Table, to the Action Memorandum.

012924

removal action meets the applicable or relevant and appropriate substantive requirements of these statutes to the maximum extent practicable.

II-7. NRC License Amendment– GE commented that a license amendment from the NRC is not required because the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also known as Superfund), does not require permits for Superfund Projects.

U.S. EPA Response: U.S. EPA agrees that under Section 121(e) of CERCLA and 40 CFR § 400.30(e)(1), no federal, state or local permits are required for on-site response actions, including removal actions. U.S. EPA is not requiring that UNC obtain any permits in connection with this removal action. However, DOE has no existing license to accept waste at the Mill Site, and has commented that an amendment to the existing NRC license will be necessary for the mine tailings to be placed at the Mill Site. De-commissioning of the UNC Mill Site also falls within the NRC's jurisdiction, whereby NRC issues a general license to DOE for long-term monitoring and maintenance. Accordingly, U.S. EPA agrees that a license amendment will be necessary for this action to allow for ultimate de-commissioning of the UNC Mill Site.

II-8. Removal Action Justification– GE commented that with past removal actions, there is no longer imminent and substantial risk and therefore no justification of a removal action at NECR.

U.S. EPA Response: U.S. EPA's determination of "imminent and substantial endangerment" is based on substantial evidence supporting the factors set forth in the National Contingency Plan ("NCP") for the appropriateness of the removal action, see 40 CFR §300.415(b)(2); and well-established case law, discussed below.

Specifically, U.S. EPA found that there is an actual or potential exposure to hazardous substances by nearby populations or the food chain, see 40 CFR §300.415(b)(2)(i), because high concentrations of radium-226 have been detected in samples off the Mine Site, and radium in the soil may be absorbed by plants. Thus, U.S. EPA found a substantial likelihood that nearby residents have been and may in the future be exposed by migration of contaminants into the residential areas. U.S. EPA found high levels of hazardous substances in soils at or near the surface that may migrate, see 40 CFR §300.415(e)(2)(iv), because contaminated soils may migrate off-site via wind and water transport mechanisms. Furthermore, U.S. EPA found weather conditions may cause migration or further release of hazardous substances, see 40 CFR §300.415(e)(2)(v), insofar as rainfall events may lead to transport of the contamination from the site. Finally, U.S. EPA found that other federal and state response mechanisms are not available to respond to the release, see 40 CFR §300.415(e)(2)(vii), in that the NNEPA has informed U.S. EPA that it does not have the authority or resources to address the site.

The term "imminent and substantial endangerment" has been construed under Section 7003 of the Resource, Conservation and Recovery Act, 42 U.S.C. §6973. In analyzing the language of Section 7003, courts give the words employed by Congress their ordinary meaning, *Perrin v. United States*, 444 U.S. 37, 42 (1979), while also construing them "in light of the purposes Congress sought to serve," *Chapman v. Houston Welfare Rights Org.*, 441 U.S. 600, 608 (1979); *Connecticut Coastal Fishermen's Assoc. v. Remington Arms Co., Inc.*, 989 F.2d 1305, 1308 (2d Cir. 1993). Courts agree that Section 7003 should be construed in a liberal, rather than a restrictive, manner. *See United States v. Aceto Agric. Chem. Corp.*, 872 F.2d 1373, 1383 (8th Cir. 1989); *United States v. Waste Indus., Inc.*, 734 F.2d 159, 167 (4th Cir. 1984).

Thus, to take action under Section 7003, U.S. EPA need not prove that an endangerment actually exists. It is sufficient to demonstrate that "there *may* be an imminent and substantial endangerment." 42 U.S.C. § 6973(a); *Lincoln Properties, Ltd. v. Higgins*, 1993 U.S. Dist. LEXIS 1251, 23 Envtl. L. Rep. (Envtl. L. Inst.) 20665, 20671 (E.D. Cal. 1993); *Waste Indus.*, 734 F.2d at 164. An endangerment is not actual harm, but a threatened or potential harm. Waste Indus., 734 F.2d at 165. Section 7003 further requires that the endangerment be imminent. 42 U.S.C. § 6973(a). Section 7003 further requires that the endangerment be imminent 42 U.S.C. § 6973(a). An endangerment need be neither immediate nor tantamount to an emergency to be imminent and warrant relief. Waste Indus., 734 F.2d at 165. Rather, an endangerment is imminent if factors giving rise to it are present, even though the harm may not be realized for years. *United States v. Conservation Chem.*, 619 F. Supp. 162, 193-94 (D. Mo. 1985). Section 7003 finally requires that an endangerment be substantial. The United States need not quantify the endangerment to prove that it is substantial. It is sufficient to demonstrate that there exists reasonable cause for concern for the integrity of the public health or the environment. *Lincoln Properties*, 23 Envtl. L. Rep. (Envtl. L. Inst.) at 20671; *Conservation Chem.*, 619 F. Supp. at 194.

EPA believes that courts would construe "imminent and substantial endangerment" under CERCLA and the NCP according to the plain meaning of the language, as they do with RCRA. Accordingly, given the high levels of radiation-contaminated soils at the site, the potential for migration to residential areas and absorption into the food chain, natural conditions that may exacerbate migration and the unavailability of other mechanisms to mitigate the harm, U.S. EPA's finding of imminent and substantial endangerment is well-founded.

II-9. Indian Country Determination – GE/UNC submitted comments contending that the Mill Site is not in Indian Country, and that therefore, EPA should not require the Navajo Nation's consent to EPA's decision to dispose of the Mine Site waste at the Mill Site.

U.S. EPA Response: As stated in the EE/CA, the federal government, including the U.S. EPA, bears a trust responsibility to Indian Tribes, including the Navajo

012926

Nation. U.S. EPA acknowledges this trust responsibility in its Policy for the Administration of Environmental Programs on Indian Reservations (1984), which states: "In keeping with [the] trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations." The U.S. EPA has consulted with the Navajo Nation throughout the development of the EE/CA and has considered the Navajo Nation's interests during preparation of the EE/CA. U.S. EPA has not required the Navajo Nation's consent to U.S. EPA's selected remedy, however, and U.S. EPA's remedy selection did not depend on whether or not the Mill Site is located in Indian Country.

II-10. Proposed Applicable or Relevant and Appropriate Requirements (ARARs) –UNC/GE commented that New Mexico, Navajo Nation, and DOE regulations are not ARARs. NMED/EMNRD commented that a discharge permit may be required for the proposed alternative and that relevant New Mexico Water Quality Control Commission, Solid Waste Management, and Hazardous Waste Management Regulations apply (NMAC 20.6.2, 20.9.1, and 2.4). Navajo Nation DOJ requested that the definition of "trespass" as contained in the Navajo Nation Civil Trespass Act, 21 N.N.C. 2203(O) should be added as an ARAR.

U.S. EPA Response:

Navajo Nation Statutes: GE's objection to inclusion of certain Navajo Nation statutes as ARARs is based on UNC's contention that Navajo Nation has no authority to regulate persons outside of its jurisdiction. U.S. EPA expressly stated in the EE/CA that the substantive requirements of these statutes may be applicable to activities on reservation and tribal trust land (EE/CA, Table 1, ARARS). Therefore, inclusion of these standards does not purport to confer regulatory authority for the Navajo Nation outside of its jurisdiction. The definition of ARARs is limited to environmental requirements and standards; therefore, the definition of "trespass" in the Navajo Nation Civil Trespass Act is not an ARAR.

DOE Regulations, 40 C.F.R. Part 61, Subpart H: GE has pointed out that this regulation will not be applicable unless the facility is owned or operated by the U.S. Department of Energy. U.S. EPA has changed the reference for these regulations to classify them as "relevant and appropriate" rather than applicable during the removal action. U.S. EPA also notes that the regulations may become directly applicable if, as is expected, long-term maintenance of this facility becomes the responsibility of DOE.

New Mexico Protection of Groundwater: With respect to Table A-1 (ARARs in the EE/CA), the State of New Mexico has requested that U.S. EPA indicate that groundwater is also protected by the New Mexico Administrative Code ("NMAC") Section 20.6.2. This provision is already listed as potentially applicable to protecting surface water. U.S. EPA has added the requested reference to protection of groundwater.

New Mexico Hazardous and Solid Waste Statutes: New Mexico has also requested that U.S. EPA list the New Mexico Solid Waste Act and the New Mexico Hazardous Waste Act, as well as the implementing regulations of each of these acts, available at NMAC 20.9 and NMAC 20.4, respectively. U.S. EPA has already listed the NMAC 20.4 regulations for hazardous waste as potentially applicable or relevant and appropriate. U.S. EPA has added references to the other requested statutes and regulations as potentially applicable or relevant and appropriate, depending on the conditions and contaminants encountered.

II-11. Contaminants of Potential Concern (COPCs) – NN EPA requested information about background soil levels for the COPCs and requested that confirmation sampling be completed for all metals which are COCs. The EE/CA calculated an average uranium concentration for site soils of nearly 80 ppm. The Navajo Nation and affected communities must have assurances that these high levels of uranium will be addressed concomitantly with radium and other hazardous substances if the 2.24- pC/g radium action level is adopted.

U.S. EPA Response: Below is a table including the background levels, residential PRGs and Mine Site statistics for the metals that were considered as Contaminants of Potential Concern (COPCs). The average levels for molybdenum, selenium, and vanadium on the mine site are all below the health based residential PRGs and Arsenic is within the acceptable risk range based on surface and subsurface soil sampling before the removal action. However, U.S. EPA plans on analyzing for all the COPCs during the confirmation sampling to ensure protectiveness.

Background Metals Concentrations at NE Church Rock

	Arsenic	Molybdenum	Selenium	Uranium	Vanadium	Radium 226
units	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*pCi/gm*
Res- PRG	0.4	390	390	230	390	0.012
average	3.7	nd	nd	1.1	26.7	1.0
95% UCL of mean	9.8	nd	0.7	1.7	38.5	1.3

nd - Non detect

II-12. Principal Threat Waste (PTW) – GE commented that the Principal Threat Waste (PTW) could be safely placed with the remaining mine waste on the UNC Mill Site repository. DOE stated a concern about radon emissions from this waste and asked how it would be placed in the cells if it were disposed on the Mill Site.

U.S. EPA Response: The NCP allows for identification of "principal threat waste," i.e. those source materials that are considered to be either highly toxic or highly mobile. U.S. EPA Guidance on Principal Threat and Low Level Threat (OSWER 9380.3-06FS) states that wastes that exceed a 10^{-3} risk may be identified as principal threat waste. The sampling from the NECR Mine Site

012928

indicates that there are several areas of significantly higher concentrations of total uranium and/or radium-226, specifically in Ponds 1 /2 and 3, and the Sediment Pad. U.S. EPA chose to define Principal Threat Waste at NECR as mine waste where the radium-226 concentration exceeds 200 pCi/g, which is at the 10^{-3} risk for an on-site worker, and/or a uranium concentration greater than 500 mg/Kg. Waste at these concentrations may be co-disposed of at the UNC Mill Site, provided that a cover can be constructed accounting for the increased radiation. However, the current conceptual design places the NECR Mine waste on top of the Mill Site wastes; therefore, the NECR principal threat waste would be located closer to the surface than the current tailings at the UNC Mill Site. Therefore, U.S. EPA has decided not to dispose the principal threat waste at the UNC Mill site. The Action Memorandum expresses a preference that the principal threat waste be reprocessed.

II-13. Risk Levels - Livestock Risks - There were many comments regarding U.S. EPA's risk analysis of the safety of grazing livestock on the mine site. Both UNC/GE and the NMA had concerns about the risk assessment assumptions that U.S. EPA used related to exposure to humans from livestock grazing. Comments included that site specific data on plant uptake, uptake into livestock tissue, and meat ingestion rate should be used or that a sensitivity analysis should be performed for the assumptions used for this pathway.

U.S. EPA Response: U.S. EPA is concerned about the additional exposure route that livestock consumption presents to the community. U.S. EPA analyzed two hypothetical receptors to evaluate the potential effect on such receptors, considering historic and projected uses of the land. U.S. EPA evaluated (1) a livestock grazer or shepherd working livestock on the site, and (2) a hypothetical resident. The analysis of the livestock grazer or shepherd assessed the effects on that person being on the land for an extended period of time tending the stock. Analysis of the hypothetical resident assumed that the resident lived on the NECR Mine site and raised produce and livestock in the same soil and that this contributed 25 percent of the resident's overall diet. U.S. EPA believes that these were appropriate assumptions to evaluate realistic risk levels and that it is not necessary to gather further site specific data on plant uptake, livestock tissue uptake, or meat ingestion rates.

II-14. Comparative Risks - The NN DOJ requested information on the comparative risks of Alternative 2 with the proposed alternative.

U.S. EPA Response: There is no difference in the cancer risk associated with exposure to Ra-226 for Alternative 2 and Alternative 5A, as both alternatives eliminate exposure routes. Thus, the two Alternatives are equally protective from a Superfund risk assessment perspective. EPA evaluated other risks when considering the implementability of the alternatives, such as traffic fatalities. For Alternative 2, based on traffic fatality statistics per mile for interstates and for two lane roads, an estimated 38 fatalities would be expected, two of which are predicted to occur on Highway 566 between I-40 and the Mine Site. By contrast,

012929

Alternative 5A has a risk near zero for traffic fatalities (0.2) due to the comparatively low number of miles of truck travel. With proper traffic controls, this risk can be reduced even further. The only alternative with a lower risk for traffic fatalities would be Alternative 4 in the EE/CA, consolidation of the waste at the NECR Mine Site.

II-15. Vent Hole #8 Drainage Survey - SRIC requested a copy of the survey of the drainage from the NECR Vent Hole #8 survey completed by NN EPA.

U.S. EPA Response: U.S. EPA provided a copy of this survey to SRIC on October 15, 2009.

II-16. Radiological Analysis for Air Filters – SRIC monitors air quality downwind of the NECR Mine Site. Although they analyze the filters currently for particulates, they requested funding to complete the radiological analysis of the air filters.

U.S. EPA Response: EPA's National Air and Radiation Environmental Laboratory (NAREL) in Montgomery, Alabama, has the capability to perform the radiological analysis on the air filters. EPA will coordinate with SRIC and endeavor to provide the requested radiological analysis for the NECR project and will work them to secure the funding, if possible, or lab access
.

II-17. Mill Site Removal – Several commenters brought up the possibility of removal of the radiological contaminants from the area including the mill tailings and cited the removal of mill waste in Moab, Utah.

U.S. EPA Response: The Atlas Mill Site (a.k.a Moab Site) disposal cell is reserved exclusively for wastes from that site. The Atlas Mill Site is a large former uranium processing site located about 250 miles north of NECR Mine site. In 1999, the NRC, which oversaw the closure at the time, submitted a proposal to close the 130-acre tailings pile in place; however, the plan was not implemented due to concerns about the tailings pile's proximity to the Colorado River. Due to an Act of Congress, DOE took over management of the tailings pile and obtained, through the Bureau of Land Management, a Public Order allowing DOE to construct a disposal cell solely for the Atlas Mill Tailings waste. The new disposal cell is approximately 30 miles away from Atlas Mill Site. DOE is required to return the land to DOI currently used as a buffer zone after the project is completed in 2025. (Feb 17, 2011 letter, D. Metzler to C. Wetmore).

II-18. UNC Status – One commenter asked about the status of UNC as a company, inquiring whether UNC, as the responsible party and the company doing the cleanup, could provide compensation for associated health problems to workers who worked for UNC in the mine. He commented that the community needs to hold this company accountable and to compensate those who got sick from their activities.

U.S. EPA Response: UNC is an indirect subsidiary of GE. Employment records can be requested by sending a letter to UNC at the address provided below. The letter should include the employee's full name, social security number, employment location and approximate timeframe of employment. UNC's address is:

UNC Corporation

Highway 566, PO Box 3077

Gallup, NM 87301

II-19. Grazing Permit Fee – One resident claimed ownership of the grazing permit, which included land on the NECR Mine Site. Because the mine is fenced, the resident stated that he has not been able to use the land for grazing purposes, but still must pay the permit fee, and requested compensation.

U.S. EPA Response: UNC/GE has entered an agreement with the permit holder for the loss of the grazing land.

II-20. NRC Jurisdictional Authorities - SRIC commented that it was important to disclose in the EE/CA that NRC and other agencies besides U.S. EPA have regulatory jurisdiction over the site that will impact the options available for the disposal cell design on the UNC Mill Site.

U.S. EPA Response: U.S EPA agrees that it is important to acknowledge the regulatory authorities of the NRC on all mill sites and therefore on our proposed alternative of disposal on the mill cells. The NRC is mentioned over 50 times in the EE/CA. Because the NRC has such a critical role in the oversight of the UNC Mill Site, more specifically, with respect to the NRC's approval authority on the final design, U.S. EPA refers to the following two excerpts from the EE/CA: On page 19, the EE/CA states, "Final design parameters will be determined by U.S. EPA in consultation with Navajo and other key agencies. Under Alternative 5 and Option B, the final design will need concurrence from NRC." On page 30, the EE/CA states "… incorporating the waste requires designing a system that satisfies all U.S. EPA's, NRC's, DOE's and the State's requirements. U.S. EPA Region 9 will work with the NRC, DOE, U.S. EPA Region 6, and the State of New Mexico to create an acceptable design of incorporating the NECR mill tailing into the existing cells that complies with the NRC/DOE permit requirements and U.S. EPA's regulations and decisions."

II-21. Red Water Pond Road/Cattle Guard – A resident requested that cattle guards be installed on Red Water Pond Road to keep cattle off the contaminated road.

012931

U.S. EPA Response: U.S. EPA ordered Rio Algom to chip seal the Red Water Pond Road as an interim measure to prevent exposure to people and livestock until the contamination can be removed.

II-22. Long-Term Monitoring Costs - The NN EPA commented that the monitoring costs were not included in the analysis of the cost of alternatives. Since monitoring would be required for alternatives three through five, this may affect the cost significantly and decrease the discrepancy between these alternatives and alternative 2.

U.S. EPA Response: The Cost Estimate in the EE/CA assumed an operation and maintenance (O&M) cost of $100,000 per year for Alternative 5A. Although the specific components of O&M were not detailed, O&M includes site monitoring, miscellaneous site repair and response to major events, if needed. Currently, UNC/GE is spending approximately $500,000 per year at the UNC Mill Site, which includes O&M activities for the existing UNC disposal cell, as well as groundwater remediation, and active site project management costs. Even if the O&M were to be $500,000 per year for Alternative 5A, U.S. EPA has calculated that this would add less than $7 million to the net present worth of this alternative and would not make Alternative 2 cost competitive.

II-23. NRC License Amendment – U.S. DOE stated its general concurrence of co-disposal in its response letter, "In general, DOE supports the concept of radioactive waste consolidation and the nonproliferation of small disposal sites." However, U.S. DOE added that it would be reluctant to accept into its long-term stewardship program a disposal site that is not co-disposed or accepted under NRC's license amendment process. U.S. DOE also noted that any new cell could not degrade groundwater protectiveness.

U.S. EPA Response: U.S. EPA concurs with U.S. DOE and has selected co-disposal with the required license amendment from NRC and eventual long-term stewardship of U.S. DOE as the selected remedy.

II-24. Red Water Pond Road – UNC/GE commented that the Red Water Pond Road cleanup should not be included in the removal action because it was the primary haul road for the Quivira mine.

U.S. EPA Response: U.S. EPA did not include the cleanup of Red Water Pond Road in this removal action.

II-25. Mine stopes– One resident requested that the waste be returned to the earth in the mine stopes with dewatering.

U.S. EPA Response: The mine stopes and shafts were filled with 11.e(2) mill waste during the mill cleanup efforts and the openings to the shafts were plugged. Therefore, this is not an available alternative.

II-26. NRC License Approval – NN EPA expressed concern that the NRC might deny the license amendment after three additional years for design, further delaying the project.

U.S. EPA Response: Although a license denial is a possibility which U.S. EPA agrees would significantly delay the project and be a major setback, NRC has agreed to be on the design team so they can identify any design concerns they may have early on. Although this involvement does not guarantee a license amendment approval, it significantly increases the chance that any major design concerns they may have will already be addressed to help expedite the license review process. NRC also commented that Alternative 5A was the best choice for the removal action, which further increases the likelihood that NRC will be supportive of the action.

II-27. Public Hearing vs. Public Meeting – One community member asked why the comments from the first public meeting on June 23, 2009 were not recorded.

U.S. EPA Response: U.S. EPA held an informational meeting about the EE/CA on June 23, 2009 to explain the information in the EE/CA and answer questions in preparation for the public hearing on July 7, 2009 where a recorder was present. As it happened, U.S. EPA received similar input at both meetings and acknowledges that it would have been useful to have the first meeting recorded.

II-28. Contingency Plan– A commenter asked if there is a contingency plan if the action chosen by the USEPA needs to be reevaluated, and added that because there is very limited data to make concise volume estimates, the waste could be twice the amount used in the Final EE/CA's assumptions.

U.S. EPA Response: Although uncommon, there can be unforeseen conditions that require U.S. EPA to re-assess the components of the removal action selected in the Action Memorandum. When this occurs, U.S. EPA can amend the Action Memorandum assuming the scope and description of work does not fundamentally change the removal action. Examples of a change not considered fundamental include increased volume, cost or time to completion. EPA is required to solicit community input on significant proposed changes prior to amending the Action Memorandum.

II-29. Community Center – Navajo Nation DOJ requested consideration for a nearby community center to serve multiple purposes, including as an administrative center during the construction phase, as a central location for remediation/restoration employment opportunities, and an educational facility for post-remediation/restoration monitoring and maintenance activities. The Navajo Nation could use the facility to house some of its technical staff and offer parts of the facility to local schools and colleges for environmental sciences instruction and job training. The comments stated that remediation/restoration cost estimates

012933

should include funds needed to construct and operate such a facility. Remediation/restoration of the highest priority AUM in Navajo Country necessitates leaving the affected community and Navajo Nation with a useful asset for current and future generations.

U.S. EPA Response: U.S. EPA response authority limits U.S. EPA activity and funding to responding to releases of hazardous materials. U.S. EPA has authority to respond, abate, and mitigate releases, but does not have authority or access to funding for building a community center. However, in a letter dated August 29, 2011 (included in the Administrative Record) UNC/GE clarifies commitments that UNC/GE is willing to make with respect to U.S EPA selection of a remedy. Some of the commitments detailed in the letter are in response to community requests beyond the cleanup of the waste.

D. CLARIFICATIONS

III- 1. At the July 7, 2009 public meeting, in response to a question from the New Mexico Mining and Mineral Bureau, U.S. EPA stated that all waste containing radium-226 exceeding 2.24 pCi/g would be removed from the NECR Mine Site. This statement should have referenced the limit of excavation for certain waste and areas, and should have clarified that the waste placed back in the stopes and shafts would not be removed. As stated in the EE/CA, the excavation will be limited to ten feet depth, except in areas susceptible to erosion or where placing clean backfill to current grade is not planned. Excavation greater than ten feet will be required for removal of principal threat waste.

III- 2 NRC noted that the EE/CA on page 17, Section 2.3.2.3, 2nd paragraph stated: "Regarding the remediation of mine waste, Title I UMTRCA standards (Subpart A of 40 CFR 192(d)) offer the following guidance…" This paragraph goes on to cite the 200-1000 year stability period and the 20 $pCi/m^2/sec$ radon requirement provided in that regulation. The reference to "mine wastes" is incorrect and should be changed to "uranium milling wastes." In addition, discussion of 40 CFR 192 requirements should mention that that regulation includes criteria for soil cleanup as indicated in the aforementioned Site Specific Comment No. 2. Also, the UNC Church Rock Mill Site is a Title II UMTRCA site.

E. ACRONYMS

ARAR	Applicable and Relevant and Appropriate Regulations
BVDA	Bluewater Valley Downstream Alliance
COC	Contaminant of Concern
DOE	U.S. Department of Energy
EE/CA	Engineering Evaluation/Cost Analysis

012934

EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
IRA	Interim Removal Action
MARSSIM	Multi-Agency Radiation Survey and Site Investigation Manual
MASE	Multicultural Alliance for a Safe Environment
NECR	Northeast Church Rock Mine
NMA	National Mining Association
NMED	New Mexico Environmental Department
NN EPA	Navajo Nation Environmental Protection Agency
NRC	Nuclear Regulatory Commission
O&M	Operation & Maintenance
pCi/gm	picocuries per gram
PRG	preliminary remediation goal
RWPRCA	Red Water Pond Road Community Association
SNEEJ	Southwest Network for Environmental & Economic Justice
SRIC	Southwest Research and Information Center
UCL	Upper Confidence Limit
UNC/GE	United Nuclear Corporation-General Electric (UNC/GE)
U.S. EPA	United States Environmental Protection Agency

012935

Attachment IV

U.S. EPA HQ CONCURRENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, CA 94105

MEMORANDUM

DATE: September 26, 2011

SUBJECT: Request for Concurrence on Proposed Nationally Significant or Precedent-Setting Removal at the Northeast Church Rock Mine Site, McKinley County, New Mexico, Pinedale Chapter of the Navajo Nation

FROM: Clancy Tenley, Assistant Director
Partnership, Land Revitalization & Cleanup Branch, Region 9

TO: Lawrence M. Stanton, Director
Office of Emergency Management

Jim Woolford, Director
Office of Superfund Remediation and Technology Innovation

The purpose of this memorandum is to request your concurrence on the proposed removal action at the Northeast Church Rock (NECR) Mine Site, McKinley County, New Mexico, within the Pinedale Chapter of the Navajo Nation. Redelegation of Authority in R-14-2 gives the Director of the Office of Emergency Management the authority to concur on nationally significant or precedent-setting removals. Given that this is a non-time critical removal action, consistent with the Superfund Removal Guidance for Preparing Action Memoranda dated September 2009 (2009 Action Memorandum Guidance) (page 6, footnote 5), Region 9 is also addressing this memorandum to the Director of the Office of Superfund Remediation and Technology Innovation.

We have discussed this proposed removal with staff of the Office of Emergency Management's Program Operations and Coordination Division (POCD) and the staff of the Office of Superfund Remediation and Technology Innovation (OSRTI). POCD and OSRTI have advised us that this removal is considered nationally significant or precedent setting because it is a removal of radioactive mining waste from a mine site located in Indian country and the excavated material will be placed on the nearby UNC Mill Site (Mill Site), an NPL site that is managed jointly by EPA Region 6 and the Nuclear Regulatory Commission (NRC). Throughout the development of the proposed removal action, EPA Region 9 has coordinated with EPA Region 6 and NRC representatives, and implementation of disposal at the Mill Site will be contingent on additional approvals from Region 6 and

012937

NRC. In addition, Region 9 has conducted extensive government to government consultation with the Navajo Nation and community involvement activities with local residents. Region 9 has consulted with EPA's National Remedy Review Board concerning the proposed removal action and responded to recommendations by the Board in its Engineering Evaluation and Cost Analysis dated May 30, 2009. See RRB recommendations dated April 7, 2009 at http://www.epa.gov/superfund/programs/nrrb/pdfs/Northeast%20Church%20Rock%20Memo.pdf) and EE/CA dated May 30, 2009 at http://yosemite.epa.gov/r9/sfund/r9sfdocw.nsf/3dc283e6c5d6056f88257426007417a2/f453d4346e384945882575cf007fd4bf!OpenDocument). Finally, consistent with page 53 of the 2009 Action Memorandum Guidance, the Region has consulted with OECA/OSRE and OGC regarding the Region's use of the emergency exemption to the $2 million limitation on removal action spending.

The Action Memorandum is attached for your review. My approval awaits your concurrence.

Concur:

9/28/11

Lawrence M. Stanton, Director — Date
Office of Emergency Management

Concur:

9/27/11

James E. Woolford, Director — Date
Office of Superfund Remediation and Technology Innovation

Non-Concur:

Lawrence M. Stanton, Director — Date
Office of Emergency Management

Non-Concur:

James E. Woolford, Director — Date
Office of Superfund Remediation and Technology Innovation

Office of Superfund Remediation and Technology Innovation

Attachment A:

Action Memorandum: Request for a Non-Time-Critical Removal Action at the Northeast Church Rock Mine Site, McKinley County, New Mexico, Pinedale Chapter of the Navajo Nation

cc: David Chung, U.S. EPA, OEM HQ, Regional Coordinator
Gilberto Irizarry, U.S. EPA, OEM HQ, Program Operations & Coordination Division, Director
Doug Ammon, U.S. EPA, OSRTI HQ, Chief, Site Assessment and Remedy Decisions Branch

Northeast Church Rock Mine Site - Email from Karin Leff - Notice that Required Consultation with OECA/OSRTI is complete

Laurie Williams to: Claire Trombadore 09/28/2011 02:48 PM
Cc: Harrison Karr, Cynthia Wetmore, Sara Jacobs

From: Laurie Williams/R9/USEPA/US
To: Claire Trombadore/R9/USEPA/US@EPA
Cc: Harrison Karr/R9/USEPA/US@EPA, Cynthia Wetmore/R9/USEPA/US@EPA, Sara Jacobs/R9/USEPA/US@EPA

Claire, Below please find the email notice from Karin Leff that the consultation required by the 2009 Removal Action Memorandum Guidance, regarding exceeding the $2 million and 12-month limitations, has been approved.
Please let me know if you have any questions on this. Thank you! Laurie
----- Forwarded by Laurie Williams/R9/USEPA/US on 09/28/2011 02:43 PM -----

From: Michael Northridge/DC/USEPA/US
To: Laurie Williams/R9/USEPA/US@EPA, Harrison Karr/R9/USEPA/US@EPA
Cc: James Costello/R6/USEPA/US@EPA
Date: 09/27/2011 08:03 AM
Subject: Fw: Northeast Church Rock Mine Site

FYI

----- Forwarded by Michael Northridge/DC/USEPA/US on 09/27/2011 11:02 AM -----

From: Karin Leff/DC/USEPA/US
To: Clancy Tenley/R9/USEPA/US@EPA, Sam Coleman/R6/USEPA/US@EPA
Cc: James Woolford/DC/USEPA/US@EPA, Larry Stanton/DC/USEPA/US@EPA, Benjamin Lammie/DC/USEPA/US, Michael Northridge/DC/USEPA/US, Gilberto Irizarry/DC/USEPA/US@EPA, Elliott Gilberg/DC/USEPA/US, Cyndy Mackey/DC/USEPA/US@EPA
Date: 09/27/2011 10:56 AM
Subject: Northeast Church Rock Mine Site

Clancy and Sam,

Please be advised that Region 9 has satisfied the requirement of consulting with my office on the Action Memorandum for the non-time-critical removal for the Northeast Church Rock Mine site. As part of the consultation process, the Region revised its draft Enforcement Addendum to reflect several comments by my staff. At this point, my office does not believe that there are any enforcement-related issues that would warrant disapproval of your request for concurrence by OEM and OSRTI.

_____
Karin Leff
Acting Director Regional Support Division
Office of Site Remediation Enforcement
202-564-7068 (O)
202-236-3669 (C)
202 564-0070 (fax)

APPENDIX B
New Mexico Environment Department
Letter of Concurrence

NEW MEXICO
ENVIRONMENT DEPARTMENT

Office of the Secretary

Harold Runnels Building
1190 St. Francis Drive, P.O. Box 5469
Santa Fe, NM 87502-5469
Phone (505) 827-2855 Fax (505) 827-2836
www.nmenv.state.nm.us

SUSANA MARTINEZ
Governor
JOHN A. SANCHEZ
Lieutenant Governor

F. DAVID MARTIN
Secretary
BUTCH TONGATE
Deputy Secretary

March 8, 2013

Carl Edlund, Director
Superfund Division
US Environmental Protection Agency Region 6
1445 Ross Avenue
Dallas, TX 75202

RE: Concurrence with the Proposed Plan and Record of Decision for the Surface Soil Operable Unit for the United Nuclear Corporation Superfund Site (NMD030443303)

Dear Mr. Edlund:

The New Mexico Environment Department (NMED) has reviewed the Proposed Plan and draft Record of Decision for the Surface Soil Operable Unit (SSOU) for the United Nuclear Corporation (UNC) Superfund Site. NMED concurs with the selected remedy, Alternative 2: On-Site Disposal at the UNC Site within the Tailings Disposal Area, for the disposal of North East Church Rock (NECR) Site mine waste. 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. Principal Threat Waste from the NECR Site will not be disposed at the UNC Site.

NMED is aware that EPA has studied multiple disposal alternatives for the NECR mine waste and supports the UNC SSOU Proposed Plan alternative of disposal of NECR waste within the tailings disposal area of the UNC Superfund Site as it provides the most expeditious and cost effective approach for returning the NECR site to unrestricted use. NMED anticipates that if EPA issues the Record of Decision, UNC will then amend their license with the Nuclear Regulatory Commission (NRC) and NMED will have an additional opportunity, through the NRC process, to review and comment on detailed design documents, as the draft Record of Decision does not contain detailed design specifications for the locations and final configurations of disposal cells.

As EPA has established a timeframe to issue the Record of Decision, NMED is submitting this concurrence letter; however, upon NMED's review of the draft Record of Decision, multiple

minor issues were identified. Mr. Earle Dixon, the State's Remedial Project Manager for both the UNC and NECR Sites, will contact Ms. Janet Brooks, EPA Region 6 Remedial Project Manager, to discuss these issues. None of the issues identified or any resolution to these issues should impact the State's concurrence.

NMED appreciates the opportunity to work with EPA regarding this Record of Decision and looks forward to providing EPA with additional support on the UNC and NECR Sites. Please contact me at 505-827-2855 or Earle Dixon of my staff at 505-827-2890 if you need additional information from NMED or have any questions.

Sincerely,

F. David Martin
Secretary, NMED

cc: Janet Brooks, EPA Region 6 Remedial Project Manager
NECR and UNC Site Files
SOS Read File

APPENDIX C
Annual Land Use Report for 2011

UNC CHURCH ROCK COAG 08

UNITED NUCLEAR CORPORATION

P.O. Box 3077
Gallup, New Mexico 87305-3077

Telephone: (505) 905-6651
Fax: (505) 905-6654

March 30, 2011

Mr. Keith I. McConnell, Deputy Director
Decommissioning and Uranium Recovery Licensing Directorate
Division of Waste Management and Environmental Protection
Office of Federal and State Materials and Environmental Management
Programs
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
#2 White Flint, Mail Stop T7 E-18
Rockville, MD 20852-2738

Re: Annual Land Use Report for 2010

Dear Mr. McConnell:

The above report is submitted, pursuant to our NRC Source Materials License No. SUA-1475, Condition 31.

Sincerely,

Max Chischilly Jr.

Max Chischilly, Jr.
Radiation Safety Officer

DY:

Enclosure

Cc: Jack E. Whitten, NRC Region IV
Steve Hill, GE
Roy Blickwedel, GE
Yolande Norman, NRC

ANNUAL LAND USE SURVEY REPORT FOR 2010

UNITED NUCLEAR CORPORATION

LICENSE NO. SUA – 1475

CONDITION NO. 31

MARCH 30, 2011

SURVEY OF LAND OWNERSHIP AND USE WITHIN TWO-MILE RADIUS OF MILL SITE

UNITED NUCLEAR CORPORATION
License No. SUA-1475
Condition No. 31

1.0 Introduction

This report has been prepared pursuant to License Condition 31 of United Nuclear Corporation's License No. SUA – 1475. The information submitted in this report was acquired from the master title plate published by the Bureau of Land Management. United Nuclear Corporation maintains the surface ownership records. The map is a copy of the USGS Quadrangle of Hardground Flats, Oak Springs, and Churchrock, the photo revised in 1979. United Nuclear Corporation's Radiation Safety Officer performed the land use survey.

2.0 Area Ownership and Use

Reference the attached map (figure 1) for location in regards to Mill Site.

Area:	Owner:	Usage:
Section 1	Navajo Tribe	Grazing and well monitoring
Section 2*	United Nuclear	Mill & Tailings site, one employee homesite and well monitoring.
Section 3	Navajo Tribe	Grazing and well monitoring
Section 4	Indian Allotted	Grazing
Section 6	Indian Allotted	Grazing
Section 9	Navajo Tribe	Grazing
Section 10	Indian Allotted	Grazing, eleven homesite, and well monitoring
Section 11	Navajo Tribe	Grazing
Section 12	BLM, A, Etah, Etal	Grazing
Section 13	Navajo Tribe	Grazing
Section 14	Indian Allotted	Grazing
Section 15	Navajo Tribe	Grazing

Area:	Owner:	Usage:
Section 33	Navajo Tribe	Grazing
Section 34	BLM (western portion) United Nuclear (eastern portion)	Grazing
Section 35	Indian Trust for Navajo Tribe	Grazing and UNC'S Reclaimed Northeast Churchrock Mine Site is located in this section.
Section 36	United Nuclear	Unauthorized grazing and well monitoring.
Map Northern Portion of 2 mile radius	Navajo Reservation	Grazing, 22 home sites, and Kerr McGee's reclaimed Navajo Mine site is located in this area.
Section 31	Indian Allotted	Grazing

*Additional Note for Section 2:

The Mill has been decommissioned and has been cleaned to meet releasable standards for unrestricted use. Final reclamation activity on the tailings area was completed in 1996 with the exception of evaporation pond area, currently used for ground water remediation. Final cover radon flux test result was reported in the "Report On Radon Emanation Testing Of Final Radon Cover Over UNC'S Church Rock Tailings Site, Docket No. 40-80907" submitted on January 3, 1997.

3.0 Current ongoing groundwater tailings seepage remediation activity

1) Sample/monitor wells on Sec. 2 and 36 (UNC), Sec. 1 and 3 (Navajo Tribe) and Sec. 10 (Indian Allotted) on a quarterly basis.

2) Continual pumping/extraction of wells RW-11, RW-16, RW-17, RW-A, PB-2, NW-1 NW-2. These wells are on UNC's Sec. 36 to enhance the remedy for cut off and containment of the migrating Zone 3 seepage impacted water.

3) Monthly monitoring (i.e. measure field parameters, in-house bicarbonate and chloride titration test) of wells NBL-1, NBL-2, PB-2, PB-3, PB-4, RW-A and NW series 1 thru 5 to track the northern most migration of the seepage impacted water in Zone 3, Sec. 36.

4.0 Well ID, Use, Location and Formation

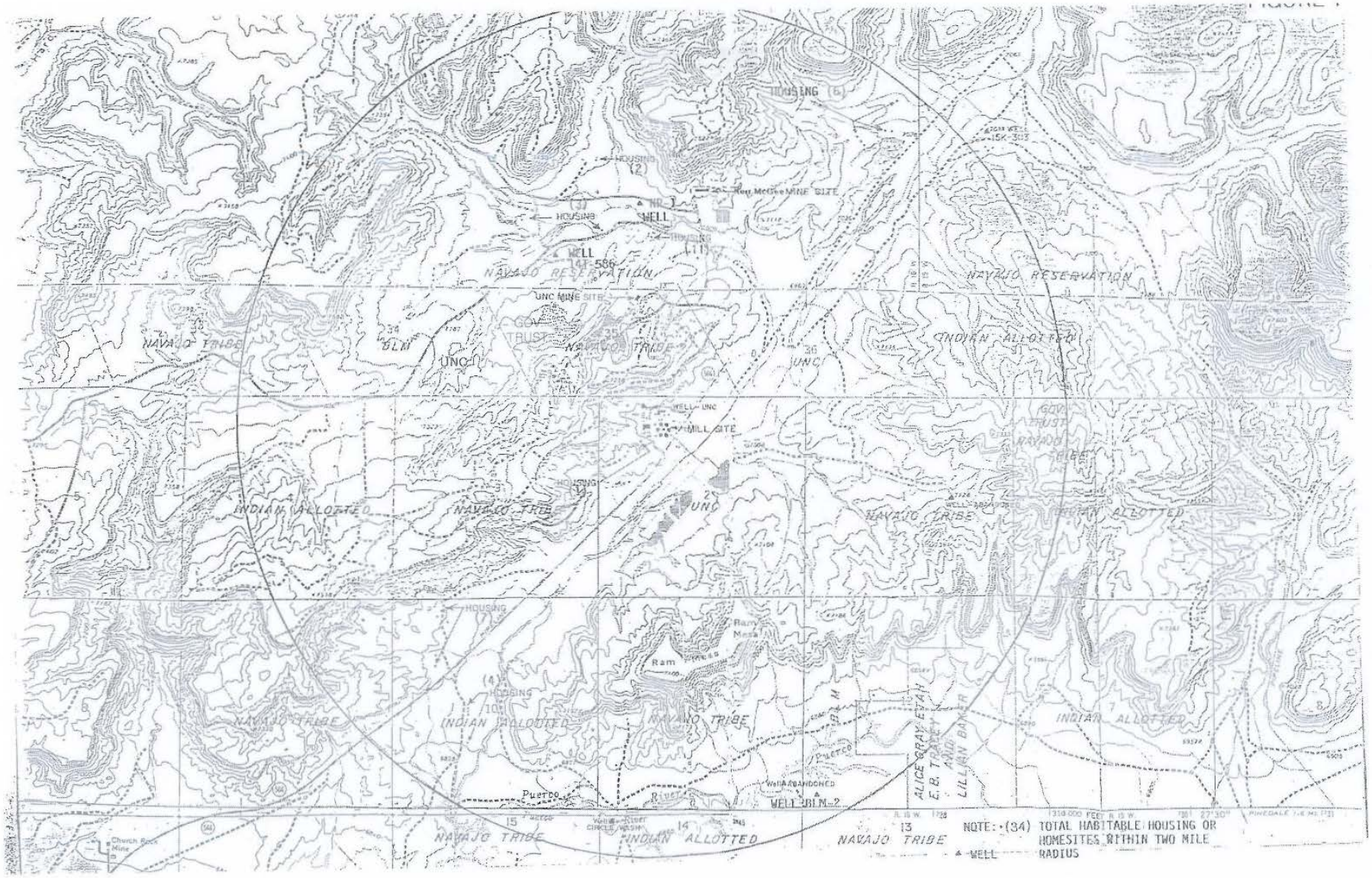
Well ID:	Use:	Location:	Formation:
United Nuclear	Domestic	Sec. 2-Mill Site	Westwater
Circle Wash	Domestic/ Livestock	Section 14	Alluvium
Unknown ID Abandoned	No Known Use	Section 11	Alluvium
J.E. Soper#1 Abandoned	No Known Use	Section 1	Two Wells- Members Mancos
BLM – 2	Monitor	Section 12	Alluvium
14T – 586 (Friendship well # 1)	Livestock	N.I.R. N Part of map	Lower Gallup
NR – 1	Monitor/ Inactive	N.I.R. N Part of map	Alluvium
15K – 303	Livestock	N.I.R. NE Part of Map	Upper Gallup

5.0 Significant changes or events which took place in 2010 are as follows:

1) No change under item 2.0 (Area ownership and Use) and item 4.0 (Well ID, Use, Location and Formation). Total revised current homesite is thirty-four within the two mile radius of mill site.

2) After the August, 2009 remedial construction activity (i.e. Interim Removal Action) on UNC'S NECR Mine Site in Sec 35 (Indian Trust Land) and adjacent Navajo Reservation Land; the following pertinent events or changes have since taken place in 2010.

- Three households who were temporarily relocated to an off-site housing complex were moved back to their permanent home sites during January.
- Re-seeding was done in January on project-impacted areas (i.e. Unnamed Arroyo, NECR – 1 pile, Step out area outside Unnamed Arroyo and Sec 36 Borrow Area).
- Enhanced final fencing and cattle guard installment were also completed in January to promote vegetation growth on re-seeded areas and to keep out livestock.
- Soil erosion and sediment control methods were installed/implemented during the construction phase of the project (e.g. sediment retention pond, drainage swale, berm, silt fencing and/or staked straw bales). Thereby monthly and storm event inspections were/are done during and after construction for compliance with the National Pollutant Discharge Elimination System (NPDES), Best Management Practices, and Storm Water Pollution Prevention Plan (SWPPP).
- During November and December erosion and sediment control construction repair and maintenance work were also done in Step-Out Area (sediment removal and berm reinforcement) and NECR – 1 Pile (diversion dike berm and turf reinforcement).


HOUSING (6)
HOUSING (2)
Roy McGee MINE SITE
HOUSING (3)
WELL
HOUSING (11)
WELL
NAVAJO RESERVATION
UNC MINE SITE
NAVAJO RESERVATION
NAVAJO TRIBE
BLM
UNC
NAVAJO TRIBE
INDIAN ALLOTTED
UNC
WELL UNC
MILL SITE
GOV. TRUST NAVAJO TRIBE
HOUSING
INDIAN ALLOTTED
NAVAJO TRIBE
UNC
NAVAJO TRIBE
INDIAN ALLOTTED
HOUSING
Ram Mesa
Ram
(4) HOUSING
INDIAN ALLOTTED
NAVAJO TRIBE
NAVAJO TRIBE
INDIAN ALLOTTED
ALICE GRAY ESTATE
E. B. TRAVIS
LILLIAN BAKER
Pueblo
Pueblo
Well ABANDONED
WELL BLM...?
Church Rock Mine
NAVAJO TRIBE
INDIAN ALLOTTED
NAVAJO TRIBE
NOTE: (34) TOTAL HABITABLE HOUSING OR HOMESITES WITHIN TWO MILE RADIUS
WELL

012951