

## **Appendix A**

### **Applicable, Relevant, and Appropriate Requirements**

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**APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS  
(ARARs)**

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**Engineering Evaluation/Cost Analysis  
North East Church Rock Mine Site  
Gallup, New Mexico  
May, 2009**

# Acronyms

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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**

<b>Media</b>	<b>Requirement</b>	<b>Requirement Synopsis</b>	<b>Status and Rationale</b>
Solid Wastes	FEDERAL  <b>Resource Conservation and Recovery Act (RCRA) of 1976, as amended –</b> Subtitle C, 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  <b>Resource Conservation and Recovery Act (RCRA) of 1976, as amended –</b> Subtitle D, 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 <b>Surface Mining Control and Reclamation Act of 1977 (SMCRA), as amended --</b>  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 <b>Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA), as amended –</b>  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

**Table A-1  
Chemical-Specific ARARs and TBC Information**

<b>Media</b>	<b>Requirement</b>	<b>Requirement Synopsis</b>	<b>Status and Rationale</b>
Other	FEDERAL <b>Code of Federal Regulations (CFR), Title 10, Part 20</b> 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 <b>Clean Air Act (CAA) –</b> 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 applicable to activities on UNC NPL site, if any; may be relevant and appropriate to activities in other areas
Other	FEDERAL <b>EPA Directive on Protective Cleanup Levels for Radioactive Contamination at CERCLA sites.</b> 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 <b>Navajo Nation Pollutant Discharge Elimination System Program –</b> 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 <b>Navajo Nation Solid Waste Act –</b> 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 <b>Navajo Nation Air Pollution Prevention and Prevention Act –</b> 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

**Table A-1  
Chemical-Specific ARARs and TBC Information**

<b>Media</b>	<b>Requirement</b>	<b>Requirement Synopsis</b>	<b>Status and Rationale</b>
Water	NAVAJO NATION <b>Navajo Nation Clean Water Act</b> – 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 <b>20.4 NMAC</b> – Hazardous Waste Management	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
Water	STATE <b>20.6.2 NMAC</b> – New Mexico Water Quality Ground and Surface Water Protections	Establishes water quality standards and regulations to prevent or abate water pollution from discharges.	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
Water	STATE <b>20.6.4 NMAC</b> – 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 <b>20.3.14 NMAC</b> – 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 <b>20.3.4 NMAC</b> – 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**

<b>Media</b>	<b>Requirement</b>	<b>Requirement Synopsis</b>	<b>Status and Rationale</b>
Cultural Resources	FEDERAL <b>The Native American Graves Protection And Repatriation Act</b> – 25 United States Code (USC) Section 3001 <i>et seq</i> 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 <b>National Historic Preservation Act</b> – 16 USC 470 <i>et seq</i> ; 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 <b>Archeological Resources Protection Act of 1979</b> – 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 <b>American Indian Religious Freedom Act</b> – 42 USC Section 1996 <i>et seq</i> .	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 <b>ESA</b> – 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

**Table A-2  
Location-Specific ARARs and TBC Information**

Media	Requirement	Requirement Synopsis	Status and Rationale
Wildlife	NAVAJO NATION <b>Navajo Nation Endangered Species List</b> – 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 <b>NMSA 1978</b> – 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



**Table A-3  
Action-Specific ARARs and TBC Information**

<b>Media/ Activity</b>	<b>Requirement</b>	<b>Requirement Synopsis</b>	<b>Status and Rationale</b>
Hazardous Materials	FEDERAL <b>Federal Hazardous Materials Transportation Law (formerly Hazardous Materials Transportation Act)</b> – 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 <b>EPA Guidance for Developing Best Management Practices for Storm Water</b> – Publication EPA/832/R-92006	Guidance for developing stormwater BMPs for industrial facilities	TBC
Water	FEDERAL <b>CWA</b> – 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 <b>CWA</b> – 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 <b>20.2 NMAC</b> – 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 <b>19.10 NMAC</b> – Regulation of Non-Coal Mining	Establishes requirements for mine reclamation and close-out plans	Substantive requirements may be relevant and appropriate

**Table A-3  
Action-Specific ARARs and TBC Information**

<b>Media/ Activity</b>	<b>Requirement</b>	<b>Requirement Synopsis</b>	<b>Status and Rationale</b>
Wildlife	STATE <b>19.21.2 NMAC</b> – New Mexico Wildlife Conservation Act <b>NMSA 178</b> 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

## **Appendix B**

### **Removal Action Cost Analysis Sheets**

## Summary of All Costs

	Alternative 2	Alternative 3	Alternative 4	Alternative 5
Total Labor Cost:	\$8,161,740	\$2,765,300	\$3,702,000	\$3,702,000
Total Material Cost:	\$324,349	\$113,800	\$173,732	\$173,732
Total Construction Cost	\$12,230,552	\$15,415,697	\$19,347,013	\$20,969,444
Total Disposal Cost:	\$66,021,260	\$694,953	\$694,953	\$626,049
Total Transportation Cost:	\$172,215,862	\$0	\$0	\$6,314,750
Total ODC:	\$6,540,357	\$1,391,168	\$1,704,532	\$1,834,178
<b>CONSTRUCTION COST</b>	<b>\$265,494,120</b>	<b>\$20,380,918</b>	<b>\$25,622,230</b>	<b>\$33,620,154</b>
Design, Plans	\$1,223,055	\$1,541,570	\$1,934,701	\$3,355,111
O&M (Present Worth)	\$368,330	\$1,841,651	\$1,841,651	\$1,227,767
<b>TOTAL CONTINGENCY COST</b>	<b>\$26,549,412</b>	<b>\$2,038,092</b>	<b>\$2,562,223</b>	<b>\$3,362,015</b>
<b>TOTAL COST (With Contingency)</b>	<b>\$293,634,917</b>	<b>\$25,802,231</b>	<b>\$31,960,805</b>	<b>\$41,565,048</b>
<b>Total Cost with Option A</b>		<b>\$28,529,451</b>	<b>\$34,688,025</b>	<b>\$44,292,268</b>
<b>Total Cost with Option B</b>		<b>\$26,651,206</b>	<b>\$32,809,780</b>	

Option A: Removal of Hot Spot to off-site Class I HazWaste Facility (tons)

Option B: Removal of Hot Spot material to UNC NPL Site

**ALTERNATIVE 2 - BASIS OF ESTIMATE SHEETS**

**Statement of Work**

**Scope Description:**

**Alternative 2.**

The scope covered by this BOE contains only those elements directly associated with the offsite disposal of contaminated waste at the NECR site. Assumptions are explained in a separate document and are generally explained in the column to the far right of each row. Elements including design, plan development, and O&M are covered by this BOE but as a separate and distinct line item.

**Judgemental Factors Applied In Projecting From Known Source Data to the Estimate:**

- 1) Cost developed for this BOE were based RSE Means, RACER, Quotes and Company Experience
- 2) RS Means Heavy Construction Cost Data 21st annual Edition.
- 3) Disposal Facilities - US Ecology - Grandview Id. Transportation - MPE Inc.

**Key Assumptions (not in conflict with the WBS):**

- 1) All material will be excavated and disposed off site at an approved facility. 2) Based on volume estimates, it is estimated that the project will take 9 years. 3) Soil conversion factor 1.45 (cy to ton). 4) 100,000cy backfill will be used from an on-site source 5) 100% of excavated waste will be LLRW and hauled to a Class A disposal facility 6) Based on area and volume data, 151 acres will be disturbed and will require hydroseeding. 8) A 10% contingency is added for unknowns

**Cost Elements**

**Labor:**

Labor Category	Labor Hours	Labor Rate	TOTAL COST
<b>Office Labor</b>			
Program	10800	\$133.00	\$1,436,400
Project Manager	18000	\$45.00	\$810,000
Engineer-Sr.	10800	\$41.00	\$442,800
Health & Safety	17280	\$44.00	\$760,320
Geologist/Hydrog	12240	\$38.00	\$465,120
Env. Scientist-Sr.	11520	\$42.00	\$483,840
Chemist-Sr.	14400	\$40.00	\$576,000
GIS-CADD-Sr.	7200	\$27.00	\$194,400
Admin Support	7200	\$22.00	\$158,400
Office Labor Total			\$5,327,280
<b>Field Labor</b>			
Field	17280	\$44.00	\$760,320
Field Inspector	17280	\$27.00	\$466,560
SSHO/QC	17280	\$36.00	\$622,080
Surveyor	8640	\$25.00	\$216,000
Security	19440	\$20.00	\$388,800
Laborer	19440	\$19.58	\$380,700
Field Labor Total			\$2,834,460
<b>Total Labor Cost</b>			<b>\$8,161,740</b>

**ALTERNATIVE 2 - BASIS OF ESTIMATE SHEETS**

Item Description	Number of Units	Number of	Unit Price	TOTAL COST
PPE, Level D (day)	1,575	20	10.00	\$315,000
Misc disposable field equipment (lump)	7	1	1000.00	\$7,000
Drums (each)	15	1	60.00	\$900
Scaffolding	483	3	34.50	\$1,449 1 54 23.70 4370
<b>Total Material Cost</b>				<b>\$324,349</b>

**Construction Costs:**

Construction Description	Number of Units	Total Hours	SubCont Rate	TOTAL COST
Util. clearance - air vac. extract. (HR)	15	4	210.00	\$12,600
Provide/place 6" Class II base (SY)	15	11,100	7.06	\$1,175,490 321123.230100
Asphalt pavement (SF)	60,000	1	2.12	\$127,200 32 12 16.140020
Liner - HDPE/LLDPE (sqft)	20,000	15	1.17	\$386,100 334713.5312
Geocomposite (SY)	2,220	15	2.25	\$82,418 31 32 19.161500
Geotextile Fabric (SY)	2,220	15	2.25	\$82,418 31 32 19.161500
Development of local borrow source	35,000	1	1.00	\$35,000 engineering estimate
Rip Rap load, haul on-site source (CY)	2,220	1	25.37	\$56,321 312323.15.6020+312323.18.2150
<b>subtotal</b>				<b>\$1,957,546</b>
Data validation (each)	4,100	1	10.00	\$41,000
Lab - CAM 17 Metals - solid (each)	4,100	1	95.00	\$389,500 Est. based on prior experience at Site
Lab - Radionuclides - solid (each)	4,100	1	100.00	\$410,000
Air Monitoring (cost/year)	9	1	75000.00	\$675,000 Racer
<b>subtotal</b>				<b>\$1,515,500</b>
Land surveying, Mob/Demob (Lump)	15	1	1000.00	\$15,000
Land surveying, field (hr)	15	16	200.00	\$48,000
Land surveying report (lump)	15	1	4500.00	\$67,500
Construction BMPs (lump)	15	1	10000.00	\$150,000
Security fencing (LF)	1,000	1	17.04	\$17,040 323113.401300
Temporary fencing (LF)	15	5,000	4.18	\$940,500 01 56 26.500250
150HP equipment-Mob/Demob	16	20	271.00	\$86,720 15436.500100
FOGM - Equip refuel (Day)	90	3	4000.00	\$1,080,000
Pavement removal (SY)	1,110	1	5.25	\$5,828 02 41 13.175050
Concrete demolition (CY)	370	1	92.00	\$34,074 02 41 13.175500
Clearing and Grubbing (AC)	151	1	2550.00	\$385,050 31 11 10.10 0020
Excavate, place in stockpile (no util's.)	261,300	1	2.12	\$553,956 31 23 16.42 0300
Excavate, direct load to trucks (no	609,700	1	2.44	\$1,486,449 31 23 16.42 0300+15%
Load stockpiles to trucks (CY)	261,300	1	0.80	\$209,040 31 23 16.42 1650
Excavation factor for utilities (CY)	8,710	1	3.55	\$30,921 3123 16.13 0110
Backfill soil, local source (CY)	200,000	1	8.88	\$1,776,000 31 23 23.18 1255
Place/compact backfill (CY)	200,000	1	1.99	\$398,000 31 23 23.17 0020+312323.23 5600
Soil amendments (topsoil) (SF)	20,000	1	1.15	\$23,000 32 91 13.23 3600
topsoil placement and grading (SY)	20,000	1	4.18	\$83,600 32 91 19.13 0800
<b>subtotal</b>				<b>\$7,390,677</b>
Geotechnical survey field	15	1	200.00	\$3,000
Geotechnical testing - field obs./tests	155	8	200.00	\$248,000
Geotech. anal. D1557 moist./density	15	2	140.00	\$4,200
Geotech. report (lump)	15	1	1000.00	\$15,000
<b>subtotal</b>				<b>\$270,200</b>
Hydroseeding (MSF)	6,578	1	60.30	\$396,628 329219.145400
Site Winterization	1	7	100000.00	\$700,000
<b>Total Construction Costs</b>				<b>\$12,230,552</b>

**ALTERNATIVE 2 - BASIS OF ESTIMATE SHEETS**

**Disposal Costs:**

Waste Disposal Description	Total Volume	Total units	Disposal Rate	TOTAL COST
soil, RCRA haz. Class I T&D (CY) -	871,000	1	75.00	\$65,325,000 US Ecology verbal quote
IDW soil T&D (drum)	10	1	217.80	\$2,178 02 81 20.101100
IDW water T&D (drum)	10	1	217.80	\$2,178
waste T&D demurrage (HR)	580	1	118.80	\$68,904 02 81 20.103110
Concrete, non-haz. Class II SW, T&D	5,000	7,600	7.60	\$38,000 02 41 19.18 0400
Asphalt, non-haz. Class II SW, T&D	5,000	6,500	90.00	\$585,000 02 41 19.19 0100
Misc. Disposal Costs				\$696,260
<b>Total Disposal Costs</b>				<b>\$66,021,260</b>

**Transportation Costs:**

Waste Transportation Description	Unit Measure	Total units	Transp Rate	TOTAL COST
Rad waste soil, RCRA haz. Class I T&D (ton)	1,262,950	1	136.36	\$172,215,862 US Ecology verbal quote
<b>Total Transportation Cost</b>				<b>\$172,215,862</b>

**Other Direct Costs:**

Item Description	units/yr	yr	Unit Price	TOTAL COST
Lodging for residents	200	2	109.00	\$43,600 per email 9/17/07 from Bill Schaal
Trailer/office space (Month)	36	9	282.00	\$91,368 01 52 13.20 0350+01 52 13.20 0700
Trailer/Conex (Month)	36	9	76.00	\$24,624 01 52 13.20 1250
Portable sanitary station (week)	160	9	165.00	\$237,600 01 54 33.40 6410
Trash (Month)	18	9	435.00	\$70,470
Utilities hook-up fees (lump)	2	1	1000.00	\$2,000
Electric power PG&E (month)	36	9	110.00	\$35,640 01 52 13.40 0160
Land phone/fax (month)	36	9	210.00	\$68,040 01 52 13.400140
Office Equipment (month)	36	9	150.00	\$48,600 01 52 13.40 0100
Office Supplies (month)	36	9	95.00	\$30,780 01 52 13.40 0120
Water	36	9	62.00	\$20,088 01 51 13.800700
Per diem, (day)	900	9	109.00	\$882,900 per email 9/17/07 from Bill Schaal
Travel, air fare (year)	104	9	1000.00	\$936,000
Mobile phone (month)	36	9	50.00	\$16,200
Radios (month)	90	9	25.00	\$20,250
Rental truck 4WD (month)	36	9	585.00	\$189,540 01 54 33.40 7200
4WD truck fuel (week)	160	9	24.00	\$34,560
Rental car (day)	48	9	40.00	\$17,280
Generator (Month)	9	9	780.00	\$63,180 01 54 33.40 2600
Generator fuel (Week)	40	9	3.00	\$1,080
Submersible Pump (Month)	18	9	198.00	\$32,076 01 54 33.40 4700
Truck Scales (Month)	18	7	200.00	\$25,200
<b>ODC's - Site Support</b>				<b>\$2,891,076</b>
Labor	332,088	9	0.58	\$1,733,499
Equipment	90,650	9	0.58	\$473,193
Material:	25,270	9	0.58	\$131,909
ODC's	247,638	9	0.58	\$1,292,670
Subcontractors	3,450	9	0.58	\$18,009
ODC's - Rad H&S				<b>\$3,649,281</b>
<b>Total ODC Costs</b>				<b>\$6,540,357</b>

**ALTERNATIVE 2 - BASIS OF ESTIMATE SHEETS**

**Other Direct Costs: O&M, Design, Plans**

Develop Design	1		6% construction cost		\$733,833
Develop Plans	1	1	4% construction cost		\$489,222
O&M Costs	30,000	30	1.00	Net present Worth 7%	\$368,330
<b>Total Excluded ODC's - O&amp;M, Design, Plans</b>					<b>\$1,591,385</b>

**Contingency:**

Basis of Contingency:  
10% general contingency applied in accordance with DOE G 430.1-1, Table 11-3 as the Sanitary Waste location/excavation is well known and documented.

Percent Contingency: 10.0%

**Total WBS Cost:**

<b>Total Labor Cost:</b>	\$8,161,740
<b>Total Material Cost:</b>	\$324,349
<b>Total Construction Cost</b>	\$12,230,552
<b>Total Disposal Cost:</b>	\$66,021,260
<b>Total Transportation Cost:</b>	\$172,215,862
<b>Total ODC:</b>	\$6,540,357
<b>TOTAL COST (Less Contingency):</b>	\$265,494,120
<b>TOTAL CONTINGENCY COST:</b>	\$26,549,412
<b>TOTAL COST (With Contingency):</b>	<b>\$292,043,532</b>
<b>Total Excluded ODC Costs - O&amp;M, Design, Plans</b>	\$1,591,385

**Approvals:**

Prepared By:	Eric Rixen (revised by Nova Clite)	Date:	10/31/2007 (rev February 14, 2008)
Revised By:	Cynthia Wetmore	Date:	10/15/2008 (rev 05/22/2009)
Approved By:		Date:	



**ALTERNATIVE 3 - BASIS OF ESTIMATE SHEETS**

Statement of Work

**Scope Description:**

**Alternative 3.**

The scope covered by this BOE contains only those elements directly associated with the excavation and consolidation of waste material into an onsite covered disposal cell at the NECR site. Assumptions are explained in a separate document and are generally explained in the column to the far right of each row. Elements including design, plan development, and O&M are covered by this BOE but as a separate and distinct line item.

**Judgemental Factors Applied In Projecting From Known Source Data to the Estimate:**

- 1) Cost developed for this BOE were based RSE Means, RACER, Quotes and Company Experience
- 2) RS Means Heavy Construction Cost Data 21st annual Edition.
- 3) Disposal Facilities - US Ecology - Grandview Id. Transportation - MPE Inc.

**Key Assumptions (not in conflict with the WBS):**

- 1) 21% of all waste material will be covered in-situ in Ponds 1 & 2
- 2) 74% of all waste material excavated and consolidated into an onsite area to be covered.
- 3) Assume the project will take 3 years.
- 4) Soil conversion factor 1.45 (cy to ton).
- 5) 200,000cy Backfill will be used from on-site borrow source; rip rap also from on-site quarry
- 6) Based on area and volume data, 151 acres will be disturbed and will require hydroseeding.
- 7) A 10% contingency is added for unknowns.

**Cost Elements**

**Labor:**

Labor Category	Labor Hours	Labor Rate	TOTAL COST	References
<b>Office Labor</b>				
Program Manager	3600	\$133.00	\$478,800	
Project Manager	6000	\$45.00	\$270,000	
Engineer-Sr.	3600	\$41.00	\$147,600	
Health & Safety	5760	\$44.00	\$253,440	
Geologist/Hydroge	2880	\$38.00	\$109,440	
Env. Scientist-Sr.	5280	\$42.00	\$221,760	
Chemist-Sr.	3200	\$40.00	\$128,000	
GIS-CADD-Sr.	2400	\$27.00	\$64,800	
Admin Support	4800	\$22.00	\$105,600	
Office Labor Total			\$1,779,440	
<b>Field Labor</b>				
Field	6480	\$44.00	\$285,120	
Field Inspector	6480	\$27.00	\$174,960	
SSHO/QC	6480	\$36.00	\$233,280	
Surveyor	1440	\$25.00	\$36,000	
Security	6480	\$20.00	\$129,600	
Laborer	6480	\$19.58	\$126,900	
Field Labor Total			\$985,860	
<b>Total Labor Cost</b>			<b>\$2,765,300</b>	

**ALTERNATIVE 3 - BASIS OF ESTIMATE SHEETS**

<b>Material:</b>					
Item Description	Number of Units	Number of	Unit Price	TOTAL COST	
PPE, Level D (day)	525	20	10.00	\$105,000	
Misc disposable field equipment (lump)	7	1	1000.00	\$7,000	
Drums (each)	15	2	60.00	\$1,800	
Scaffolding	483	3	34.50	\$1,449	1 54 23.70 4370
<b>Total Material Cost</b>				<b>\$113,800</b>	
<b>Construction Costs:</b>					
Construction Description:	Number of Units	Total Hours	SubCont Rate	TOTAL COST	
Util. clearance - air vac. extract. (HR)	15	4	210.00	\$12,600	
Provide/place 6" Class II base (SY)	15	11,100	7.06	\$1,175,490	321123.230100
Asphalt pavement (SF)	60,000	1	2.12	\$127,200	32 12 16.140020
Liner - HDPE/LLDPE (sqft)	720,583	1	1.17	\$843,082	334713.5312
Geotextile Filter Fabric (SY)	80,065	1	2.25	\$180,146	31 32 19.161500
Geonet Fabric (SY)	80,065	1	2.25	\$180,146	31 32 19.161500
Development of local borrow source	539,789	1	1.00	\$539,789	RMeans estimate
Rip Rap load, haul on-site source (CY)	40,032	1	25.37	\$1,015,622	312323.15.6020+312323.18.2150
subtotal				<b>\$4,074,075</b>	
Data validation (each)	4,000	1	10.00	\$40,000	
Lab - CAM 17 Metals - solid (each)	4,000	1	95.00	\$380,000	Est. based on prior experience at Site
Lab - Radionuclides - solid (each)	4,000	1	100.00	\$400,000	
Air Monitoring (cost/year)	3	1	75000.00	\$225,000	Racer
subtotal				<b>\$1,045,000</b>	
Land surveying, Mob/Demob (Lump)	13	1	1000.00	\$13,000	
Land surveying, field (hr)	13	8	200.00	\$20,800	
Land surveying report (lump)	13	1	4500.00	\$58,500	
Construction BMPs (lump)	13	1	10000.00	\$130,000	
Security fencing (LF)	1,000	1	17.04	\$17,040	323113.401300
Temporary fencing (LF)	15	5,000	4.18	\$313,500	01 56 26.500250
Hydro-Geological survey report (lump)	1	1	100000.00	\$100,000	
150HP equipment	15	20	271.00	\$81,300	15436.500100
FOGM - Equip refuel (Day)	155	3	4000.00	\$1,860,000	
Pavement removal (SY)	1,110	1	5.25	\$5,828	02 41 13.175050
Concrete demolition (CY)	370	1	92.00	\$34,074	02 41 13.175500
Clearing and Grubbing (AC)	151	1	2550.00	\$385,050	31 11 10.10 0020
Excavate, direct load to trucks (no	776,000	1	2.44	\$1,891,888	31 23 16.42 0300+15%
Excavation factor for utilities (CY)	7,760	1	3.55	\$27,548	3123 16.13 0110
Local borrow soil, backfill delivered	175,000	1	8.88	\$1,554,000	31 23 23.18 1255
Place/compact backfill (CY)	175,000	1	1.99	\$348,250	31 23 23.17 0020+312323.23 5600
Soil amendments (topsoil) (SF)	17,500	1	1.15	\$20,125	32 91 13.23 3600
topsoil placement and grading (SY)	17,500	1	4.18	\$73,150	32 91 19.13 0800
Place/compact Waste material (CY)	737,200	1	2.47	\$1,820,884	31 23 23.17 0020+312323.23 5640
Local borrow soil, cover material	53,376	1	8.88	\$473,979	31 23 23.18 1255
Place/compact cover material (CY)	53,376	1	2.47	\$131,839	31 23 23.17 0020+312323.23 5640
subtotal				<b>\$9,360,754</b>	
Geotechnical survey field	13	1	200.00	\$2,600	
Geotechnical testing - field obs./tests	200	8	200.00	\$320,000	
Geotech. anal. D1557 moist./density	13	2	140.00	\$3,640	
Geotech. report (lump)	13	1	1000.00	\$13,000	
subtotal				<b>\$339,240</b>	
Hydroseeding (MSF)	6,578	1	60.30	\$396,628	329219.145400
Site Winterization	2	1	100000.00	\$200,000	
<b>Construction Costs:</b>				<b>\$15,415,697</b>	

**ALTERNATIVE 3 - BASIS OF ESTIMATE SHEETS**

<b>Disposal Costs:</b>				
<b>Waste Disposal Description</b>	<b>Total Volume</b>	<b>Total units</b>	<b>Disposal Rate</b>	<b>TOTAL COST</b>
IDW soil T&D (drum)	7	1	217.80	\$1,525 02 81 20.101100
IDW water T&D (drum)	7	1	217.80	\$1,525
waste T&D demurrage (HR)	580	1	118.80	\$68,904 02 81 20.103110
Concrete, non-haz. Class II SW, T&D	5,000	7,600	7.60	\$38,000 02 41 19.18 0400
Asphalt, non-haz. Class II SW, T&D	5,000	6,500	90.00	\$585,000 02 41 19.19 0100
Misc. Disposal Costs				\$694,953
<b>Total Disposal Costs</b>				<b>\$694,953</b>
<b>Transportation Costs for optional handling of "Principal Threat" Material:</b>				
<b>Option</b>	<b>Unit Measure</b>		<b>Transp Rate</b>	<b>TOTAL COST</b>
<b>Option A: To off-site Class I Hazardous Waste Disposal Facility (tons)</b>				
Transportation Costs (tons)	14,500	1	136.36	\$1,977,220 MPE Verbal Quote
Disposal fee - (CY)	10,000	1	75.00	\$750,000 US Ecology verbal quote
<b>Subtotal Option A</b>				<b>\$2,727,220</b>
<b>Option B: To UNC NPL Site</b>				
Transport to UNC Mill Site	14,500	1	5.00	\$72,500 engineering estimate
Construction of Hot Spot Cell at NPL site				\$776,475 5% of construction costs for Alt 3
<b>Subtotal Option B</b>				<b>\$848,975</b>
<b>Other Direct Costs:</b>				
<b>Item Description</b>	<b>units/yr</b>	<b>yr</b>	<b>Unit Price</b>	<b>TOTAL COST</b>
Lodging for residents	200	2	109.00	\$43,600 per email 9/17/07 from Bill Schaal
Trailer/office space (Month)	36	3	282.00	\$30,456 01 52 13.20 0350+01 52 13.20 0700
Trailer/Conex (Month)	36	3	76.00	\$8,208 01 52 13.20 1250
Portable sanitary station (week)	160	3	165.00	\$79,200 01 54 33.40 6410
Trash (Month)	18	3	435.00	\$23,490
Utilities hook-up fees (lump)	2	1	1000.00	\$2,000
Electric power PG&E (month)	36	3	110.00	\$11,880 01 52 13.40 0160
Land phone/fax (month)	36	3	210.00	\$22,680 01 52 13.400140
Office Equipment (month)	36	3	150.00	\$16,200 01 52 13.40 0100
Office Supplies (month)	36	3	95.00	\$10,260 01 52 13.40 0120
Water	36	3	62.00	\$6,696 01 51 13.800700
Per diem, (day)	900	3	109.00	\$294,300 per email 9/17/07 from Bill Schaal
Travel, air fare (each)	104	3	1000.00	\$312,000
Mobile phone (month)	36	3	50.00	\$5,400
Radios (month)	90	3	25.00	\$6,750
Rental truck 4WD (month)	36	3	585.00	\$63,180 01 54 33.40 7200
4WD truck fuel (week)	160	3	24.00	\$11,520
Rental car (day)	48	3	40.00	\$5,760
Generator (Month)	9	3	780.00	\$21,060 01 54 33.40 2600
Generator fuel (Week)	40	3	3.00	\$360
Submersible Pump (Month)	18	3	198.00	\$10,692 01 54 33.40 4700
Truck Scales (Month)	18	0	200.00	\$0
ODC's - Site Support				<b>\$985,692</b>
Labor	332,088	1	0.58	\$192,611
Equipment	90,650	1	0.58	\$52,577
Material:	25,270	1	0.58	\$14,657
ODC's	247,638	1	0.58	\$143,630
Subcontractors	3,450	1	0.58	\$2,001
ODC's - Rad H&S				<b>\$405,476</b>
<b>Total ODC Costs</b>				<b>\$1,391,168</b>

**ALTERNATIVE 3 - BASIS OF ESTIMATE SHEETS**

Develop Design	1	1	6% construction cost		\$924,942
Develop Plans	1	1	4% construction cost		\$616,628
O&M Costs	150,000	30	1.00	Net present Worth 7%	\$1,841,651
<b>Total Excluded ODC's - O&amp;M, Design, Plans</b>					<b>\$3,383,221</b>

**Contingency:**

Basis of Contingency:  
10% general contingency applied in accordance with DOE G 430.1-1, Table 11-3 as the Sanitary Waste location/excavation is well known and documented.

Percent Contingency: 10.0%

**Total WBS Cost:**

<b>Total Labor Cost:</b>	\$2,765,300	
<b>Total Material Cost:</b>	\$113,800	
<b>Total Construction Cost</b>	\$15,415,697	
<b>Total Disposal Cost:</b>	\$694,953	
<b>Total Transportation Cost:</b>		
<b>Total ODC:</b>	\$1,391,168	
<hr/>		
<b>TOTAL COST (Less Contingency):</b>	\$20,380,918	
<b>TOTAL CONTINGENCY COST:</b>	\$2,038,092	
<b>TOTAL COST (With Contingency):</b>	<b>\$22,419,010</b>	
<b>Additional Cost with Option A TSD Disposal</b>	<b>\$2,727,220</b>	\$25,146,230
<b>Additional Cost with Option B UNC NPL Disposal</b>	<b>\$848,975</b>	\$23,267,985
<hr/>		
<b>Total Excluded ODC Costs - O&amp;M, Design, Plans</b>	\$3,383,221	

**Approvals:**

Prepared By:	Eric Rixen (revised by Nova Clite)	Date:	10/31/2007 (rev February 13, 2008)
Revised By:	Cynthia Wetmore	Date:	10/15/2008 (rev 05/22/2009)
Approved By:		Date:	

**ALTERNATIVE 4 - BASIS OF ESTIMATE SHEETS**

**Statement of Work**

**Scope Description:**

**Alternative 4.**

The scope covered by this BOE contains only those elements directly associated with the excavation and consolidation of waste material into an onsite fully encapsulated disposal cell at the NECR site. Assumptions are explained in a separate document and are generally explained in the column to the far right of each row. Elements including design, plan development, and O&M are covered by this BOE but as a separate and distinct line item.

**Judgemental Factors Applied In Projecting From Known Source Data to the Estimate:**

- 1) Cost developed for this BOE were based RSE Means, RACER, Quotes and Company Experience
- 2) RS Means Heavy Construction Cost Data 21st annual Edition.
- 3) Disposal Facilities - US Ecology - Grandview Id. Transportation - MPE Inc.

**Key Assumptions (not in conflict with the WBS):**

- 1) All material will be excavated and consolidated into an onsite repository.
- 2) Based on volume estimates, it is estimated that the project will take 4 years.
- 3) Soil conversion factor 1.45 (cy to ton).
- 4) 200,000cy Backfill will be obtained from an on-site borrow source, rip-rap also assumed from on-site quarry.
- 5) Based on area and volume data, 151 acres will be disturbed and will require hydroseeding.
- 7) A 10% contingency is added for unknowns.
- 8) Repository will be located over Sandfill 2, NECR-2, and Sandfill 3 areas.

**Cost Elements**

**Labor:**

Labor Category	Labor Hours	Labor Rate		TOTAL COST	Reference
<b>Office Labor</b>					
Program	4800	\$133.00		\$638,400	
Project Manager	8000	\$45.00		\$360,000	
Engineer-Sr.	4800	\$41.00		\$196,800	
Health & Safety	7680	\$44.00		\$337,920	
Geologist/Hydrog	3840	\$38.00		\$145,920	
Env. Scientist-Sr.	7040	\$42.00		\$295,680	
Chemist-Sr.	6400	\$40.00		\$256,000	
GIS-CADD-Sr.	3200	\$27.00		\$86,400	
Admin Support	3200	\$22.00		\$70,400	
Office Labor Total				\$2,387,520	
<b>Field Labor</b>					
Field	8640	\$44.00		\$380,160	
Field Inspector	8640	\$27.00		\$233,280	
SSHO/QC	8640	\$36.00		\$311,040	
Surveyor	1920	\$25.00		\$48,000	
Security	8640	\$20.00		\$172,800	
Laborer	8640	\$19.58		\$169,200	
Field Labor Total				\$1,314,480	
<b>Total Labor Cost</b>				<b>\$3,702,000</b>	

**Material:**

Item Description	Number of Units	Number of	Unit Price	TOTAL COST	
PPE, Level D (day)	700	20	\$10.0	\$140,000	
Misc disposable field equipment (lump)	15	2	\$1,000.0	\$30,000	
Drums (each)	15	2	\$60.0	\$1,800	
Scaffolding	483	4	34.50	\$1,932	1 54 23.70 4370
<b>Total Material Cost</b>				<b>\$173,732</b>	

**ALTERNATIVE 4 - BASIS OF ESTIMATE SHEETS**

<b>Construction Costs:</b>				
<b>Construction Description</b>	<b>Number of Units</b>	<b>Total Hours</b>	<b>SubCont Rate</b>	<b>TOTAL COST</b>
Util. clearance - air vac. extract. (HR)	15	4	\$210.0	\$12,600
Provide/place 6" Class II base (SY)	15	11,100	7.06	\$1,175,490 321123.230100
Asphalt pavement (SF)	60,000	1	2.12	\$127,200 32 12 16.140020
Liner - HDPE/LLDPE (sqft)	1,526,533	1	1.17	\$1,786,044 334713.5312
Geotextile Filter Fabric (SY)	169,615	1	2.25	\$381,633 31 32 19.161500
Geonet Fabric (SY)	169,615	1	2.25	\$381,633 31 32 19.161500
Development of local borrow source	539,789	1	1.00	\$539,789 RSM estimate
Rip Rap load, haul on-site source (CY)	49,889	1	25.37	\$1,265,681 312323.15.6020+312323.18.2150
<b>subtotal</b>				<b>\$5,670,071</b>
Data validation (each)	4,100	1	10.00	\$41,000
Lab - CAM 17 Metals - solid (each)	4,100	1	95.00	\$389,500 Est. based on prior experience at Site
Lab - Radionuclides - solid (each)	4,100	1	100.00	\$410,000
Air Monitoring (cost/year)	4	1	75000.00	\$300,000 Racer
<b>subtotal</b>				<b>\$1,140,500</b>
Land surveying, Mob/Demob (Lump)	16	1	\$1,000.0	\$16,000
Land surveying, field (hr)	15	8	\$200.0	\$24,000
Land surveying report (lump)	16	1	\$4,500.0	\$72,000
Security fencing (LF)	1,000	1	17.04	\$17,040 323113.401300
Temporary fencing (LF)	15	5,000	4.18	\$313,500 01 56 26.500250
Hydro-Geological survey report (lump)	1	1	100000.00	\$100,000
Construction BMPs (lump)	20	1	10000.00	\$200,000
150HP equipment	15	20	271.00	\$81,300 15436.500100
FOGM - Equip refuel (Day)	155	3	4000.00	\$1,860,000
Pavement removal (SY)	1,110	1	5.25	\$5,828 02 41 13.175050
Concrete demolition (CY)	370	1	92.00	\$34,074 02 41 13.175500
Clearing and Grubbing (AC)	151	1	2550.00	\$385,050 31 11 10.10 0020
Excavate, place in stockpile (no util's.) (CY)	130,650	1	\$7.6	\$998,166 31 23 16.463320
Excavate, direct load to trucks (no util's.) (CY)	740,350	1	2.44	\$1,804,973 31 23 16.42 0300+15%
Load stockpiles to trucks (CY)	130,650	1	\$0.3	\$37,889 31 23 16.420020
Excavation factor for utilities (CY)	8,710	1	3.55	\$30,921 3123 16.13 0110
Local borrow soil, backfill delivered (CY)	200,000	1	8.88	\$1,776,000 31 23 23.18 1255
Place/compact backfill (CY)	200,000	1	1.99	\$398,000 31 23 23.17 0020+312323.23 5600
Soil amendments (topsoil) (SF)	20,000	1	1.15	\$23,000 32 91 13.23 3600
topsoil placement and grading (SY)	20,000	1	4.18	\$83,600 32 91 19.13 0800
Place/compact Waste material (CY)	871,000	1	2.47	\$2,151,370 31 23 23.17 0020+312323.23 5640
Import soil, Repository material delivered (CY)	113,077	1	8.88	\$1,004,124 31 23 23.18 1255
Place/compact imported repository material (CY)	113,077	1	2.47	\$279,300 31 23 23.17 0020+312323.23 5640
<b>subtotal</b>				<b>\$11,696,134</b>
Geotechnical survey field (mob/demob)	16	1	\$200.0	\$3,200
Geotechnical testing - field obs./tests (Hr)	200	8	\$200.0	\$320,000
Geotech. anal. D1557 moist./density relation	16	2	\$140.0	\$4,480
Geotech. report (lump)	16	1	\$1,000.0	\$16,000
<b>subtotal</b>				<b>\$343,680</b>
Hydroseeding (MSF)	6,578	1	60.30	\$396,628 329219.145400
Site Winterization	1	1	100000.00	\$100,000
<b>Construction Costs:</b>				<b>\$19,347,013</b>

**ALTERNATIVE 4 - BASIS OF ESTIMATE SHEETS**

<b>Disposal Costs:</b>				
<b>Waste Disposal Description</b>	<b>Total Volume</b>	<b>Total units</b>	<b>Disposal Rate</b>	<b>TOTAL COST</b>
IDW soil T&D (drum)	7	1	217.80	\$1,525 02 81 20.101100
IDW water T&D (drum)	7	1	217.80	\$1,525
waste T&D demurrage (HR)	580	1	118.80	\$68,904 02 81 20.103110
Concrete, non-haz. Class II SW, T&D (CY)	5,000	7,600	7.60	\$38,000 02 41 19.18 0400
Asphalt, non-haz. Class II SW, T&D (ton)	5,000	6,500	90.00	\$585,000 02 41 19.19 0100
Misc. Disposal Costs				\$694,953
<b>Total Disposal Costs</b>				<b>\$694,953</b>

<b>Transportation Costs for optional handling of "Principal Threat" Material:</b>				
<b>Options</b>	<b>Unit Measure</b>	<b>Total units</b>	<b>Transp Rate</b>	<b>TOTAL COST</b>
<b>Option A: To off-site Class I Hazardous Waste Disposal Facility (tons)</b>				
Transportation Costs (tons)	14,500	1	136.36	\$1,977,220 MPe Verbal Quote
Disposal fee - (CY)	10,000	1	75.00	\$750,000 US Ecology verbal quote
<b>Subtotal Option A</b>				<b>\$2,727,220</b>
<b>Option B: To UNC NPL Site</b>				
Transport to UNC Mill Site	14,500	1	5.00	\$72,500 engineering estimate
Construction of Hot Spot Cell at NPL site				\$976,037 5% of construction costs for Alt 4
<b>Subtotal Option B</b>				<b>\$1,048,537</b>

<b>Other Direct Costs:</b>				
<b>Item Description</b>	<b>units/yr</b>	<b>yr</b>	<b>Unit Price</b>	<b>TOTAL COST</b>
Lodging for residents	200	2	109.00	\$43,600 per email 9/17/07 from Bill Schaal
Trailer/office space (Month)	36	4	282.00	\$40,608 01 52 13.20 0350+01 52 13.20 0700
Trailer/Conex (Month)	36	4	76.00	\$10,944 01 52 13.20 1250
Portable sanitary station (week)	160	4	165.00	\$105,600 01 54 33.40 6410
Trash (Month)	18	4	435.00	\$31,320
Utilities hook-up fees (lump)	2	1	1000.00	\$2,000
Electric power PG&E (month)	36	4	110.00	\$15,840 01 52 13.40 0160
Land phone/fax (month)	36	4	210.00	\$30,240 01 52 13.400140
Office Equipment (month)	36	4	150.00	\$21,600 01 52 13.40 0100
Office Supplies (month)	36	4	95.00	\$13,680 01 52 13.40 0120
Water	36	4	62.00	\$8,928 01 51 13.800700
Per diem, (day)	900	4	109.00	\$392,400 per email 9/17/07 from Bill Schaal
Travel, air fare (each)	104	4	1000.00	\$416,000
Mobile phone (month)	36	4	50.00	\$7,200
Radios (month)	90	4	25.00	\$9,000
Rental truck 4WD (month)	36	4	585.00	\$84,240 01 54 33.40 7200
4WD truck fuel (week)	160	4	24.00	\$15,360
Rental car (day)	48	4	40.00	\$7,680
Generator (Month)	9	4	780.00	\$28,080 01 54 33.40 2600
Generator fuel (Week)	40	4	3.00	\$480
Submersible Pump (Month)	18	4	198.00	\$14,256 01 54 33.40 4700
Truck Scales (Month)	18	0	200.00	\$0
<b>ODC's - Site Support</b>				<b>\$1,299,056</b>
Labor	332,088	1	0.58	\$192,611
Equipment	90,650	1	0.58	\$52,577
Material:	25,270	1	0.58	\$14,657
ODC's	247,638	1	0.58	\$143,630
Subcontractors	3,450	1	0.58	\$2,001
ODC's - Rad H&S				<b>\$405,476</b>
<b>Total ODC Costs</b>				<b>\$1,704,532</b>

**ALTERNATIVE 4 - BASIS OF ESTIMATE SHEETS**

Develop Design	1	1	6% construction cost		\$1,160,821
Develop Plans	1	1	4% construction cost		\$773,881
O&M Costs	150,000	30	\$1.0	Net present Worth 7%	\$1,841,651
<b>Total Excluded ODC's - O&amp;M, Design, Plans</b>					<b>\$3,776,352</b>

**Contingency:**

Basis of Contingency:  
10% general contingency applied in accordance with DOE G 430.1-1, Table 11-3 as the Sanitary Waste location/excavation is well known and documented.

Percent Contingency: 10.0%

**Total WBS Cost:**

<b>Total Labor Cost:</b>	\$3,702,000	
<b>Total Material Cost:</b>	\$173,732	
<b>Total Construction Cost</b>	\$19,347,013	
<b>Total Disposal Cost:</b>	\$694,953	
<b>Total Transportation Cost:</b>		
<b>Total ODC:</b>	\$1,704,532	
<b>TOTAL COST (Less Contingency):</b>	\$25,622,230	
<b>TOTAL CONTINGENCY COST:</b>	\$2,562,223	
<b>TOTAL COST (With Contingency):</b>	<b>\$28,184,453</b>	
<b>Additional Cost with Option A TSD Disposal</b>	<b>\$2,727,220</b>	<b>\$30,911,673</b>
<b>Additional Cost with Option B UNC NPL Disposal</b>	<b>\$1,048,537</b>	<b>\$29,232,990</b>
<b>Total Excluded ODC Costs - O&amp;M, Design, Plans</b>	<b>\$3,776,352</b>	

**Approvals:**

Prepared By:	Eric Rixen (revised by Nova Clite)	Date:	10/31/2007 (rev February 13, 2008)
Revised By:	Cynthia Wetmore	Date:	10/15/2008 (rev 05/22/2009)
Approved By:		Date:	



**ALTERNATIVE 5 - BASIS OF ESTIMATE SHEETS**

**Statement of Work**

**Scope Description:**

**Alternative 5.**

The scope covered by this BOE contains only those elements directly associated with the excavation and consolidation of waste material into a fully encapsulated disposal cell at the NECR UNC site. Assumptions are explained in a separate document and are generally explained in the column to the far right of each row. Elements including design, plan development, and O&M are covered by this BOE but as a separate and distinct line item.

**Judgemental Factors Applied In Projecting From Known Source Data to the Estimate:**

- 1) Cost developed for this BOE were based RSE Means, RACER, Quotes and Company Experience
- 2) RS Means Heavy Construction Cost Data 21st annual Edition.
- 3) Disposal Facilities - US Ecology - Grandview Id. Transportation - MPE Inc.

**Key Assumptions (not in conflict with the WBS):**

- 1) 100% of excavated waste material will be excavated and consolidated into a repository constructed at the UNC-NPL site.
- 2) Project will take 4 years.
- 3) Soil conversion factor 1.45 (cy to ton).
- 4) 200,000cy Backfill will be used from an on-site borrow source; rip-rap also from developed on-site quarry.
- 5) 151 acres will be disturbed and will require hydroseeding.
- 6) A 10% contingency is added for unknowns.

**Cost Elements**

**Labor:**

Labor Category	Labor Hours	Labor Rate		TOTAL COST	Reference
<b>Office Labor</b>					
Program Manager	4800	\$133.00		\$638,400	
Project Manager	8000	\$45.00		\$360,000	
Engineer-Sr.	4800	\$41.00		\$196,800	
Health & Safety	7680	\$44.00		\$337,920	
Geologist/Hydrogeo-Sr.	3840	\$38.00		\$145,920	
Env. Scientist-Sr.	7040	\$42.00		\$295,680	
Chemist-Sr.	6400	\$40.00		\$256,000	
GIS-CADD-Sr.	3200	\$27.00		\$86,400	
Admin Support	3200	\$22.00		\$70,400	
Office Labor Total				\$2,387,520	
<b>Field Labor</b>					
Field Superintendent	8640	\$44.00		\$380,160	
Field Inspector	8640	\$27.00		\$233,280	
SSHO/QC	8640	\$36.00		\$311,040	
Surveyor	1920	\$25.00		\$48,000	
Security	8640	\$20.00		\$172,800	
Laborer	8640	\$19.58		\$169,200	
Field Labor Total				\$1,314,480	
<b>Total Labor Cost</b>				<b>\$3,702,000</b>	

**Material:**

Item Description	Number of Units	Number of Units	Unit Price	TOTAL COST
PPE, Level D (day)	700	20	\$10.0	\$140,000
Misc disposable field equipment (lump)	15	2	\$1,000.0	\$30,000
Drums (each)	15	2	\$60.0	\$1,800
Scaffolding	483	4	34.50	\$1,932.154 23.70 4370
<b>Total Material Cost</b>				<b>\$173,732</b>

**ALTERNATIVE 5 - BASIS OF ESTIMATE SHEETS**

**Construction Costs:**

<b>Construction Description</b>	<b>Number of Units</b>	<b>Total units</b>	<b>SubCont Rate</b>	<b>TOTAL COST</b>
Util. clearance - air vac. extract. (HR)	15	8	\$210.0	\$25,200
Provide/place 6" Class II base (SY)	15	16,380	7.06	\$1,734,642 321123.230100
Asphalt pavement (SF)	81,760	1	2.12	\$173,331 32 12 16.140020
Liner - HDPE/LLDPE (sqft)	1,526,533	1	1.17	\$1,786,044 334713.5312
Geotextile Filter Fabric (SY)	169,445	1	2.25	\$381,252 31 32 19.161500
Geonet Fabric (SY)	169,445	1	2.25	\$381,252 31 32 19.161500
Development of local borrow source	539,789	1	1.00	\$539,789 RSM estimate
Rip Rap load, haul on-site source (CY)	49,889	1	25.37	\$1,265,684 312323.15.6020+312323.18.2150
<b>subtotal</b>				<b>\$6,287,193</b>
Data validation (each)	4,100	1	10.00	\$41,000
Lab - CAM 17 Metals - solid (each)	4,100	1	95.00	\$389,500 Est. based on prior experience at Site
Lab - Radionuclides - solid (each)	4,100	1	100.00	\$410,000
Air Monitoring (cost/year)	4	1	75000.00	\$300,000 Racer
<b>subtotal</b>				<b>\$1,140,500</b>
Land surveying, Mob/Demob (Lump)	16	2	\$1,000.0	\$32,000
Land surveying, field (hr)	18	24	\$200.0	\$86,400
Land surveying report (lump)	16	2	\$4,500.0	\$144,000
<b>Surveying Costs</b>				<b>\$262,400</b>
Security fencing (LF)	1,000	2	17.04	\$34,080 323113.401300
Temporary fencing (LF)	15	5,000	4.18	\$313,500 01 56 26.500250
Hydro-Geological survey report (lump)	1	1	100000.00	\$100,000
Construction BMPs (lump)	15	2	10000.00	\$300,000
150HP equipment	16	20	271.00	\$86,720 15436.500100
FOGM - Equip refuel (Day)	155	3	4000.00	\$1,860,000
Pavement removal (SY)	1,110	1	5.25	\$5,828 02 41 13.175050
Concrete demolition (CY)	370	1	92.00	\$34,074 02 41 13.175500
Clearing and Grubbing (AC)	192	2	2550.00	\$979,200 31 11 10.10 0020
Excavate, direct load to trucks (no util's.) (CY)	871,000	1	2.44	\$2,123,498 31 23 16.42 0300+31 23 16.42 0020
Excavation factor for utilities (CY)	8,710	1	3.55	\$30,921 3123 16.13 0110
Local soil source, backfill delivered (CY)	200,000	1	8.88	\$1,776,000 31 23 23.18 1255
Place/compact backfill (CY)	200,000	1	1.99	\$398,000 31 23 23.17 0020+312323.23 5600
Soil amendments (topsoil) (SF)	20,000	1	1.15	\$23,000 32 91 13.23 3600
topsoil placement and grading (SY)	20,000	1	4.18	\$83,600 32 91 19.13 0800
Place/compact Waste material (CY)	871,000	1	2.47	\$2,151,370 31 23 23.17 0020+312323.23 5640
Import soil, Repository material delivered (CY)	113,077	1	8.88	\$1,004,124 31 23 23.18 1255
Place/compact imported repository material (CY)	113,077	1	2.47	\$279,300 31 23 23.17 0020+312323.23 5640
<b>subtotal</b>				<b>\$11,583,214</b>
Geotechnical survey field (mob/demob)	16	2	\$200.0	\$6,400
Geotechnical testing - field obs./tests (Hr)	200	16	\$200.0	\$640,000
Geotech. anal. D1557 moist./density relation	16	4	\$140.0	\$8,960
Geotech. report (lump)	16	1	\$1,000.0	\$16,000
<b>subtotal</b>				<b>\$671,360</b>
Hydroseeding (MSF)	6,839	2	60.30	\$824,777 329219.145400
Site Winterization	1	2	100000.00	\$200,000
<b>Construction Costs:</b>				<b>\$20,969,444</b>

**ALTERNATIVE 5 - BASIS OF ESTIMATE SHEETS**

**Disposal Costs:**

Waste Disposal Description	Total Volume	Total units	Disposal Rate	TOTAL COST
IDW soil T&D (drum)	7	1	217.80	\$1,525 02 81 20.101100
IDW water T&D (drum)	7	1	217.80	\$1,525
Concrete, non-haz. Class II SW, T&D (CY)	5,000	7,600	7.60	\$38,000 02 41 19.18 0400
Asphalt, non-haz. Class II SW, T&D (ton)	5,000	6,500	90.00	\$585,000 02 41 19.19 0100
Misc.Disposal Costs				\$626,049
<b>Total Disposal Costs</b>				<b>\$626,049</b>

**Transportation Costs for optional handling of "Principal Threat" Material:**

Options	Unit Measure	Total units	Transp Rate	TOTAL COST
<b>Option A: To off-site Class I Hazardous Waste</b>				
<b>Disposal Facility (tons)</b>				
Transportation Costs (tons)	14,500	1	136.36	\$1,977,220 MPe Verbal Quote
Disposal fee - (CY)	10,000	1	75.00	\$750,000 US Ecology verbal quote
<b>Subtotal Option A</b>				<b>\$2,727,220</b>

**Transportation Costs:**

Waste Transportation Description	Unit Measure	Total units	Transp Rate	TOTAL COST
Transport to UNC Mill Site	1,262,950	1	5.00	\$6,314,750
<b>Total Transportation Cost</b>				<b>\$6,314,750</b>

**Other Direct Costs:**

Item Description	units/yr	yr	Unit Price	TOTAL COST
Lodging for residents	200	2	109.00	\$43,600 per email 9/17/07 from Bill Schaal
Trailer/office space (Month)	36	4	282.00	\$40,608 01 52 13.20 0350+01 52 13.20 0700
Trailer/Conex (Month)	36	4	76.00	\$10,944 01 52 13.20 1250
Portable sanitary station (week)	160	4	165.00	\$105,600 01 54 33.40 6410
Trash (Month)	18	4	435.00	\$31,320
Utilities hook-up fees (lump)	2	1	1000.00	\$2,000
Electric power PG&E (month)	36	4	110.00	\$15,840 01 52 13.40 0160
Land phone/fax (month)	36	4	210.00	\$30,240 01 52 13.400140
Office Equipment (month)	36	4	150.00	\$21,600 01 52 13.40 0100
Office Supplies (month)	36	4	95.00	\$13,680 01 52 13.40 0120
Water	36	4	62.00	\$8,928 01 51 13.800700
Per diem, (day)	900	4	109.00	\$392,400 per email 9/17/07 from Bill Schaal
Travel, air fare (each)	104	4	1000.00	\$416,000
Mobile phone (month)	36	4	50.00	\$7,200
Radios (month)	90	4	25.00	\$9,000
Rental truck 4WD (month)	36	4	585.00	\$84,240 01 54 33.40 7200
4WD truck fuel (week)	160	4	24.00	\$15,360
Rental car (day)	48	4	40.00	\$7,680
Generator (Month)	9	4	780.00	\$28,080 01 54 33.40 2600
Generator fuel (Week)	40	4	3.00	\$480
Submersible Pump (Month)	18	4	198.00	\$14,256 01 54 33.40 4700
Truck Scales (Month)	18	3	200.00	\$10,800
ODC's - Site Support				<b>\$1,309,856</b>
Labor	332,088	1	0.75	\$249,066
Equipment	90,650	1	0.75	\$67,988
Material:	25,270	1	0.75	\$18,953
ODC's	247,638	1	0.75	\$185,729
Subcontractors	3,450	1	0.75	\$2,588
ODC's - Rad H&S				<b>\$524,322</b>
<b>Total ODC Costs</b>				<b>\$1,834,178</b>

**ALTERNATIVE 5 - BASIS OF ESTIMATE SHEETS**

Develop Design		1	12% construction cost		\$2,516,333
Develop Plans		1	4% construction cost		\$838,778
O&M Costs	100,000	30	\$1.0	Net present Worth 7%	\$1,227,767

**Total Excluded ODC's - O&M, Design, Plans** **\$4,582,879**

**Contingency:**

Basis of Contingency:

10% general contingency applied in accordance with DOE G 430.1-1, Table 11-3 as the Sanitary Waste location/excavation is well known and documented.

Percent Contingency: 10.0%

**Total WBS Cost:**

<b>Total Labor Cost:</b>	\$3,702,000	
<b>Total Material Cost:</b>	\$173,732	
<b>Total Construction Cost</b>	\$20,969,444	
<b>Total Disposal Cost:</b>	\$626,049	
<b>Total Transportation Cost:</b>	\$6,314,750	
<b>Total ODC:</b>	\$1,834,178	
<hr/>		
<b>TOTAL COST (Less Contingency):</b>	\$33,620,154	
<b>TOTAL CONTINGENCY COST:</b>	\$3,362,015	
<b>TOTAL COST (With Contingency):</b>	<b>\$36,982,169</b>	
<b>Total Excluded ODC Costs - O&amp;M, Design, Plans</b>	\$4,582,879	
<b>Additional Cost with Option A TSD Disposal</b>	<b>\$2,727,220</b>	<b>\$39,709,389</b>

**Approvals:**

Prepared By:	Eric Rixen (revised by Nova Clite)	Date	10/31/2007 (rev February 14, 2008)
Revision By:	cynthia wetmore	Date	10/15/2008 (rev 05/22/2009)
Approved By:		Date	

## **Appendix C**

**Navajo Department of Justice letter to EPA discussing  
Trust Responsibility.**

**September 2, 2008**



**NAVAJO NATION DEPARTMENT OF JUSTICE**  
**OFFICE OF THE ATTORNEY GENERAL**

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LOUIS DENETSOSIE  
ATTORNEY GENERAL

HARRISON TSOSIE  
DEPUTY ATTORNEY GENERAL

September 2, 2008

Mr. Dustin Minor  
Office of Regional Counsel  
United States Environmental Protection Agency Region IX  
75 Hawthorne St.  
San Francisco, CA 94105

Re: Draft Engineering Evaluation/Cost Analysis for the Northeast Church Rock site

Dear Mr. Minor:

The Navajo Nation writes regarding the Engineering Evaluation/Cost Analysis ("EE/CA") currently being assembled for the Northeast Church Rock mine site near Gallup, New Mexico ("NECR"). As previously expressed to the Agency, the Navajo Nation opposes disposal of radioactive waste on Navajo tribal land as being inconsistent with both federal law and the Agency's federal trust responsibility. Unique historical, cultural, and religious realities of Navajo life, as well as the Agency's own guidelines for completing the EE/CA, militate against the selection of such an alternative. Accordingly, the Navajo Nation urges the Agency to consider and apply these and the other factors discussed below as it identifies and recommends cleanup alternatives in the EE/CA.

**1. The Agency's Indian Policy Should Guide the Agency's Decisions Regarding the NECR Mine Site**

The federal government bears a unique trust responsibility to Indian Tribes, including the Navajo Nation. In a 2001 Supreme Court decision involving the Klamath Tribe's water rights, the Court described the trust doctrine as "one of the primary cornerstones of Indian law," ... with the United States as trustee, the Indian tribes ... as beneficiaries, and the property and natural resources managed by the United States as the trust corpus." *Dep't of Interior v. Klamath Water Users Protective Ass'n*, 532 U.S. 1, 11 (2001) (quoting Felix S. Cohen's Handbook of Federal Indian Law 221 (Rennard Strickland et al. eds., 1982) (1942)).

This trust obligation applies to every arm of the federal government, including the Agency. Courts have not only acknowledged the Agency's trust duties to the Navajo Nation, they have also upheld EPA positions regarding tribal lands based on its trust duties. *See, e.g., HRI, Inc. v. EPA*, 198 F.3d 1224, 1246 (10th Cir. 2000) ("Congress's intent to protect tribal lands and governance extends no less to EPA than to other departments of the federal government.").

The EPA acknowledged this unique trust relationship in its Policy for the Administration of Environmental Programs on Indian Reservations.<sup>1</sup> The Policy recognizes the Agency's duty to protect the lands and jurisdiction of the Indian tribes: "In keeping with that trust responsibility, the Agency will endeavor to protect the environmental interests of Indian Tribes when carrying out its responsibilities that may affect the reservations." Significantly, the Policy commands the Agency to "ensure the close involvement of Tribal Governments in making decisions and managing environmental programs affecting reservation lands," and to "give special consideration to Tribal interests in making Agency policy."

## **2. Several Factors Militate Against Retaining Radioactive Waste on Navajo Land**

The Navajo Nation believes that the unique cultural, religious, and historical context surrounding the NECR mine render inappropriate any remedial measure that results in mine waste remaining on Navajo land. Furthermore, under the Agency's Guidance on Conducting Non-Time-Critical Removal Actions under CERCLA (Aug. 1993) ("Guidance"), the NECR EE/CA must consider several criteria when analyzing cleanup alternatives. Among these criteria are effectiveness, implementability, and community acceptance, which also weigh heavily in favor of an off-site solution. (Guidance at 20, 43.)

As explained below, each of these considerations is relevant to the NECR EE/CA. The EE/CA must contain a comparative analysis of the cleanup alternatives in order to "evaluate the relative performance of each alternative in relation to each of the criteria. The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that the key tradeoffs that would affect the remedy selection can be identified." (Guidance at 45.) Accordingly, the Navajo Nation urges the Agency to discuss these considerations in its analysis of alternatives in the EE/CA and to apply them should a preferred alternative for the NECR site be selected.

### **a. Historical and Cultural Considerations**

No analysis of the NECR mine site or any other mine in Navajo Indian Country is complete without recognition of the long and devastating history of uranium mining in that area. Over fifty years ago, the Navajo Nation opened its lands and provided the services of its people in assisting with the development of the United States' nuclear capacity. Various groups mined millions of tons of uranium ore from Navajo lands, providing uranium for the Manhattan Project and for the United States' weapons stockpile. As a result, the United States was able to prevail in the Cold War, but not without great cost.

A grossly disproportionate share of that cost has been borne by the Navajo Nation and the Navajo people. The decades of uranium mining have left the Navajo a blighted homeland with over 500 abandoned mines, four inactive milling sites, a former dump site, contaminated groundwater, structures that may contain elevated levels of radiation, and other environmental and public health concerns. As a result of the radioactive waste still permeating their land, the Navajo people suffer any number of maladies. The livestock on which many Navajo depend for their livelihood are often born deformed or diseased. Water and soil pollution are common. During hearings on Capitol Hill last October, Members of both political parties in the United States Congress rightly termed the Navajo's plight a "modern American tragedy."

In addition to the historical significance any clean-up at NECR has to the Navajo people, the Agency must also consider the cultural significance of the Navajo lifestyle. Navajo is an agrarian society: its people eat what they raise on the land. Yet, the radioactive waste still permeating their land has made this a dangerous practice. There is cultural and spiritual value to the Navajo in living off of land that is free from

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<sup>1</sup> Available at <http://www.epa.gov/superfund/tools/topics/relocation/policy.htm>.

harmful levels of radioactive contaminants. When considered in light of the Agency's legal and trust responsibility to the Navajo people, this cultural spiritual value necessitates more than merely cleaning up property to an arbitrary agricultural standard.

b. Application to EE/CA analysis through Guidelines and recommendations

The Agency's own Guidelines require special consideration in the EE/CA to the unique concerns of the Navajo Nation. Among the most important of these guidelines are the effectiveness, implementability, and community acceptance criteria.

i. Effectiveness

As concerns effectiveness, extensive experience of the Navajo Nation, including in this very area of Navajo Indian country, has demonstrated that consolidating and capping is a temporary and ineffective remedy, notwithstanding good faith expectations to the contrary. The weather characteristics, intensive land use, and special demographic, cultural and economic factors make Navajo Indian country unique in this respect.

ii. Feasibility

The EE/CA's alternatives must be administratively and legally feasible. To be feasible in these respects, any alternative that implicates on-site disposal on Navajo trust land must be carefully and explicitly qualified in the EE/CA because, under applicable federal law, such a remedy requires the consent of the Navajo Nation. Neither outside governments nor private parties can take tribal trust lands, either directly or by unauthorized occupation, for use as a dump without tribal consent. *See United States v. Pend Oreilles Pub. Util. Dist.*, 28 F.3d 1544, 1548 (9th Cir. 1994) (“The Utility may not condemn tribal lands embraced in a reservation under the [Federal] Power Act or any other federal statute) (emphasis added), *cert. denied*, 514 U.S. 1015 (1995); *United States v. 2,005.32 Acres of Land*, 160 F.Supp. 193 (D.S.D.) (Army could not condemn tribal lands), *vacated as moot*, 259 F.2d 271 (8th Cir. 1958).<sup>2</sup>

iii. Community Acceptance

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<sup>2</sup> Importantly, the only lawful uses of lands owned by the United States and held in trust for Indian nations are those undertaken in conformity with federal law, and this has been true since the first Congress of the United States. *See* 25 U.S.C. § 177 (Indian Trade and Intercourse Act, first enacted in 1793;. *See, e.g., Golden Hill Paugusett Tribe v. Weicker*, 39 F.3d 51, (2d Cir. 1994) (purpose of § 177 is to prevent encroachment by white settlers on Indian lands); *Bear v. United States*, 611 F.Supp. 589 (D. Neb. 1985) (under § 177, congressional approval was required to condemn Winnebago trust land along Missouri River), *aff’d*, 810 F.2d 153 (8th Cir. 1987); *Schaghticoke Tribe v. Kent School Corp.*, 423 F.Supp. 780 (D. Conn. 1976) (Tribal trust land is an instrumentality of the federal government and may not be taken from the Indians by contract, adverse possession, or otherwise, without the consent of the government); *7,405.3 Acres, supra* (same). Congress has buttressed this federal protection through other laws, also. *See Imperial Granite Co. v. Pala Band of Mission Indians*, 940 F.2d 1269, 1272 n.4 (9th Cir. 1991) (federal Quiet Title Act poses an “insuperable burden” to a suit to establish right to use Indian land).



The Agency must consider community acceptance in fashioning and selecting alternatives. This factor should be given added weight in this instance because the Agency and the Department of the Interior have determined that NEC residents comprise a "dependent Indian community," a distinct community of Indians dependent primarily on federal and tribal services.<sup>3</sup>

The Church Rock Chapter desires the off-site removal of all contaminated materials. This position is not an arbitrary one, but stems from cultural attributes of the Navajo people that have been expressed to the Agency both in this letter and on several prior occasions. Navajo tribe members share unique and profound ties to the land that justify their strong preference for total removal of contaminated materials from Navajo trust land. The unique attachment of the Navajo to their land has been judicially acknowledged. For example, in *United States v. Tsosie*, the court was asked to evict a Navajo woman from land where she had lived most of her life and where her umbilical cord was buried in accordance with Navajo tradition. The court explained:

[M]any of the cultural traditions and values [of Navajo society] are strong enough and important enough to the preservation of a balanced and harmonious society to have the force of law, equivalent to a statute or even a constitutional provision in United States laws. There tradition, values and related rights and obligations are viewed by the Navajo people as sacred because they are rooted in religious songs, prayers and chants. . . . Relocating traditional Navajos from the land where their umbilical cords are buried and where they have always lived is uprooting them from their religion, and from a central part of their own identities. There are no precise analogies in the non-Navajo society of which I am aware to describe the harm that such relocation causes. It would be like yanking an infant away from its mother when the infant is still screaming and the mother is reaching for it, and the mother is killed from loneliness and the child is killed for lack of tenderness and sustenance. It is tantamount to separating the Navajo from her spirit.

849 F.Supp. 758, 774-75 (D.N.M. 1994), *aff'd*, 92 F.3d 1037 (10th Cir. 1999).

Because of the Navajo's unique connection with the land, a remedial alternative that simply retains radioactive material on Navajo land will not only be ineffective and difficult to implement (and impossible to implement without Navajo Nation consent) it will be rejected by the community it is supposed to serve. To ignore the Church Rock community's complete opposition to a solution other than complete off-site removal would be a violation of the EPA's trust responsibilities to the Navajo people. *See, e.g., HRI, Inc. v. EPA*, 198 F.3d 1224, 1247 (10th Cir. 2000) ("The fact that EPA is not specifically charged with administration of Indian lands or funds does not render unreasonable its solicitude for core Indian interests.")

### 3. Conclusion

The Navajo continue to pay much more than their fair share for the United States' successes in the Cold War. As the Agency recognizes, the uranium contamination at NECR poses a grave risk to human health and the environment. Any action that retains radioactive material on Navajo land will only prolong rather than remedy the disharmony between the Navajo and their land. To the Navajo people, for whom the land is "a central part of their identities," this disharmony is as palpable as the more outwardly visible manifestations of NECR's uranium contamination such as livestock deformities or human illnesses.

Ultimately, the Navajo Nation recognizes that, in drafting the EE/CA, the Agency must balance the conflicting interests of many important constituencies. We appreciate the difficulty inherent in this task, and

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<sup>3</sup> 18 U.S.C. § 1151(b). *See* 72 Fed. Reg. 8380 (Feb. 26, 2007)

remain thankful for the thoughtful attention that the Agency has paid and will continue to pay to the Navajo Nation's unique situation as it completes work on the NECR EE/CA. We emphasize that any alternative that requires use or occupancy of Navajo lands must be explicitly conditioned on Navajo Nation consent, which the Navajo Nation may withhold in its sole discretion. By analyzing the unique context of the Navajo people and the NECR mine as required by the Agency's Indian Policy, trust responsibility, and established factors for EE/CA analyses, we believe the Agency will reach a fair and just resolution to this continuing problem.

Very truly yours,  
NAVAJO NATION DEPARTMENT OF JUSTICE  
LOUIS DENETSOSIE ATTORNEY GENERAL

A handwritten signature in cursive script that reads "David A. Taylor". The signature is written in black ink and is positioned below the typed name and title.

David A. Taylor, Senior Attorney  
NATURAL RESOURCES UNIT

## **Appendix D**

### **Supporting Data and Analysis**

**Appendix D**

**Supporting Data and Analysis**

**Removal Site Evaluation Data**

ANAGRP	METALS
ZONE	(All)
UNITS	(All)

Max of RESULT2			CHEM_CODE						
AREA	LOC_ID2	LABSAMPID2	AS	MO	RA-226	SE	U	V	
Arroyo	Arroyo-SB-001	C06120235-072	2.6	0	14.9	4.4	29	27.1	
		C06120235-073	5.4	0	17.3	3.7	27.3	29.6	
		C06120235-074	7.8	0	8.4	2.1	14.3	32.6	
	Arroyo-SB-002	C06120336-001	2.2	0	12.7	5.9	15.6	24	
		C06120336-002	2.8	0	21.1	8	21.7	28.1	
		C06120336-003	6.1	0	21	11.1	108	34.2	
	Arroyo-SB-003	C06120336-004	1.4	0	12.9	0	14.2	20	
		C06120336-005	3.6	0	13.3	1.9	18.6	23.3	
		C06120336-006	4.7	0	12.4	3	16.4	29.6	
	Arroyo-SB-004	C06120336-007	1.2	0	12.5	1.1	14.6	19.8	
		C06120336-008	2.9	0	14.9	5.3	16.6	23.8	
		C06120336-009	6.3	0	18.5	2.8	23.7	34.9	
	Arroyo-SB-005	C06120336-010	2.2	0	18.1	12.7	25.7	30.4	
		C06120336-011	4.7	0	30.2	14.4	79.2	37.9	
		C06120336-012	7.3	0	10.3	4.9	27	36.6	
	Arroyo-SB-006	C06120336-013	1.7	0	11.2	2.9	18.7	20.7	
		C06120336-014	3.3	0	11.8	3	23.7	24	
		C06120336-015	8.2	0	11.1	2.1	19.4	36.1	
	Arroyo-SB-007	C06120336-016	1.8	0	14.8	3.5	21.7	34.7	
		C06120336-017	2.6	0	11.1	2.9	17.1	25.5	
		C06120336-018	4.3	0	35.7	4.3	45.4	37.3	
	Arroyo-SB-008	C06120336-019	1.9	0	17.6	4.6	17.4	27.9	
		C06120336-020	2.1	0	21.5	6.3	17.1	28	
		C06120336-021	2.1	0	24.5	7.4	21.3	30.9	
	Arroyo-SB-009	C06120336-024	2.2	0	11.7	5.6	22.6	22.7	
		C06120336-025	1.3	0	15.5	2.3	23.7	23.5	
		C06120336-026	3.5	0	15.5	11.3	31.7	32.5	
	Arroyo-SB-010	C06120336-027	2.6	0	18.5	12.4	35.1	34.1	
		C06120336-028	1.9	0	18.6	5.5	26.6	25.1	
		C06120336-029	1.5	0	12.9	6	21.9	23.1	

**Appendix D**

**Supporting Data and Analysis**

**Removal Site Evaluation Data**

Arroyo	Arroyo-SB-208	C06120336-022	2.2	0	20.2	4.5	19.2	29.1
		C06120336-023	2.2	0	23	8.1	22.3	32.4
Backgrd	NECRBKG-01	C06081541-001	4.4	0	0.8	0.2	0.8	24.7
	NECRBKG-02	C06081541-002	9.2	0	1.3	0.7	1.4	29.8
	NECRBKG-03	C06081541-003	10	0	1.1	0.7	1.8	32.3
	NECRBKG-04	C06081541-004	5.1	0	1.3	0.7	1.3	40.7
	NECRBKG-05	C06081541-005	4.5	0	1.1	0.5	1	30.7
	NECRBKG-06	C06081541-006	6.1	0	1	0.6	1.1	31.9
	NECRBKG-07	C06081541-007	4.2	0	1.1	0.5	1.3	33.5
	NECRBKG-08	C06081541-008	3.1	0	1.2	0.4	1.4	32.5
	NECRBKG-09	C06081541-009	2.8	0	1.2	0.5	1.4	31.6
	NECRBKG-10	C06081541-010	2.5	0	0.9	0.5	1.1	27.3
	NECRBKG-11	C06081541-011	2.9	0	1	0.4	0.9	30.6
	NECRBKG-12	C06081541-012	3.1	0	1.2	0.3	1	23.7
	NECRBKG-13	C06081541-013	2.8	0	1	0.4	1.1	31.2
	NECRBKG-14	C06081541-014	2.4	0	1	0.2	1.1	20.1
	NECRBKG-15	C06081541-015	2.7	0	1.2	0.5	1.2	28.7
	NECRBKG-16	C06081541-016	2.7	0	0.7	0.4	1.2	23
	NECRBKG-17	C06081541-017	3	0	1.1	0	1.2	29
	NECRBKG-18	C06081541-018	2.4	0	0.6	0	1.1	21.2
	NECRBKG-19	C06081541-019	2.7	0	1.1	0.2	0.9	18.4
	NECRBKG-20	C06081541-020	2.7	0	1	0	0.9	20
	NECRBKG-21	C06081541-021	2.9	0	1	0.3	1	22.5
	NECRBKG-22	C06081541-022	3.4	0	0.8	0.2	0.9	18
	NECRBKG-23	C06081541-023	2.9	0	0.9	0	0.9	22.6
	NECRBKG-24	C06081541-024	2	0	1	0	0.9	18.8
	NECRBKG-25	C06081541-025	2.5	0	1.3	0	1.2	24.9
	NECRBKG-42	C06081541-026	3.3	0	1	0	0.9	17.5
	NECRBKG-45	C06081541-027	2.7	0	1.3	0.3	1	26.8
CORR	NECR-COR-A-01	C06081547-001			1.9			
	NECR-COR-A-02	C06081547-002			5.4			
	NECR-COR-A-03	C06081547-003			4.5			
	NECR-COR-A-04	C06081547-004			1.8			
	NECR-COR-A-05	C06081547-005			3.7			
	NECR-COR-A-06	C06081547-006			1.1			
	NECR-COR-A-07	C06081547-007			1.5			

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CORR	NECR-COR-A-08	C06081547-008						3.5
	NECR-COR-A-09	C06081547-009						6.6
	NECR-COR-A-10	C06081547-010						31.6
	NECR-COR-A-11	C06081547-012						1.9
	NECR-COR-A-12	C06081547-013						6.8
	NECR-COR-A-13	C06081547-014						8.9
	NECR-COR-A-14	C06081547-015						10.3
	NECR-COR-A-15	C06081547-016						9.2
	NECR-COR-A-16	C06081547-018						6.2
	NECR-COR-A-17	C06081547-019						185
	NECR-COR-A-18	C06081547-020						40.4
	NECRCOR-A-19	C06081541-028						1
	NECR-COR-A-50	C06081547-011						32.3
	NECR-COR-A-55	C06081547-017						8.8
	NECR-COR-B-01	C06081542-001						11.9
	NECR-COR-B-02	C06081542-002						10.6
	NECR-COR-B-03	C06081542-003						9.7
	NECR-COR-B-04	C06081542-004						11.4
	NECR-COR-B-05	C06081542-005						15.8
	NECR-COR-B-06	C06081542-006						15.7
	NECR-COR-B-07	C06081542-007						14.9
	NECR-COR-B-08	C06081542-008						14.4
	NECR-COR-B-09	C06081542-009						18.9
	NECR-COR-B-10	C06081542-010						21.2
	NECR-COR-B-11	C06081542-012						19.6
	NECR-COR-B-12	C06081542-013						21.4
	NECR-COR-B-13	C06081542-014						19.2
	NECR-COR-B-14	C06081542-015						21
	NECR-COR-B-15	C06081542-016						26.4
	NECR-COR-B-40	C06081542-011						22.1
	NECR-COR-B-45	C06081542-017						27.6
	Homes	Home1-SS-001	C06110906-048	2.9	0	1.2	0	0.8
Home1-SS-002		C06110906-049	2.7	0	0.9	0.3	1	28.9
Home1-SS-003		C06110906-050	3.2	0	1	0.2	1	27.8
Home1-SS-004		C06110906-051	2.3	0	1.3	0	1	31.2
Home1-SS-005		C06110906-052	5.7	0	1.5	0	1.4	32.3

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Homes	Home2-SS-001	C06110906-053	5.9	0	0.9	0.7	1	35.9
	Home2-SS-002	C06110906-054	5.1	0	0.9	0.3	0.7	37.5
	Home2-SS-003	C06110906-055	4.1	0	0.9	0.6	1	36.1
	Home2-SS-004	C06110906-056	3.6	0	0.9	1.2	0.8	33.4
	Home2-SS-005	C06110906-058	4.5	0	0.9	0.3	1	35.5
	Home2-SS-204	C06110906-057	4.7	0	1	0.7	1	36.5
	Home3-SS-001	C06110906-059	3.3	0	0.9	0	1.4	32.8
	Home3-SS-002	C06110906-060	3.3	0	1.1	0	0.9	31.2
	Home3-SS-003	C06110906-061	3.7	0	1.1	0.6	0.7	28.5
	Home3-SS-004	C06110906-062	4.5	0	1.2	0.7	1	37.4
	Home3-SS-005	C06110906-063	6.4	0	1.1	0	1.1	42.6
	Home4-SS-001	C06110906-064	3.9	0	1.3	0	1.1	33.5
	Home4-SS-002	C06110906-065	3	0	2.1	0.8	1.5	26.6
	Home4-SS-003	C06110906-067	3.2	0	1.6	0.7	1.5	25.8
	Home4-SS-004	C06110906-068	6	0	3.6	1.6	3.5	28.8
	Home4-SS-005	C06110906-069	4.3	0	3	1.1	2.7	28.2
	Home4-SS-202	C06110906-066	3.1	0	2.1	0.4	1.4	26.5
	Home5-SS-001	C06110906-070	3	0	1	0.9	0.8	30.1
	Home5-SS-002	C06110906-071	5.2	0	1.4	1.2	1.1	31.9
	Home5-SS-003	C06110906-072	4.4	0	0.9	1	0.9	30
	Home5-SS-004	C06110906-073	7.2	0	1.3	0.8	1.4	31.2
	Home5-SS-005	C06110906-074	3.3	0	2.1	0.7	2.4	23.8
	Home6-SS-001	C06110906-075	4.2	0	6.1	1.5	9.3	33.9
	Home6-SS-002	C06110906-076	4.4	0	11.4	2	11.1	38.4
	Home6-SS-003	C06110906-077	4.5	0	5.6	2	5.7	34.8
	Home6-SS-004	C06110906-078	4.5	0	8.9	1.7	10.2	36.8
	Home6-SS-005	C06110906-079	4.2	0	14.9	2.7	12.7	37.3
	Home7-SS-001	C06110906-080	4.9	0	3.4	1.2	2.3	31
	Home7-SS-002	C06110906-081	4.4	0	5.5	1.5	6.3	34.1
	Home7-SS-003	C06110906-082	5.2	0	29.6	6.3	20.5	49.7
	Home7-SS-004	C06110906-083	5.5	0	9.4	2	11.8	43.3
	Home7-SS-005	C06110906-084	3.4	0	7.4	1.3	9.2	28.4
	Home8-SS-001	C06110906-085	3.5	0	2.3	0.2	2.1	30.9
	Home8-SS-002	C06110906-086	3	0	2.5	0.5	2.7	33.2
Home8-SS-003	C06110906-087	2.7	0	3.2	0.5	5.3	34	
Home8-SS-004	C06110906-088	4.1	0	5.6	1.2	6.4	34	

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Homes	Home8-SS-005	C06110906-089	5.3	0	3.3	0	4.9	38.8
	Home9-SS-001	C06110906-090	5	0	3.4	1	7.9	29.8
	Home9-SS-002	C06110906-091	3.6	0	3.3	0.7	8.1	27.8
	Home9-SS-003	C06110906-092	4.1	0	6.7	1.8	19.1	33.1
	Home9-SS-004	C06110906-093	2.8	0	5.4	1.2	12.4	26.1
	Home9-SS-005	C06110906-094	4.5	0	2.6	0.4	3.3	29.4
NECR-1	NECR1-SB-016	C06111057-012	0	0	80.8	59.5	758	62.4
		C06111057-014	3.8	0	21.1	9.5	99.5	34.2
		C06111057-015	0	0	64.6	29.6	141	54.4
		C06111057-016	0	0	63.1	32.8	144	35
		C06111057-017	5.1	0	1.4	0.6	21.4	38.7
	NECR1-SB-046	C06111057-003	0	0	58.8	54.2	176	52.5
		C06111057-044	0	0	31.9	24.6	71.1	41.7
		C06111057-045	0	0	19.3	5.4	72.7	31
		C06111057-046	6.9	0	1.3	1.4	337	41.5
		C06111057-047	5.2	0	1	0	3.4	34.4
		C06111057-048	5.5	0	1.1	0.5	0.8	39.2
		C06111057-049	6.2	0	1.1	0	1.1	37.9
	NECR1-SB-095	C06111057-018	3.8	0	27.7	6.7	90.4	41.9
		C06111057-019	7.9	0	7.9	1.1	11.4	48.4
		C06111057-020	5.2	0	1.8	0.9	2.4	39.7
		C06111057-078	3	0	75.7	30.6	209	45.1
	NECR1-SB-131	C06111057-084	1.6	0	41.5	14.7	58.7	34.3
		C06111057-117	2.8	0	67.4	15.4	58.6	47.8
		C06111057-118	7.3	0	1.9	0	59.4	40.7
		C06111057-119	5.1	0	1.8	0	19.2	31.5
		C06111057-120	7.9	0	1.2	0	1.6	39.8
		C06111057-121	5.2	0	1.3	0	1.5	37.3
	NECR1-SB-90	C06111057-021	4.4	0	6.9	1.9	8.5	41.2
		C06111057-022	3.1	0	4.2	0.8	43.2	44.5
		C06111057-023	0.8	0	103	20.6	125	89.5
		C06111057-024	0.9	0	90	45.4	144	63.7
		C06111057-025	0.6	0	48.9	47	218	83.3
		C06111057-026	6.4	0	1.7	0.2	313	31.7
C06111057-027		4.9	0	1.3	0.4	331	34.5	
C06111057-028		4.3	0	1.2	1	240	35.1	



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NECR-1	NECR1-SB-90	C06111057-029	5.3	0	1.3	0.8	165	42
		C06111057-093	2.3	0	84.8	29	122	47.1
	NECR1-SS-005	C06111057-013	3.7	0	8.9	2.6	5.1	28.6
	NECR1-SS-018	C06111057-011	2.1	0	21.7	5.4	17	27.1
	NECR1-SS-020	C06111057-010	1.9	0	46.2	54.1	52	38.3
	NECR1-SS-023	C06111057-009	4.5	0	18.3	11.2	71.2	42.8
	NECR1-SS-026	C06111057-008	0	0	68.4	69.4	199	42.5
	NECR1-SS-028	C06111057-007	7.4	63.8	26.3	6.6	79.9	35.4
		C06120336-054	5.7	55.5	18.5	5.5	42.4	21.4
	NECR1-SS-030	C06111057-006	5.3	0	6.5	2.1	8.5	32.5
	NECR1-SS-044	C06111057-004	1.3	0	47.9	27.3	57.7	48.4
	NECR1-SS-047	C06111057-002	2.3	0	31.3	19.2	27.7	33.8
	NECR1-SS-049	C06111057-001	8.3	214	29.3	5.1	664	22.9
	NECR1-SS-065	C06111057-097	5.7	0	28.4	16	59.1	56.9
	NECR1-SS-067	C06111057-096	2.9	0	38.3	21.2	55.1	39.1
	NECR1-SS-068	C06111057-095	1.9	0	12.8	5.7	256	21.6
	NECR1-SS-070	C06111057-094	2.5	0	26.1	9.4	49.6	32.8
	NECR1-SS-101	C06111057-090	4.4	0	12.7	4.1	27.2	30.2
	NECR1-SS-103	C06111057-089	5.6	0	17.7	7.9	17.7	41.6
	NECR1-SS-126	C06111057-087	5.9	10.8	50.9	14.1	99.3	48.6
	NECR1-SS-127	C06111057-086	6.9	15.2	93.3	21.6	177	75.9
	NECR1-SS-129	C06111057-085	4.4	0	7	2.4	7.7	31.9
	NECR1-SS-133	C06111057-083	2.1	0	54.7	12.6	52.6	35.8
	NECR1-SS-135	C06111057-082	4.6	0	63.2	16.5	81	61.3
	NECR1-SS-137	C06111057-081	5.4	0	52.6	17.6	98.5	64.2
	NECR1-SS-138	C06111057-080	2.2	0	48.6	13.5	19.9	26.8
	NECR1-SS-140	C06111057-079	4.8	0	15.8	4.2	21.2	34.7
	NECR1-SS-164	C06120235-037	4.3	0	35.7	11.4	22	43.2
	NECR1-SS-173	C06120235-038	4.5	0	4.6	1.4	5.6	32.3
	NECR1-SS-184	C06120235-039	2.7	0	1.2	1	2.9	35.9
	NECR1-SS-281	C06120235-047	4	0	80.5	53.1	83.4	69.7
	NECR1-SS-289	C06120235-048	5.7	0	1.8	1	3.1	30.6
	NECR1-SS-293	C06120235-049	9	0	7	3.2	21.4	32.9
NECR1-SS-307	C06120235-050	13.3	0	3.8	1.1	6.8	41	
NECR1-SS-316	C06120235-009	2.7	0	1.3	0	1.2	19.3	
NECR1-SS-323	C06120235-007	3.7	0	2.6	0.9	2.2	32.3	

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NECR-1	NECR1-SS-326	C06120235-008	2.8	0	5.2	1.6	4.3	28.5
	NECR1-SS-92	C06111057-092	3.1	0	13.2	8.2	18.1	28.3
	NECR1-SS-93	C06111057-091	2	0	35.7	12.8	56.9	29.6
	NECR1-TP-138	C06120405-010	6.9	0	24.2	13.2	73.6	42.3
	NECR-SS-207	C06120235-040	4.9	0	3.1	1.4	7.6	30.5
	NECR-SS-238	C06120235-041	7.9	0	1.6	1.4	3.4	42.9
	NECR-SS-240	C06120235-042	14.9	0	1.5	0.5	3.6	50.2
	NECR-SS-240 DUP	C06120235-043	13.9	0	1.2	1.1	3.8	48.7
	NECR-SS-262	C06120235-044	5.2	0	1.4	1.1	2.2	30.4
	NECR-SS-265	C06120235-045	4.9	0	1.6	0.4	2.4	30.6
	NECR-SS-266	C06120235-046	5.1	0	1.7	0.6	57.7	34.6
NECR-2	NECR2-SS-004	C06110906-046	4	0	1.2	0	1.5	28.9
	NECR2-SS-015	C06110906-032	3.5	0	97.2	11.9	107	46.7
	NECR2-SS-017	C06110906-033	2.8	0	55.3	13.3	48.9	39.9
	NECR2-SS-018	C06110906-034	3.4	0	3.6	1.2	2.2	29.4
	NECR2-SS-020	C06110906-042	1.3	0	38.1	15.7	66.2	26.8
	NECR2-SS-027	C06110906-047	3.4	0	35.3	6.6	12.3	34.9
	NECR2-SS-033	C06110906-035	3.3	0	2	1.2	5.2	16
	NECR2-SS-035	C06110906-037	1.9	0	160	26.7	370	67.3
	NECR2-SS-037	C06110906-036	4.8	0	4.6	1.2	7.1	33
	NECR2-SS-039	C06110906-038	2.3	0	35.4	6.5	29.5	26.7
	NECR2-SS-050	C06110906-040	6.4	0	1.2	0	2	24.7
	NECR2-SS-052	C06110906-045	2.5	0	23	5.6	43.5	31
	NECR2-SS-056	C06110906-041	3.4	0	11.9	2.6	3.9	33
	NECR2-SS-069	C06110906-043	4.7	0	8.9	2.6	9.6	34.2
	NECR2-SS-071	C06110906-044	5	0	40	14.5	45.7	58.9
	NECR2-SS-083	C06120235-017	3.3	0	3.1	0.4	3.2	26.5
	NECR2-SS-096	C06120235-018	8.1	0	1.4	0.4	3.7	39
	NECR2-SS-103	C06120235-019	4.9	0	1.5	0.6	2.1	35.6
	NECR2-SS-109	C06120235-020	6.4	0	1.6	0.9	1.7	37.2
	NECR2-TP-015	C06110906-021	3.6	0	2.5	1	17	35.4
	NECR2-TP-020	C06110906-018	3.2	0	1.2	0.9	9.7	25
	NECR2-TP-035	C06110906-015	2.9	0	10.4	1.4	35.5	18.8
	NECR2-TP-039	C06110906-019	3.6	0	5.5	2.1	32.2	33.7
	NECR2-TP-052	C06110906-016	3.4	0	12.6	4	70.6	32.5
		C06110906-017	3.2	0	2.9	0.8	32.7	25.9

**Appendix D**

**Supporting Data and Analysis**

**Removal Site Evaluation Data**

NECR-2	NECR2-TP-239	C06110906-020	3.3	0	5.2	1.4	15.8	34.1	
NEMSA	NEMSA-TP-001	C06110906-027	3.6	0	1.2	0.6	1	28.6	
		C06110906-028	0.8	0	45.8	17.5	71	32.5	
		C06110906-029	1.5	0	57.3	15.6	67	35.1	
		C06110906-030	4.9	0	1.3	0.4	311	28.5	
	NEMSA-TP-002	C06120336-030	4.2	0	1.7	1	4.8	32.4	
		C06120336-031	0.7	0	46.6	19	79.5	41.7	
		C06120336-032	0	0	68.8	38.9	125	47.3	
		C06120336-033	3.7	0	1.1	0	227	25.6	
	NEMSA-TP-003	C06120336-034	3.2	0	0.9	1.7	0.9	18	
		C06120336-035	0.6	0	38.2	24.2	17.6	36.4	
		C06120336-036	4	0	0.8	0	49.3	24.9	
	NEMSA-TP-004	C06120336-037	4.3	0	1.3	1.2	4.8	29.2	
		C06120336-038	1.3	0	68.8	112	136	44	
		C06120336-052	0.8	0	140	40.1	390	43.2	
		C06120336-053	0	0	112	132	75.8	38.5	
	NEMSA-TP-005	C06120336-039	4.3	0	2.6	0	2.2	28.9	
		C06120336-040	4.5	0	8.4	0.5	27.3	32.8	
		C06120336-041	3.4	0	0.8	0	1.4	26.5	
	Pond 1/2	Pond1/2-SB-71	C06111057-071	5.5	0	0.7	0	2.1	37.6
			C06111057-072	6.7	0	1	1	3.3	43.2
Pond1/2-SB-82		C06111057-073	2.7	0	177	56.3	339	75.6	
		C06111057-074	4.6	0	14.4	3.7	22.7	36.2	
		C06111057-075	5	0	12.2	3.4	18.1	38	
		C06111057-076	6.8	0	1.1	0	5	42.6	
		C06111057-077	5.1	0	1.5	0	1.7	37.9	
Pond12-SB-071		C06111057-069	3.1	0	49.9	11.3	73.9	34.9	
Pond12-SB-71		C06111057-070	4.7	0	0.9	0	1.3	30.2	
Pond12-SS-009		C06120235-010	2.2	0	1.7	1.2	1.6	24.6	
Pond12-SS-011		C06111057-050	5	0	1.1	0	1	35.3	
Pond12-SS-012		C06120235-011	4.5	0	1.5	0.8	1.7	35.2	
Pond12-SS-014		C06111057-051	3.2	0	96.9	36.3	47.5	56.2	
Pond12-SS-019		C06111057-052	4.9	0	4.7	0.9	7.8	34.9	
Pond12-SS-020		C06111057-054	5	0	2.2	0.5	2	35.6	
Pond12-SS-023		C06111057-055	2.5	0	62.4	22.8	28.6	38.5	
Pond12-SS-024		C06111057-056	2.5	0	26.9	7.1	16.2	28.7	

**Appendix D**

**Supporting Data and Analysis**

**Removal Site Evaluation Data**

Pond 1/2	Pond12-SS-032	C06120235-012	4.4	0	1.6	0.8	2	33.5	
	Pond12-SS-035	C06111057-057	8.8	0	78.5	30.6	85.5	83.7	
	Pond12-SS-041	C06111057-059	4.2	0	3	1.5	4.1	26.8	
	Pond12-SS-042	C06111057-060	5.6	0	1	0	1.5	35.5	
	Pond12-SS-047	C06111057-061	3.7	0	73.1	24.3	37.7	49.6	
	Pond12-SS-050	C06111057-062	5.3	0	13.7	5.3	11.9	35.8	
	Pond12-SS-056	C06111057-063	5.3	0	11.2	3.2	10.1	35.9	
	Pond12-SS-058	C06111057-064	5.5	0	655	159	1080	198	
	Pond12-SS-061	C06111057-065	4.4	0	26.5	5.2	36.6	35.8	
	Pond12-SS-063	C06120235-013	3	0	1.2	0.6	1.3	40.1	
	Pond12-SS-069	C06111057-066	3.8	0	161	33	166	79.6	
	Pond12-SS-076	C06111057-067	5.2	0	2.2	0.2	8	40.8	
	Pond12-SS-077	C06111057-068	5.1	0	487	83.7	423	123	
	Pond12-TP-030	C06120235-057	C06120235-058	5.5	0	41.3	13.2	149	45.2
			C06120235-058	6.4	0	6.2	1.6	80.3	30.7
	Pond12-TP-035	C06120235-060	C06120235-061	1.4	0	41.5	11.2	38.9	31.6
			C06120235-061	4.4	0	19.6	15.5	206	35.3
	Pond12-TP-035)	C06120235-059	3.2	0	417	159	286	158	
	Pond12-TP-058	C06120235-062	C06120235-063	4.3	0	438	227	760	173
			C06120235-063	5.6	0	1.3	2.6	59.4	31.9
Pond 3/3a	Pond3/3a-SB-61	C06111057-111	3.7	0	17.3	6.8	28.4	30.3	
		C06111057-112	4.8	0	0.9	0	1.3	29.6	
		C06111057-113	4.8	0	1.1	0	1	27.9	
		C06111057-114	4.1	0	1.5	0	1	29.7	
		C06111057-115	4.5	0	1	0	1.1	34.5	
		C06111057-116	4.9	0	1.3	0	1	35	
	Pond3-SS-001	C06111057-110	6.1	0	18.1	5.2	42	50.4	
	Pond3-SS-007	C06111057-109	5.5	0	259	22.3	1020	64.1	
	Pond3-SS-014	C06111057-122	5.7	6.6	875	71.9	3970	118	
	Pond3-SS-015	C06111057-108	3.9	0	18.8	8.6	11.1	32.4	
	Pond3-SS-027	C06111057-107	4	0	4.7	0.9	19.1	26.9	
	Pond3-SS-038	C06111057-105	6.1	0	20.9	4.2	34.9	34.1	
	Pond3-SS-042	C06111057-103	5.1	0	1.4	0.7	1.9	28.8	
	Pond3-SS-046	C06111057-099	6.7	0	19.5	3.3	34.3	42.5	
	Pond3-SS-057	C06111057-098	8.1	0	2.8	0.7	4.5	39.9	
	Pond3-SS-059	C06111057-100	5.5	0	26.9	5.2	62.9	39.5	

**Appendix D**

**Supporting Data and Analysis**

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Pond 3/3a	Pond3-SS-063	C06111057-102	6.4	0	3.8	2.9	8.8	38.9
	Pond3-SS-065	C06111057-101	5.7	0	39.6	5.2	68.4	46.8
	Pond3-SS-29	C06111057-106	5	0	312	24.5	1240	79.3
	Pond3-TP-007	C06120336-042	4.9	0	4.5	3.1	24.4	35.8
		C06120336-043	2.9	0	0.7	0	0.7	22.6
	Pond3-TP-014	C06120336-044	3.3	0	0.8	0	1.5	25.6
		C06120336-045	3.2	0	0.8	0	1.4	22.1
	Pond3-TP-029	C06120336-046	6.2	0	14.3	0.8	102	28.5
		C06120336-047	6.7	0	15.7	2.9	116	31.1
		C06120336-048	4.5	0	2.1	0	30.8	33.7
	Pond3-TP-037	C06120336-049	2.7	0	7.7	1	9.8	19.2
		C06120336-050	6.6	0	2.2	1	16.3	45.7
		C06120336-051	4.9	0	0.7	0	23.5	31.4
Sand 1	Sand1-SS-009	C06110737-028	5.1	0	1.8	0.3	1.9	20.2
	Sand1-SS-011	C06110737-024	3.2	0	5.8	0.9	2.5	22.8
	Sand1-SS-017	C06110737-022	2	0	2.1	0.3	2.8	11.8
	Sand1-SS-021	C06110737-026	2.6	0	2.3	0.7	12.6	13.4
	Sand1-SS-027	C06110737-027	2.8	0	4.4	0.6	1	14.1
	Sand1-SS-028	C06110737-029	3	0	0.8	0.2	0.7	15.6
	Sand1-SS-030	C06110737-023	4.1	0	14.3	2.5	10.6	33.9
	Sand1-SS-032	C06120235-014	4.6	0	3.8	1.3	2.5	34.4
	Sand1-SS-041	C06110737-025	5.6	0	1.3	0.4	2.1	23.2
	Sand1-SS-043	C06110737-030	3.4	0	6.7	1.7	1.8	18.8
	Sand1-SS-044	C06110737-015	6.7	0	11	1.6	1.7	31.9
	Sand1-SS-049	C06110737-016	4.9	0	16.8	3	41	81.3
	Sand1-SS-050	C06110737-018	5	0	15.7	8.1	4.5	26.1
	Sand1-SS-051	C06110737-019	4.6	0	1.9	0.5	1	32.6
	Sand1-SS-053	C06120235-015	7	0	5.4	1.4	2.5	32
	Sand1-SS-063	C06110737-020	3.3	0	20.8	3.5	6.9	28.5
	Sand1-SS-065	C06120235-016	4.6	0	4.3	1	3	30.1
	Sand1-SS-068	C06110737-021	2.3	0	47.3	19.2	41.3	42.1
	Sand1-SS-249	C06110737-017	5.1	0	19.1	3.7	44.8	82.5
	Sand1-TP-030	C06120405-011	2.9	0	113	15.8	31.7	45.7
		C06120405-020	13.9	0	4.8	1.4	5.2	44.8
	Sand1-TP-043	C06120405-012	3.4	0	0.6	0.4	0.8	17.4
	Sand1-TP-049	C06120405-013	3.4	0	75.8	17.3	32.3	40.6

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**Supporting Data and Analysis**

**Removal Site Evaluation Data**

Sand 1	Sand1-TP-049	C06120405-014	4.4	0	6.4	2.4	3	23.9
	Sand1-TP-063	C06120405-016	1.1	0	80.6	21.7	89.8	48.5
		C06120405-017	9.2	0	8.8	4.6	60.5	28.3
	Sand1-TP-068	C06120405-018	2.5	0	57.4	34.3	91.6	45.3
		C06120405-019	6.5	0	7.1	0.6	27	10.4
Sand1-TP-249	C06120405-015	4.2	0	9	3.3	3.6	21.7	
Sand 2	Sand2-SS-003	C06110737-001	8	0	3.3	0.9	4.2	22.6
	Sand2-SS-004	C06110737-002	7.3	0	2	0.8	2.2	29.1
	Sand2-SS-006	C06110737-003	7.8	0	1.2	0.2	1	30.9
	Sand2-SS-007	C06110737-004	4	0	16.1	2.8	7	37.6
	Sand2-SS-010	C06110737-005	9	0	1.2	0.3	1.2	42.6
	Sand2-SS-011	C06110737-006	4.7	0	6.2	1	5.4	29.6
	Sand2-SS-012	C06110737-008	3.3	0	6.2	0.9	26.3	54.2
	Sand2-SS-014	C06110737-009	3.5	0	0.8	0	0.7	12.4
	Sand2-SS-015	C06110737-010	5.5	0	4.4	0.8	2.7	38.1
	Sand2-SS-016	C06110737-011	4.5	0	6.1	1.3	2.5	34.3
	Sand2-SS-017	C06110737-012	3.2	0	36	6.3	9	41.5
	Sand2-SS-019	C06110737-013	3.3	0	21.6	3.6	27.5	49.7
	Sand2-SS-020	C06110737-014	4.1	0	27.7	5	41.4	49
	Sand2-TP-008	C06110906-026	3.6	0	2.4	0.4	15.3	45
	Sand2-TP-011	C06110906-022	5.3	0	1.1	0.5	2.5	41.7
	Sand2-TP-012	C06110906-023	3.1	0	3.8	0	26.5	50.9
	Sand2-TP-017	C06110906-024	3.8	0	1.9	0.7	2.8	29.9
	Sand2-TP-019	C06110906-025	3.6	0	1.8	0	3.2	35.2
	Sand 3	Sand3-SS-002	C06110906-013	3.4	0	15.3	4.2	42.6
Sand3-SS-004		C06120235-064	2.1	0	1.4	1	3.5	34.9
Sand3-SS-006		C06110906-012	4.7	0	17.4	3.5	119	39.6
Sand3-SS-008		C06110906-014	3.7	0	1.4	0.5	2.9	34.1
Sand3-SS-010		C06110906-010	3.8	0	33.4	7.2	136	45
Sand3-SS-012		C06120235-065	4.3	0	1.4	0	2.3	38.8
Sand3-SS-014		C06110906-005	1.7	0	123	33.5	396	51.5
Sand3-SS-017		C06110906-011	5.3	0	1	0.7	1.4	26
Sand3-SS-022		C06110906-004	2.9	0	1.2	0	0.9	22.7
Sand3-SS-024		C06110906-003	4.3	0	27.4	5.8	7.4	33.2
Sand3-SS-025		C06110906-002	2.7	0	26.9	5.5	10.9	28.6
Sand3-SS-026		C06110906-001	2.5	0	19.6	5.3	7.3	20.6

**Appendix D**

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Sand 3	Sand3-SS-027	C06110906-007	4.7	0	4.5	1.4	3.2	28.7
	Sand3-SS-05	C06110906-009	1.5	0	66.9	32.2	86.4	54.5
	Sand3-SS-09	C06110906-008	3.7	0	31.9	14	41.4	41
	Sand3-SS-214	C06110906-006	1.7	0	123	47.6	516	63.5
	Sand3-TP-005	C06120235-066	0.8	0	40.8	39.2	131	63.3
		C06120235-067	4.3	0	28.1	3.6	78.8	33.9
	Sand3-TP-006	C06120235-068	5	0	8.4	0.8	102	35
	Sand3-TP-009	C06120235-069	6.9	0	5.1	1.7	90.6	38
	Sand3-TP-014	C06120235-070	4.2	0	1.2	1.3	227	29.4
		C06120235-075	1.5	0	84.1	29	488	52.2
Sand3-TP-025	C06120235-071	4.6	0	27.2	8.9	21.1	41.3	
Sed Pad	SEDPAD-SS-005	C06111057-030	3.1	0	17.7	3.7	14.1	25.5
	SEDPAD-SS-006	C06111057-031	3	0	38.8	14.2	21.7	39.5
	SEDPAD-SS-011	C06111057-033	11.6	0	3.8	2.7	27.3	502
	SEDPAD-SS-014	C06111057-036	2.7	0	236	78.8	366	106
	SEDPAD-SS-015	C06111057-037	1.5	0	33.4	12.9	34.7	31.5
	SEDPAD-SS-018	C06111057-038	7.1	0	1.5	1.3	1.9	46.8
	SEDPAD-SS-020	C06111057-039	6	0	12.8	3.8	17.7	22.2
	SEDPAD-SS-021	C06111057-040	1.3	0	85.6	45.4	1640	59.1
	SEDPAD-SS-022	C06111057-041	1.3	0	104	44.5	85.9	60.7
	SEDPAD-SS-025	C06111057-042	1.5	0	36.7	7.5	21.9	29.9
	SEDPAD-SS-026	C06111057-043	3	0	27.1	9	33.1	32.1
	SEDPAD-SS-07	C06111057-032	1.1	0	106	45.5	92.4	63.4
	SEDPAD-SS-08	C06111057-034	3	0	25.8	7.9	19.8	35.5
	SEDPAD-SS-12	C06111057-035	0.9	0	118	37.8	363	52.9
	SEDPAD-TP-006	C06120405-001	0.6	0	92.9	161	68.6	74.7
		C06120405-002	4.2	0	2.8	2.4	88.7	29
	SEDPAD-TP-012	C06120405-003	0.8	0	84	83.5	147	48.4
		C06120405-004	4.3	0	2.9	2.7	158	30.7
	SEDPAD-TP-014	C06120405-005	2.7	0	165	61.4	252	75
		C06120405-006	3.8	0	9.8	3.4	18.9	31.5
	SEDPAD-TP-021	C06120405-007	1.9	0	99.7	63.9	357	60.3
		C06120405-008	0	0	86.3	74.1	270	63.9
	SEDPAD-TP-026	C06120405-009	5.5	0	86.6	40.9	89	65.4
Trailer	Trailer-SS-001	C06120235-051	3.7	0	12.5	6.6	12.7	43.7
	Trailer-SS-009	C06120235-053	6.1	0	102	39.8	139	61.3

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**Removal Site Evaluation Data**

Trailer	Trailer-SS-013	C06120235-052	0	0	33.2	101	44	78.4
	Trailer-SS-024	C06120235-054	5.4	0	2.1	1.7	16.7	32.8
	Trailer-SS-027	C06120235-056	5.3	0	2.1	0.8	1.7	31.7
	Trailer-SS-224	C06120235-055	5.5	0	1.8	1.1	16.5	33.1
Vent 3/8	Vent3-SS-034	C06120235-005	2.3	0	1.4	0.2	1.1	9
	Vent8-SS-002	C06120235-001	5.1	0	3.6	2.9	5.2	35.3
	Vent8-SS-006	C06120235-003	3.3	0	13.2	5	19.4	30.3
	Vent8-SS-019	C06120235-006	3.3	0	137	27.4	358	55.4
	Vent8-SS-031	C06120235-004	2.6	0	2.2	0.9	2.1	21.6
	Vent8-SS-202	C06120235-002	4.6	0	3.9	1.4	4.6	32.8
Boneyard	Boneyard-TP-001	C06110906-031	1.3	0	45.9	16.7	17.4	41.3
		C06120235-021	5.2	0	1.3	0.2	0.8	29.9
		C06120235-022	3.7	0	1.6	0.4	0.8	29
	Boneyard-TP-002	C06120235-023	5.5	0	2.2	0.6	2.1	32
		C06120235-024	5.2	0	1.1	0	1.5	31.1
		C06120235-025	4	0	1.1	0	0.9	27.8
	Boneyard-TP-003	C06120235-026	5.1	0	1.1	0.8	1.5	31.6
		C06120235-027	5.1	0	1.2	0	1	37.8
	Boneyard-TP-004	C06120235-029	1.9	0	50.7	33.4	228	33.9
		C06120235-030	3.3	0	10.1	3.1	240	22.2
		C06120235-031	3.5	0	1.9	0.8	5.5	24.7
	Boneyard-TP-004)	C06120235-028	0.8	0	48.4	24.3	12.5	36.9
	Boneyard-TP-005	C06120235-033	4	0	1.2	0	1	26
		C06120235-034	4	0	1.4	1.2	5.6	25.2
		C06120235-035	4	0	1.7	0.3	4.3	24.7
		C06120235-036	4.9	0	1.9	0.5	8.4	25.6
	Boneyard-TP-204	C06120235-032	4.2	0	13	4.6	475	24.5



Subsurface Soil Analytical Results Supplemental Removal Site Evaluation Sampling, April 2008 Northeast Church Rock Mine Site					
Location ID	Depth (ft bgs)	Ra-226 (pCi/g)	Uranium (mg/kg)	Gamma (cpm)	Comments
<b>Unnamed Arroyo</b>					
A-420	2	n/a		51,997	
	5	6.7	22.9	48,306	
	10	1.1	10.1	45,876	
	15	n/a		45,491	
	20	n/a		42,922	Possible bedrock
	25	n/a		45,957	Weathered bedrock
A-421	2	n/a		40,592	
	5	7.0	42.9	40,813	
	10	1.4	11.3	37,414	
A-422	2	n/a		63,052	
	5	n/a		63,185	
	10	6.6	14.6	58,560	
	15	1.6	7.69	56,082	
	20	1.3	7.11	53,924	
A-423	2	n/a		80,863	
	5	n/a		79,971	
	10	1.2	24.6	72,861	
	15	2.9	14.9	72,028	
	20	n/a		73,970	
	25	n/a		73,680	
	30	n/a		72,234	
	35	n/a		73,808	
	40	n/a		72,458	
	45	n/a		n/a	Bedrock
<b>Boneyard</b>					
BY-415	5	1.8	48.2	18,852	
	10	0.7	34.6	17,938	
	15	n/a		17,863	Possible bedrock
<b>NECR-1</b>					
N1-419	2	n/a		84,000	
	5	19	13.9	75,326	
	10	2.4	55.2	72,758	
	15	n/a		n/a	
<b>NEMSA</b>					
NA-416	5	n/a		50,573	
	10	n/a		37,417	
	15	17.5	117.0	44,685	
	20	1.9	17.6	31,452	
NA-417	2	3.1	21.6	23,570	
	5	2.5	11.1	23,531	

Subsurface Soil Analytical Results Supplemental Removal Site Evaluation Sampling, April 2008 Northeast Church Rock Mine Site					
Location ID	Depth (ft bgs)	Ra-226 (pCi/g)	Uranium (mg/kg)	Gamma (cpm)	Comments
<b>Pond 1</b>					
P1-418	2	n/a		226,493	
	5	n/a		226,202	
	10	15.6	74.6	229,405	
	15.5	n/a		n/a	Bedrock
<b>Pond 3</b>					
P3-414	2	n/a		74,081	
	5	n/a		73,993	
	10	2.4	26.5	66,348	
	15	1.8	21.9	65,897	
	20	n/a		n/a	Weathered bedrock
<b>Notes:</b> n/a = not applicable					