ACTION MEMORANDUM

RILEY PASS URANIUM MINES SITE
Non-Tronox Bluffs
REMOVAL ACTION

Within the
NORTH CAVE HILLS LAND UNIT

Custer National Forest – Sioux Ranger District
Harding County, South Dakota

April 27, 2010

ACTION MEMORANDUM

CONTENTS

I. PURPOSE

The purpose of this Action Memorandum is to request and document approval of the selected non-time critical removal action, as authorized by section 104 (42 U.S.C. 9604) of the Comprehensive, Environmental, Response, Compensation, and Liability Act (CERCLA), to address Bluffs A, F, I, J and K within the Riley Pass Uranium Mines site, located on the Custer National Forest, in Harding County, South Dakota. These bluffs are referred at as the Non-Tronox bluffs and will subsequently be referred to as the Project area, which comprises a portion of the larger Riley Pass Uranium Mines site (Site), The Site is defined in the Riley Pass Abandoned Uranium Mines Final Engineering Evaluation and Cost Analysis (EE/CA) (the Final EE/CA). A map showing the Project areas is provided as Figure 1.

A release, or a significant threat of a release, has or is occurring at the Project area that poses a threat to public health or welfare or the environment, on and/or from lands under the jurisdiction, custody, or control of the USDA Forest Service, Custer National Forest (National Forest System Lands or NFS lands). Conditions at the Riley Pass Uranium Mines site (including the Project area) present an imminent and substantial endangerment to human health and the environment, due to the high concentrations of arsenic, thorium, uranium, and radium^{226} metals found in the soils and sediment from the mining area. These conditions meet the criteria for initiating a Removal Action under 40 CFR Section 300.415 (b)(2) of the National Contingency Plan (NCP). Executive Order 12580 and 7 CFR 2.60(a)(39) delegates Removal Action authority to the USDA Forest Service, when the source of the release or potential release of hazardous substances is on or from National Forest System lands. The scope of this proposed action is to control and contain the release of and exposures to specific contaminants that are impacting human health and the environment at the Project area. This action alone will not address all contaminant sources or the impacts from these sources in the encompassing Riley Pass Uranium Mines site. Additional actions will need to take place to address these other sources and impacts within the site as documented in the Engineering Evaluation and Cost Analysis (EE/CA). This proposed action addresses only those Non-Tronox Bluffs and features (identified above) for which no responsible party has been identified.

The proposed actions set forth in this Action Memorandum are consistent with the Final EE/CA that was prepared for the Forest Service by its consultant Pioneer Technical Services, Incorporated. The EE/CA developed various alternatives that address impacts associated with hazardous substances present at the Project area (Pioneer, 2006). The Final EE/CA provides the details and basis for the proposed response action for features within the Project area. Additional characterization and design work has been completed by MSE Millennium Science and Engineering for the Forest Service. This additional information has further characterized the waste at the site and this information is used in the final design for the response actions at the Site. The discussion in the balance of this Action Memorandum substantiates the need for a removal response, identifies the proposed action, provides the specific risk reduction criteria under which the proposed action will be conducted and a determination these

criteria are protective of human health and the environment, and explains the rationale for the Forest Service's selection of the proposed action.

The proposed action will be executed by following the non-time-critical removal action process as defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA; 42 USC 9604) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP; 40 CFR Part 300). Response actions as explained in the U.S. Environmental Protection Agency's (EPA) *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* -- are implemented to respond to "the cleanup or removal of released hazardous substances from the environment ... as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or to the environment..." (EPA, 1993).

II: SITE CONDITIONS AND BACKGROUND

A. Site Description

The February 2007 Action Memorandum, as well as the EE/CA uses a variety of terms to describe site conditions, materials present at the Project area, the risks associated with these conditions or materials, cleanup levels, and conditions that will be present after completion of the proposed action. Many of these terms overlap. For clarity and ease of understanding, the definition of these terms as they are used in the February 2007 Action Memorandum was provided as Attachment 3 Many of these definitions apply to this Action Memo, but some have changed based on additional site sampling and data from the site, specifically Cleanup levels and Criteria. These definitions will be used as a guide for this action memo, but different interpretations of terms may apply.

During the late 1950s and early 1960s, relatively extensive, unrestricted strip mining conducted by numerous individuals and companies occurred on the NFS lands administered by the Sioux Ranger District during removal of uranium-bearing lignite coal beds permitted under the General Mining Laws and Public Law 357 (requiring no form of restoration). Approximately 1,000 acres of land have been reported to be disturbed by excavation, spoils deposition, and subsequent erosional deposition from the original source sites (USFS, 1964).

Mining in the area consisted of the removal of overburden to allow access to the uranium-bearing lignite coal beds, which in places were 80 feet below the original ground surface. For purposes of identification, the mines addressed in this Action Memorandum are broken into six individual bluffs. These bluffs are described below (see Figure 1). Additional site characterization data, particularly for Arsenic (As) and Radium 226 (Ra-226) are summarized in the Riley Pass Uranium Mine Site, X-Ray Fluorescence (XRF) and Gamma Surveys Report by MSE Millennium Science & Engineering dated May 6, 2009 (MSE, 2009) for the six Non-Tronox bluffs.
During mining, much of the overburden was piled on the outer edges of the rim rock or pushed over the rim rock edges. The highly erosive spoils remained piled on the pit floor. In some cases the contaminants of concern associated with the ore deposit were left exposed when mining ceased in 1964.

Bluff A

Bluff A is located approximately 0.25 miles north of Bluff B in Township 22 North, Range 5 East, Sections 22 and 23. The estimated mine waste volume is approximately 2,500 cubic yards (cy), with a total disturbed area of 3 acres, of which approximately 1 acres is unvegetated spoils. These spoils materials are located on the south side of Bluff A and drain towards a dry draw that adjoins a large spoils pile area associated with Bluff B. The analytical results for Bluff A are included in Appendix C of the EE/CA and in section 6.8 and Table 17 of the 2009 MSE report. Based on the 2009 characterization work, 32% of all surface XRF readings are above the 142 ppm As cleanup criteria. The gamma survey revealed Ra-226 concentrations above the 30pCi/g in the northern and southeastern sections of the bluff area.

Bluff F

Bluff F is located approximately 6400 feet southeast of Bluff B in Township 22 North, Range 5 East, Section 35 and encompasses approximately two acres, with good vegetation of the spoil piles and berms. The estimated mine waste volume is approximately 6,000 cubic yards (cy), There are some areas of exposed bedrock located within the bluff. There are no signs of erosion from the berms or spoils piles. The analytical results for Bluff F are included in Appendix C of the EE/CA and in section 6.4 and Table 12 of the 2009 MSE report. Based on the 2009 characterization work, all but one of the 11 surface XRF readings are above the 142 ppm As cleanup criteria. The gamma survey reveals an extensive area of Ra-226 concentrations above the 30pCi/g throughout the bluff area.

Bluff I

Bluff I is located approximately .25 mile south of Bluff F in Township 22 North, Range 5 East, Sections 35 and 36. Bluff I is broken into three separate areas, Bluff I1, Bluff I2 and Bluff I3. The disturbed area of Bluff I1 is approximately 16.5 acres, Bluff I2 is about 4 acres and Bluff I3 is about 1.6 acres. The estimated mine waste volume from all three areas is approximately 12,000 cubic yards (cy), These bluffs also have approximately 85,000 cy of unstable, highly erosive mine spoils over the edge of the bluffs. The combined disturbed area for Bluff I is approximately 22 acres and the majority of this area is unvegetated and eroding into an intermittent drainage north of the bluff. Based on the 2009 characterization work, approximately 22% of the 126 surface XRF readings are above the 142 ppm As cleanup criteria for Bluff I1 and I2. The gamma survey reveals Ra-226 concentrations above the 30pCi/g to be sporadic throughout Bluff I1 and isolated in the northern part of Bluff I2. Bluff I3 had 10% of the XRF samples exceeding the cleanup criteria and no exceedances of Ra-226,

Bluff J

Bluff J is located approximately 3 air miles northwest of Riley Pass in Township 22 North, Range 5 East, Section 20. The site is access by traveling south approximately 3.5 miles from Harding County Road 733 on the Craig Pass Road. Bluff J encompasses approximately four acres and consists of dozer cuts, highwalls, spoils piles/berms and road cuts. The estimated mine waste volume from Bluff J is approximately 2,500 cubic yards (cy), This "bluff" is located below the sandstone rim rock and is not actually a true bluff. Bluff J is broken into two Bluffs J1 and J2. Anecdotal evidence suggests that Bluff J1 may have been a processing area for some of the uranium ore as the residual material on site appears to have been burned and exhibits relatively high radioactivity. Based on the 2009 characterization work, none of the surface XRF readings are above the 142 ppm As cleanup criteria . The gamma survey reveals isolated Ra-226 concentrations greater than 30 pCi/g in the central portion of Bluff J2 and an extensive area of Ra-226 concentrations above the 50pCi/g throughout Bluff J1.

Bluff K

Bluff K is located approximately 3 air miles northwest of Riley Pass in Township 22 North, Range 5 East, Section 21. The site is access by traveling south approximately 3.5 miles from Harding County Road 733 on the Craig Pass Road. Bluff K encompasses approximately two acres and consists of two spoils pile/berms within an open grassmeadow in the middle of a bluff. Bluff K is broken into two separate areas, Bluff K1 and Bluff K2. The estimated mine waste volume for Bluff K areas is approximately 2,300 cubic yards (cy), Based on the 2009 characterization work, 6 of the 29 XRF readings are above the 142 ppm As cleanup criteria. The gamma survey reveals Ra-226 concentrations above the 30pCi/g in the west-central and southwestern sections of Bluff K2,

Bluff L

Bluff L is located approximately 3 air miles southwest of Riley Pass in Township 22 North, Range 5 East, Section 29. The bluff is accessed by traveling south approximately 3.5 miles from Harding County Road 733 on the Craig Pass Road and traveling approximately 2 miles to the bluff. Bluff L encompasses approximately eight acres and consists of several small spoils piles, old roads and dozer cuts scattered throughout the bluff. One spoils pile is located on the north end of the bluff in a dry draw. Based on the 2009 characterization work, none of the XRF readings are above the 142 ppm As cleanup criteria. The gamma survey reveals Ra-226 concentrations below the 30pCi/g throughout the entire Bluff L, Based on this site specific characterization, no response action is proposed at Bluff L.

1. Removal Site Evaluation

In 1964, the Forest Service noted that overburden from one of the claims mined by Kermac had slipped down the hill, through the Forest boundary fence, and caused considerable disturbance on an adjacent property owner's land and destroyed over 320 feet of fence. In 1991, after several other incidents at the Riley Pass Uranium Mining site, the Forest Service contracted Denver Knight Piesold to conduct an Environmental Evaluation at the main disturbed area (later identified as Bluff "B") within the Project area. After 1991, other time-critical actions (described later in this document) were taken at the Project area. Potential for similar releases still exist.

In 1999 the USDA Forest Service contracted with Pioneer Technical Services to complete a Site Investigation. That investigation resulted in a number of water, soil, and sediment samples being collected from the site and the result of that sampling effort being published in the final Site Investigation (SI) report that was issued in 2002. Following the issuance of the SI, Pioneer Technical, still under contract with the Forest Service, utilized the result from the SI to develop a Draft Final Engineering Evaluation and Cost Analysis (EE/CA). Additional sampling was done by Portage Environmental (also under contract to the Forest Service) in 2004 in order to develop a comprehensive Human Health and Ecological Risk assessment that was included into the Draft Final EE/CA which was completed by Pioneer Technical in 2005. After receipt of public comments on the Draft Final EE/CA, a Final EE/CA (including a revised Final Risk Assessment) was issued by the Forest Service in October of 2006.

Additional characterization work for the Non-Tronox Bluffs was conducted by MSE under contract to the Forest Service (MSE, 2009). This work consisted of X-Ray Fluorescence (XRF) field work for Arsenic (As) and gamma surveys for Radium 226 (Ra-226). This report also reviewed the data to determine if there was a direct correlation between the Radium-226 and Arsenic as originally reported in the EE/CA. The report concluded that at times there is a correlation, but at other bluffs there is no correlation. Therefore the correlation between Arsenic and gamma (Ra-226) is inconsistent and therefore the presence or absence of gamma cannot be used as a tool to predict the occurrence of Arsenic.

2. Physical Location

The Riley Pass Uranium Mines Site is located in the North Cave Hills area of Harding County, South Dakota. The Site is approximately 25 miles north of Buffalo, South Dakota, which is the county seat, and 100 miles north of Belle Fourche, South Dakota. Ludlow, South Dakota, is the nearest town to the site and is located approximately five miles due east. The Sioux District Office of the Custer National Forest of the USFS administers the Project area. The mined areas that are associated with the Site covers approximately 250 acres of highwalls, pit floor, and spoils in Sections 20, 21, 22, 23, 25, 26, 27, 29, 35, and 36 of Township 22 North, Range 5 East of the Black Hills Meridian and are broken into 12 bluffs. These bluffs are shown on the enclosed map. The sites are bordered by USFS, private, and U.S. Department of Interior/Bureau of Land Management (BLM) land.

The North Cave Hills area serves as the headwaters of the South and North Forks of the Grand River which flows into the Missouri River at Mobridge, South Dakota, 200 miles away.

There are currently several ranches within one to five miles of the Project area. Primary land uses in the area include grazing, hunting, hiking, ATV/motorcycle use, camping, and American Indian spiritual use.

3. Site Characteristics

The Project area is located at an elevation of 3,200 feet above mean sea level. The USFS records from 1931 through 1973 report average annual precipitation at Ludlow, South Dakota, at 14.8 inches. Approximately 73% or 10.8 inches of this precipitation appears in the form of rain during May through September. Significant precipitation occurs during convective storms, often accompanied by strong winds and occasional flash flooding. June is the wettest month of the year, with an average rainfall slightly over three inches.

The North Cave Hills form a diverse and varied landscape compared with the surrounding short and midgrass prairies. The rimrock hills, with their complex slopes and aspects, create unique microclimates and diverse vegetation. Several habitat types have been recognized by the USFS in this region. Landscapes include hardwood draws, ponderosa pine woodlands, and several grassland ecosystems.

4. Release or Threatened Release into the Environment of a Hazardous Substance

a. Hazardous Substances

The hazardous substances, as defined in section 101(14) of CERCLA, found at the Project area include arsenic, molybdenum, thorium, uranium, and radium^{226} metals. Concentrations of hazardous substances in solid wastes and surface water are documented in the EE/CA (Pioneer, 2006).

b. Sampling and Analytical Data

The sampling methods used to collect the chemical data are described in the EE/CA (Pioneer, 2006).

A substantial number of soil, sediment, and water samples were taken at the Project area during the course of three (3) major sampling events from 1991 to 2004. The sampling events documented the concentration and migration of the contamination from the historically mined portions of the bluffs to the various re-deposit points in Pete's Creek drainage and Schleichart Draw. Laboratory analytical results indicated elevated

levels of arsenic, molybdenum, thorium, uranium, and radium^{226} as compared to measured background concentrations.

In addition, radiological measurements were made at the various bluffs to determine radiation exposure levels at the Project area. Measurements revealed that the highest radiation levels are from the lignite material which was the source of uranium mined in the area.

Surface water sampling took place at several locations within the various drainages associated with the Project area as well as two other non mined drainages. Indications are that the water quality for the area is naturally degraded due to the mineralization associated with the area. However, it was documented that the historic mining activity and subsequent erosion stemming from that activity is locally impacting the surface water quality from the source of the contaminants to points at or near the Forest Service boundary.

c. Mechanism for Past, Present, or Future Release

The sediment and mine waste generated by past activity at the Project area to a large extent are un-vegetated and unconfined due to the geological make up of the material. Runoff erodes material into Pete's Creek and Schleichart Draw. Winds can cause material to be airborne and transported offsite.

d. Events or Features that could Spread or Accelerate Releases

Large runoff events, particularly during the late summer, present potential conditions for increasing erosion of the material into the surface water drainages and onto the surrounding land surfaces. Water quality in Schleichart Draw has been shown to be impacted by the contaminants. Retention ponds built by the Forest Service in the 1980s, have been filled to capacity and have been cleaned out on at least three occasions. Additional sediment loading and eventual embankment failure of these retention ponds could result in large-scale releases. Schleichart Draw reservoir and the Ducks Unlimited pond also appear to contain large amounts of sediments eroded from the mined areas.

e. Properties that Influence the Rate of Releases

The primary mechanisms of movement of contaminated material:

- Erosion into surface water courses and onto adjacent land
- Dissolution of contaminants in runoff
- Infiltration of dissolved metals into soil

Because of its chemical and soil characteristics the contaminated material associated with the historic mining activity does not readily support plant life and continues to be vulnerable to erosion by water and wind. In addition, the contaminated materials are uncontained and the outer slopes are quite steep, contributing to accelerated erosion.

Actions taken during the non-time-critical removal are designed to vegetate the site, reduce overland migration of the contaminated material, and reduce infiltration of water into the contaminated material which would result in the release of the contamination.

Actions directed at reducing infiltration through, and runoff from, the contaminated material should result in surface water quality improvements. In addition, isolation of the highly contaminated material in engineered repositories will prevent the highest contaminated material from being exposed to water and wind thereby substantially reducing the human health and environmental threat.

5. National Priority List (NPL) Status

The Riley Pass is currently not on the National Priority List. No other removal or remedial activities are currently in progress.

6. Maps, Pictures, and other Graphic Representations

A location map and map of Project area features from the Final EE/CA (Pioneer, 2006; Figure 2-1) is provided as Attachment 1.

B. Other Actions to Date

1. Previous Actions

As previously mentioned, numerous actions, investigations and time critical actions have been taken at the Project area. These include:

1999 to 2002- The Forest Service retained Pioneer Technical Services to conduct all steps needed to produce a Site Investigation and EE/CA.

2002-The Forest Service posted signs in the area warning the public of the potential hazards associated with the site.

2004-The Forest Service retained Portage Environmental Incorporated to gather additional samples and information to produce a comprehensive Human Health and Environmental Risk Assessment.

2005-The Draft Final EECA was delivered to the Forest Service and released to the public.

The Forest Service continued discussions with the State of South Dakota, EPA, and Tribes.

A Public meeting was held in May 2005 in Buffalo, South Dakota to inform interested parties of history, conditions of the site, as well as, the processes associated with CERCLA. A public notice appeared in the Rapid City Journal on July 11, 2005 and the Nation's Center News on July 14, 2005 announcing that the draft EE/CA was available, setting the time for the comment period, and listing the location of the Information Repositories. A 60-day comment period was established which ended on September 12, 2005. Three public meetings were held on August 24, 25, and 26, 2005. The meetings were held in Rapid City, Buffalo, and Bullhead, South Dakota, to solicit comments on the EE/CA. Comments and data collected were incorporated into the final version of the EE/CA. Copies of the Administrative Record, including the final and all draft versions of the EE/CA are available for public review at Information Repositories in Camp Crook (Sioux Ranger District of the Custer National Forest) and Buffalo (County Courthouse).

The Forest Service received numerous public comments generated by the release of the Draft EE/CA.

2006-The Forest Service came to an agreement with SD State DENR on the ARARs to be included in the Final EE/CA.

2009 - Additional characterization and design work has been completed by MSE Millennium Science and Engineering for the Forest Service. This additional information has further characterized the waste at the site and this information is used in the final design for the response actions at the Site.

To date The Forest Service has expended over $410,000 for response actions taken at the Riley Pass Uranium Mines Non-Tronox bluffs site to address those bluffs and features addressed by this Action Memorandum. This includes 50% of the cost for the EE/CA and Risk Assessment completed for all bluffs at Riley Pass.

2. Current Actions

The primary objectives for the removal action at the Project area are to attain a degree of isolation, containment, and clean-up of hazardous substances that assures protection of public health, safety and welfare of the environment; as well as reducing erosion of contaminated material from the Project area, reducing stream sedimentation attributable to soils erosion; eliminating risk of future offsite soils migration; and achieving revegetation of the Project area consistent with a long-term maintenance plan that will require a minimum of effort.

As explained in the EE/CA, although not an objective of this removal action, the reduction of stream sediment that will result from the proposed action is expected to

minimize the impact to surface water quality stemming from total metals within the sediment.

No other government or private cleanup activities are currently being conducted at this Project area.

C. State and Local Authorities' Role

1. State, Local, and Tribal Actions to Date

The Forest Service has been cooperating throughout the project with the South Dakota Department of Environmental & Natural Resources, South Dakota Game, Fish & Parks, the South Dakota Division of Forestry, the South Dakota Governor's Office, the Harding County Commissioners, and the Bowman/Slope Soil Conservation District. A list of Applicable, or Relevant and Appropriate Requirements (ARARs) has been developed for the project with significant input provided by the State of South Dakota.

A briefing was given to the Standing Rock Sioux Tribal Council. Notification letters were sent to the Crow, Northern Cheyenne, Standing Rock Sioux, Cheyenne River Sioux, Crow Creek Sioux, Lower Brule Sioux, Yankton Sioux, Ogalala Dakota Nation, Mandan-Hidatsa-Aikara and Three Affiliated Tribes regarding various public meetings and opportunities to add input into the process. Meetings were held on the site with various Tribal Historic Preservation officials to receive input concerning cultural concerns at the Project area.

All cooperating agencies and governments have been provided an opportunity to review the various project documents. Comments have been provided to the USDA Forest Service and are documented in the Responsiveness Summary included in the Final EE/CA. All communications with the various agencies and governments have been documented in the Community Involvement Plan for the Riley Pass Abandoned Uranium Mines (USFS, 2006).

2. Potential for Continued State/Local Response

Neither the State nor local authorities have the resources or authority to conduct a Removal Action at this time. State and local constituents will continue to be involved in site activities and will be kept apprised of all activities conducted as part of this Removal Action.

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

The EE/CA indicates there is a threat to public health or welfare, or to the environment as set forth in the National Contingency Plan (NCP) at 40 CFR 300.415(b)(2). Briefly, this threat is the risk associated with exposure to metals and radionuclides in areas

impacted by mining and risk of present and future metals and radionuclide contamination of the surrounding lands and surface waters in the Schleichart Draw and Pete's Creek drainages.

Due to the concentrations of contaminants in the mine waste sources (Pioneer, 2006), conditions at these sources meet the criteria for initiating a Response Action under 40 CFR 300.415(b)(2) of the NCP. The following factors from 40 CFR 300.415(b)(2) of the NCP form the basis for USDA Forest Service's determination of the threat present and the appropriate action to be taken:

(i) Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances or pollutants or contaminants;

(ii) Actual or potential contamination of sensitive ecosystems;

(iii) High levels of hazardous substances, pollutants, or contaminants in soils largely at or near the surface that may migrate;

(iv) Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released.

A. Threats to Public Health or Welfare

A Risk Assessment conducted for the Forest Service by Portage Environmental Incorporated (Portage, 2006) identified human-health and ecological risks posed by current conditions at the Project area that exceed minimum U.S EPA-defined risk levels that are protective of human health and the environment [i.e., an excess lifetime cancer risk higher than $1x10^{-4}$ (1 in 10,000)]. The risk assessment determined that the risk levels for maximally exposed individuals could potentially be as high as 3×10^{-3}. Potential human-health exposure pathways identified include ingestion of contaminated soils, surface water contaminated by contact with surface soils, consumption of beef by local ranchers, consumption of game meat by hunters, inhalation of airborne contaminated soils, direct dermal contact with exposed contaminated soils, and direct gamma irradiation from contaminated soils. These pathways, and the associated calculated potential risks are the result of elevated concentrations of contaminants (metals and radionuclides) in mining spoils (soils) that are exposed at the surface.

The area around the Project area is popular for recreational uses such as hiking, ATV/motorcycle use, hunting, and camping. In addition, the Project area is used by various American Indian tribes for spiritual purposes. There is a potential for inhalation of airborne contaminated soils from such recreational and spiritual uses.

The highest risk potential scenarios (Permit Holder and Recreational Visitor) were used to back-calculate preliminary concentrations in soil that are protective of human health. This range of risk-based preliminary soil cleanup concentrations for radionuclides was presented in Section 5 (Risk Assessment) for 10^{-4}, 10^{-5} and 10^{-6} risk levels assuming ingestion of beef/deer at 10%, 50% and 100% of total meat

source. Section 6.2 of the EE/CA presented preliminary risk-based soil concentrations for consideration at the Riley Pass site for a risk level of 1×10^{-6} and assuming 100% beef ingestion (for arsenic) and 10% beef ingestion (for radium).

B. Threats to the Environment

Primary ecological receptors are the animal species that utilize the forage and water resources of the Riley Pass area. The pathways by which ecological receptors could become exposed to contaminants at the Project area are through direct contact with soils, ingestion of contaminated soils, direct contact with water and sediments, ingestion of water and sediments, and ingestion of contaminated food.

The Schleichart Draw reservoir was reported to have been a trout pond prior to mining in the 1960s. Ducks Unlimited developed a waterfowl pond downstream from the Schleichart Draw reservoir. The functionality of both water features have been diminished dramatically due to sedimentation and poor water quality. Aquatic life chronic surface water standards for arsenic and lead are exceeded for many of the sediment retention ponds located at the site, while acute aquatic life water standards for copper are exceeded in all water sources at the site, including Schleichart Draw reservoir and the Ducks Unlimited pond.

The presence of bare unvegetated soils and sediment deposits can partially be assumed as being the result of phytotoxic conditions.

A threat to the environment also exists through the migration of, and airborne exposure to, contaminated dust. On dry windy days, dust may migrate to surface waters, wetlands, and other areas as the dust becomes airborne.

IV. ENDANGERMENT DETERMINATION

Actual or threatened releases of hazardous substances from this Project area, if not addressed by implementing the response action selected in the Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS AND ESTIMATED COSTS

A. Proposed Actions

The EE/CA (Pioneer, 2006) evaluated six alternatives to address the purpose and need to take action. These are displayed in Table 1 below:

TABLE 1 – Action Alternatives for Riley Pass Uranium Mines Site

Alternative	Description
Alt 1	No Action
Alt 2	Institutional Controls
Alt 3	Minimal Grading and Sediment Control
Alt 4	Comprehensive Grading and Sediment Control
Alt 5	Comprehensive Grading, Consolidation and Containment of Acutely Contaminated Materials, and Sediment Control
Alt 6	Comprehensive Grading, Consolidation and Containment of Acutely Contaminated Materials, Sediment Control, and Reduction of High Walls

The EE/CA evaluated how each alternative complied with Applicable or Relevant and Appropriate Requirements (ARARs). More detail on the removal action objectives and alternative analysis can be found in the final EE/CA. The Agency preferred response consists of a combination of alternatives documented in the final EE/CA and are displayed in Table 2 below.

TABLE 2 – Preferred Action Alternatives Riley Pass Uranium Mines Site

INDIVIDUAL BLUFF	PREFERRED ALTERNATIVE	ESTIMATED COST*
Bluff A	**Alternative 5**	$156,000
Bluff F and I	Alternative 3	$2,689,000
Bluff J	Alternative 3	$163,000
Bluff K	**Alternative 5**	$203,000

* The estimated costs for reclamation of bluffs are from the design package completed by MSE (2010)

The proposed action will consist of implementation at the Project area of the preferred alternatives as generally described in Sections 7 and 8 of the EE/CA, applying the

criteria specified below. After review of public comments received on the site-wide EE/CA, the Forest Service determined it was not necessary to revise the selection of these preferred alternatives for the Project area in response to public comments. The Forest Service has determined that implementing the proposed action in this way is expected to result in post-reclamation conditions at the Project area that are materially consistent with the stated objectives of the preferred alternatives, Forest Service responses to comments, appropriate risk reduction requirements and criteria established in this Action Memorandum by the Forest Service, and the requirements of the NCP.

1. Proposed Action Description

The proposed action is to contain, consolidate, stabilize, and vegetate contaminated soil, spoils, and sediment associated with the historic mining activities within the Riley Pass Uranium Mines site associated with Bluffs A, F, I, J and K that are on National Forest System lands. The proposed actions will substantially lower the human health risk to an approximate value of 1×10^{-5} which is considered safe by both the U.S. EPA and Forest Service by mitigating exposures to acutely and significantly contaminated materials as explained immediately below and then in Section 1.a. Management of these materials will be in accordance with the criteria established herein.

The proposed action will be accomplished by implementing the preferred alternatives for these bluffs identified in the EE/CA and in doing so, applying the reclamation criteria specified below. The selection of one alternative over another was based, as described in the EE/CA, on the presence of acutely contaminated material on a given bluff and the relative reduction of the human health and environmental risks required at each bluff to meet U.S. EPA risk-protective standards.

The cleanup criteria defined below will determine the extent of excavation, re-grading, mitigation, and internment of the contaminated soils, spoils, and sediment. Cleanup levels established by these criteria (see Section 1.a., below) are protective of humans and ecological receptors from exposure to all contaminants (including the primary contaminants arsenic and radium^{226}). Cleanup of the Project area must be to a risk-protective radium^{226} concentration as well as 142 ppm arsenic concentrations that will be protective of human health and potential environmental receptors. A cleanup verification sampling plan will be developed to allow for direct quantifiable measurements to be made in the field during the course of the removal action.

The following specific criteria will be met in the implementation of the Removal Action

Criteria 1: Material with exceedances (Ra- 226 and As)

The Forest Service has defined the following soil reclamation criteria that it has determined to be risk-protective and that will be applied to these bluffs. These criteria define the reclamation and materials handling requirements for these bluffs where there

is demonstrable disturbance attributable to surface mining activities. Measurement to confirm attainment of these criteria will be based on surface gamma radiation readings correlated to radium^{226} activity and Arsenic concentrations and will be based on block averaging or another agreed to method. Upon completion of the site reclamation, the Bluffs will be divided into appropriately sized grids. Utilizing radiation detector equipment, a transect survey will be conducted to the extent practical across each grid in order to record readings to verify that cleanup criteria have been met. Areas such as side slopes and highwalls will be scanned to the extent safety and accessibility allow. The average of the radiation readings collected in a specific grid block will be used to determine if the criteria have been met for that block.

Category 2: Greater than 30 pCi/g but less than or equal to 50 pCi/g Ra-226

For materials in this category at these bluffs, mitigation efforts will be implemented to bring average radium measurements down to less than or equal to 30 pCi/g by any practical combination, as necessary, of covering, removing, or other means identified in the field so long as the desired goal is achieved. Areas will be vegetated to achieve soil stability and prevent erosion as described above. Areas are to be monitored for successful re-vegetation for a period of 3 years.

Category 3: Greater than 50 pCi/g Ra-226

Materials in this category at these bluffs will be excavated and placed in a designed disposal repository located at the Project area. In the case of exposed coal seams in the highwall that exceed these criteria, the seams will be covered or otherwise mitigated where technically feasible but not excavated. While the number of disposal sites will be limited, there may be more than one to allow for flexibility and efficiency in getting the material to a repository. Disturbed areas will be vegetated to achieve soil stability and prevent erosion as described above. Areas are to be monitored for successful re-vegetation for a period of 3 years.

Criteria 2: Material with no exceedances

The Forest Service has defined the following soil reclamation criteria that it has determined to be risk-protective and that will be applied to these bluffs. In areas at these bluffs where minimal overburden was historically present and vegetation has stabilized the soils so that no significant erosion is occurring, no reclamation will be required, if there are no Ra 226 exceedances. In areas where only the base rock is exposed, no reclamation will be required provided no substantial erosion is occurring and the area is acceptable based upon cleanup verification sampling. In those small areas where active erosion is occurring due to poor vegetation cover, appropriate stabilization efforts will be performed along with the establishment of a vegetative cover.

a. Address Identified Human Health and Environmental Threats

Regrading, stabilizing, and re-vegetation of spoil materials at the Project area will result in the development of a vegetative barrier between the human/environmental receptor and these materials, and will prevent migration of these materials from the Project area. Removal and isolation of acutely contaminated materials and mitigation of significantly contaminated materials is an appropriate response because it will stabilize soils and prevent sediment from migrating into the surface waters or coming into contact with or exposing human or environmental receptors to unacceptable risks.

Given the complex mineralogical make-up of the Riley Pass area and the corresponding background concentrations of certain metals and radioactive elements, the appropriate protective human health risk value for the area based on background arsenic conditions and scenarios described in the EE/CA, is 2×10^{-5}. The cleanup criteria selected by the Forest Service will result in a more protective post-reclamation risk level of 1 x 10-5.

A radium^{226} soil concentration of 30 pCi/g is protective to the 1×10^{-5} risk level for the most exposed individual described in the EE/CA (Permit Holder based on a 10% locally produced beef consumption scenario). Originally it was believed that when the radium^{226} soil concentration is 30 pCi/g, the corresponding arsenic concentration at Riley Pass is expected to be approximately 142 mg/kg (see Table 3- Bluff H data, below). Further site characterization work has shown that the radium226 and the Arsenic are not always directly related; therefore these two constituents must be measured separately in order to determine their levels. This arsenic concentration in soil conservatively results in an estimated risk to the Permit Holder of 1×10^{-5}.

Exposures of ecological receptors at the Project area will also be risk-protective with the implementation of the 30 pCi/g radium^{226} and the 142 mg/kg As concentrations soil cleanup. U.S. EPA recently published arsenic Eco-Soil Screening Levels (SSL) for protection of representative species of birds and mammals (March 2005). These SSLs support the selected criteria and cleanup levels. For birds the conservatively protective arsenic EcoSSLs range from 43 mg/kg (protective of an avian insectivore consuming all food from a confined area) to 1100 mg/kg for an avian carnivore. Similarly, for mammals, the range is 46 mg/kg for an insectivore confined to the area to 170 mg/kg for carnivores. The proposed action will result in average arsenic concentrations at or below 142 mg/kg in the most contaminated areas, and well below this concentration across the entire ecological exposure area.

b. Justification for Proposed Response

The USDA Forest Service has proposed a Project area response which is a combination of EE/CA alternatives 3 and 5. This response was selected for the various areas within the Project area because it reduces post-reclamation exposures and risks to levels that are well within the range defined by U.S. EPA as protective of human

health and the environment and provides the best combination of effectiveness, implementability, and cost as evaluated in the EE/CA.

Re-vegetation will be accomplished by using clean borrow to cover mine wastes and spoils, applying organics and fertilizer and seeding with an acceptable seed mix ensure continued stabilization of the Project area and protection to human health and the environment.

c. Technical Feasibility and Probable Effectiveness

The proposed actions will effectively reduce exposure levels as well as contaminant mobility at the Project area by establishing a barrier between materials with contaminants at concentrations above risk-protective levels (acutely or significantly contaminated materials) and the human/environmental receptor. The proposed actions for the various areas are technically and administratively feasible. The actions will reduce the human health risks to the $1X10^{-5}$ level which is protective under U.S EPA standards, and appropriate for this Project area given the fact that the natural background conditions (due to the complex mineralization of the area) constitute human health risks at a level greater than $1X10^{-6}$. Key project components such as equipment, materials, and construction expertise, although distant from the Project area, are available and would allow the timely implementation and successful execution of the alternatives.

Stabilizing and isolating contaminated soils and sediment will effectively eliminate pathways for human health risks such as inhalation/ingestion of contaminated soils and sediment, dermal contact with the contaminated material and gamma irradiation from direct exposure to the contaminated material. This action will require little maintenance and provide long-term effectiveness.

d. Further Information

No further information is needed to select the proposed action.

e. Verify Extent of Contamination

Final contours, visual observations, and field testing will be used to determine the completeness of the removal action. In particular, direct gamma measurements will be used to accurately quantify the radium^{226} concentrations. The direct gamma measurements will be accomplished by dividing the reclaimed areas into appropriate grids and by obtaining the average gamma reading for the individual grid cell to determine that the cleanup for that cell is met. This method will be used to direct the extent of the removal action since it is easily implemented in the field and allows for instant results. Because there is not a direct correlation between radium^{226} and arsenic concentrations, xray diffraction equipment will be used to verify arsenic concentrations using a grid system.

f. Sensitive Environments

Increased sedimentation may result during the implementation of the action at the Project area. These impacts can be mitigated by limiting the construction period to the drier months of the year and by implementing best management practices for storm water runoff. Since the Project area and surrounding locations are known to contain a high heritage site density, areas of new disturbance must be reviewed and approved by a Forest Service approved consultant or the Forest Archeologist prior to initiation of reclamation work.

g. Access

The FS has legal access into the North Cave Hills across the county Tufte and Johnson Roads. Access roads will be maintained during the construction season. Any temporary access roads will be reclaimed at the completion of construction. The Forest Service will seek an access agreement for any access across private property.

h. Uncertainties

Uncertainties associated with implementing these actions are limited to the uncertainty of knowing the exact volumes of the various categories of contaminated soils and sediment that will be addressed or isolated.

i. Institutional Controls

Following construction, a temporary 4-strand barbed wire fence may be constructed around the perimeter of reclaimed areas to protect against livestock and vehicle damage. The fencing will be removed once the area is re-vegetated.

Appropriate control measures will be instituted, such as recording a summary of the removal actions in land status documents and deed notices to notify potential users and possible future land purchasers of onsite hazards. These, and other control measures, will be reviewed and could be revised during future actions taken at the Riley Pass Uranium Mines site.

j. Off-Site Disposal

Off-site disposal was considered in the EE/CA, but was not brought forward for further evaluation since the contaminated materials are being disposed on-site and the benefits of transporting the material off-site would not justify the prohibitively high costs.

k. Post-Removal Site Controls

Post-removal site controls will be required. An operation, monitoring and maintenance plan will be prepared to define these controls. Post-removal site control at excavation and re-grading sites will involve monitoring to identify any problems with revegetation, drainage, or erosion.

l. Changes Resulting from Public Comments

Written comments were received on the final draft (June 2005) EE/CA from the EPA, South Dakota Department of Environmental & Natural Resources, South Dakota Game, Fish & Parks, Tronox, and other public and private entities. The comments and Forest Service responses are included in the Final EE/CA.

2. Short-Term Impacts

The major short-term impact to the closest community, residents, recreational users, and wildlife involves increased vehicle traffic and temporary delays to passage on various roadways surrounding the Project area. An increase in traffic will occur during mobilization and demobilization of construction equipment. Travel delays may also be necessary during removal and transport of contaminated material from various sediment retention areas within the Pete's Creek and Schleichart Draw drainages. Increased traffic may impact wildlife by either changing their daily migration patterns or exposing them to a higher potential for injury or death due to collisions with vehicles.

3. Contribution to Removal Performance

The selected Removal Action will likely be followed by other actions in the Riley Pass Uranium Mines Site area. This Removal Action will not mitigate all the mining impacts at the site. This source stabilization and removal will, however, address contributions from areas within the Project area. This includes sediment impacts to surface water, and, in combination with the sum of all response actions for the overall site, is expected to meet project goals, objectives, and ARARs to the extent practicable. In addition the proposed action will lower the risk to human health and the environment. The proposed action will not impede future responses based on available information.

4. Description of Alternative Technologies

General response actions potentially capable of achieving response action objectives and goals were screened in the EE/CA (Pioneer, 2006). These included no action, institutional controls, engineering controls, excavation and treatment, and in-situ treatment.

a. Institutional Controls

Institutional controls include land use and access restriction. Institutional controls by themselves will not prevent migration of the contaminants off-site through surface water,

or air. Therefore, institutional controls as a separate alternative were not considered by themselves in detail. However, institutional controls as components of other alternatives were considered.

b. Engineering Controls

Engineering controls limit the release or threat of release of hazardous substances generally by limiting mobility through isolation, and/or by limiting physical processes necessary for mobility. These measures included removal, containment, chemical fixation, and surface controls. All of these measures were incorporated into the alternatives considered for this Project area.

c. Waste Disposal

Waste disposal options are used as a source control measure by placing contaminated media in an engineered repository. The EE/CA evaluated excavation of the contaminated soils and sediment for disposal in an on site engineered repository. However, due to the remoteness of the site and the large volumes of material in question, the EE/CA did not evaluate the excavation of the contaminated material for transport and placement in an off-site engineered repository.

d. Miscellaneous Alternatives

No evaluation was conducted for technologies that directly address surface water because water treatment technologies are beyond the scope of this phase of the response action. The removal of solid wastes from contact with the environment makes it likely that a reduction in contaminant concentrations will occur in surface water and streambed sediments.

Various response actions and technology types were evaluated but rejected due to a variety of reasons including uncertainties in effectiveness and high cost. These response actions included onsite reprocessing of the material to extract residual mineralization. The concentrate generated by reprocessing would be shipped offsite for processing, while byproducts of reprocessing would be consolidated and placed in an onsite repository, amended, if necessary, and revegetated.

5. Engineering Evaluation/ Cost Analysis (EE/CA)

Pioneer Technical, on contract to the Forest Service, prepared the final EE/CA that details site characteristics and identifies, develops, and evaluates alternatives. This undertaking was accomplished with substantial input from Forest Service specialists who analyzed the effects of the alternatives identified in the EE/CA and considered public comments. From this effort the Forest Service was able to select the preferred alternative.

6. Applicable or Relevant and Appropriate Requirements (ARARs)

Section 300.415(i) of the National Contingency Plan (NCP) and guidance issued by the Environmental Protection Agency (EPA) require that removal actions attain ARARs under federal or state environmental laws or facility siting laws, to the extent practicable considering the urgency of the situation and the scope of the removal (EPA, 1993). In addition to ARARs, the lead Agency may identify other federal or state advisories, criteria, or guidance to be considered for a particular release.

ARARs are categorized as either applicable or relevant and appropriate. Applicable requirements are those standards, requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, or contaminant found at a site. Relevant and appropriate requirements are those standards, requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that are not applicable to a particular situation but apply to similar problems or situations, and therefore may be requirements for a response action to address.

The following tables identify those ARARs that were evaluated during the development of the EE/CA, and present the Forest Service's final determination of ARARs for the proposed action.

During preparation of this Action Memorandum, the Forest Service identified certain typographical errors in the ARARs tables contained in the Final EE/CA. All identified errors have been corrected in the tables below. The Forest Service reviewed the evaluation of alternatives in the EE/CA relative to ARARs and has determined that the evaluation and selection of the preferred alternatives is consistent with the final ARARs presented below.

FEDERAL ARARs FOR THE RILEY PASS PROJECT

FEDERAL- CHEMICAL SPECIFIC

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status
Ambient Water Quality Criteria	40 CFR Part 131 Quality Criteria for Water 1976,1980, 1986	Sets criteria for water quality based on toxicity to aquatic organisms and human health.	Not an ARAR for the actions being considered for this project
Soils Cleanup	40 CFR Part	This citing sets guidelines for the cleanup of	Not an

Criteria	192 Subpart B	sites that were used to process Uranium ores and as a result generated mill tailings that contain radio-nuclides. The actions proposed for this Project area are based on site-specific risk based clean up goals.	ARAR for the actions being considered for this project
Exposure Limits for Radioactive Wastes	40 CFR Part 190 (10 CFR 20.1301)	Sets radiation exposure limits to the public	Relevant and Appropriate

FEDERAL- LOCATION SPECIFIC

Standard, Requirement Criteria Or Limitation	**Citation**	**Description**	**ARAR Status**
National Historic Preservation Act	16 USC § 470; 36 CFR Part 800; 40 CFR 6.310(b)	Requires Federal Agencies to take into account the effect of any Federally-assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places and to minimize harm to any National Historic Landmark adversely or directly affected by an undertaking.	Applicable
Archaeological and Historic Preservation Act	16 USC § 469; 40 CFR § 6.301(c)	Establishes procedures to provide for preservation of historical and archaeological data, which might be destroyed through alteration of terrain, as a result of a Federal construction project or a Federally licensed activity or program.	Applicable
Historic Sites, Buildings and Antiquities Act ***Appendix A, Executive Order No. 11, 990***	16 USC §§ 461-467; 40 CFR § 6.301(a)	Requires Federal agencies to consider the existence and location of landmarks on the National Registry of Natural Landmarks to avoid undesirable impacts on such landmarks.	Applicable
Protection of Wetlands Order	40 CFR Part 6, Appendix A, Executive Order No. 11,990	Avoid adverse impacts associated with destruction or loss of wetlands and avoid support of new construction in wetlands if a practicable alternative exists.	Applicable

Fish and Wildlife Coordination Act	16 USC §§ 2901-2912; 40 CFR Part 6.302(g)	Requires consultation when Federal department or agency proposes or authorizes any modification of any stream or other water body and adequate provision for protection of fish and wildlife resources.	Applicable
Floodplain Management Order	40 CFR Part 6	Requires Federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid the adverse impacts associated with direct development of a floodplain. (Only substantive portions are applicable to on-site actions)	Applicable
Endangered Species Act	16 USC §§ 1531-1543; 40 CFR 6.302(h); 50 CFR Part 402	Activities may not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify a critical habitat.	Applicable
Migratory Bird Treaty Act	16 USC §§ 703	Establishes a federal responsibility for the protection for the international migratory bird resource and requires consultation with the USFWS during reclamation design and reclamation construction to ensure the cleanup of the Project area does not unnecessarily impact migratory birds. Specific mitigation measures may be identified for compliance with this requirement. (Only substantive portions are applicable to on-site actions)	Applicable
Resource Conservation and Recovery Act Criteria for Classification of Solid Waste Disposal Facilities and Practices	40 CFR Part 257	Establishes performance criteria for solid waste disposal facilities and practices to avoid adverse effects on health or the environment	Relevant and Appropriate (For issues pertaining to the design and construction of a suitable repository)

FEDERAL- ACTION SPECIFIC

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status
Clean Water Act National Pollutant Discharge Elimination System (NPDES)	40 CFR Part 122.26	Requires permits for the discharge of pollutants from any point source into waters of the United States. The State of South Dakota has been delegated authority to implement the Clean water Act and enforces these through the Surface Water Discharge System. Sites under CERCLA are required to meet the substantive requirements of the permit but do not have to obtain an actual permit	This is not an ARAR for the actions being taken at this Project area because the action will not cause a point source discharge.
Hazardous Materials Transportation Act Standards Pertaining to Transporters of Hazardous Waste	49 CFR Parts 106-180	Regulates the transport of hazardous waste by rail, aircraft, vessel, or public highways. This includes metals that are listed under CERCLA.	Relevant and Appropriate (If work utilizes State or County highways)
Resource Conservation and Recovery Act Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities	40 CFR Parts 264.116 through 264.310	Establishes minimum national standards that define the acceptable management of hazardous waste for owners and operators of facilities that treat, store, or dispose of hazardous waste. Because of the Bevill Amendment for mine wastes these regulations can not be considered applicable and only substantive portions of the regulations are relevant and appropriate to on-site actions)	Relevant and Appropriate (For issues pertaining to the design and construction of a suitable repository)

STATE ARARs FOR THE RILEY PASS PROJECT

STATE CONTAMINANT SPECIFIC

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
Drinking Water Standards	ARSD 74:04:05	Established the MCLs for public water systems. These standards are not applicable because they apply to community water supply systems.	(See Note# 1 below)
Regulated Substances	ARSD 74:34:01:02	Prohibits the un-permitted release of regulated substances to the environment. No person may discharge to the environment a regulated substance listed in § 74:34:01:03 except pursuant to and in compliance with the conditions of a federal or state permit or by activities allowed by federal or state law or rule. The mixture of a listed regulated substance with a non-regulated substance subjects the mixture to full regulation under this chapter.	(See Note# 1 below)
Ambient Air Quality Standards	ARSD 74:36:02:01	Establishes air quality guidelines.	Relevant and Appropriate

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
	ARSD 74:36:02:02	Establishes ambient air quality standards. South Dakota has adopted the ambient air quality standards listed in 40 C.F.R. §§ 50.1 to 50.12, inclusive (July 1, 1997), except as revised in publication 62 Fed. Reg. 38711 to 38712 and 38894 to 38895 (July 18, 1997). They define the types and levels of air pollution above which the ambient air would limit the attainment of the goals specified in § 74:36:02:01. These standards apply to the entire state of South Dakota, and no person may cause these standards to be exceeded. The standards stated in 40 C.F.R. §§ 50.1 to 50.12, inclusive (July 1, 1997), except as revised in publication 62 Fed. Reg. 38711 to 38712 and 38894 to 38895 (July 18, 1997), include normal background levels of air pollutants.	Relevant and Appropriate
Surface Water Quality Standards	ARSD 74:51:01	Establishes water quality standards for surface water in the state of South Dakota.	
	ARSD 74:51:01:02	Requires compliance with the criteria of a designated beneficial use. A person may not discharge or cause to be discharged into surface waters of the state pollutants that cause the receiving water to fail to meet the criteria for its designated beneficial use or uses.	(See Note# 1 below)
	ARSD 74:51:01:05	Prohibits materials causing pollutants to form in waters. Wastes discharged into surface waters of the state may not contain a parameter that violates the criterion for the waters' existing or designated beneficial use or impairs the aquatic community as it naturally occurs. Where the interaction of materials in the wastes and the waters causes the existence of such a parameter, the material is considered a pollutant and the discharge of such pollutants may not cause the criterion for this parameter to be violated or cause impairment to the aquatic community.	(See Note# 1 below)

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
	ARSD 74:51:01:06	Prohibits visible pollutants. Raw or treated sewage, garbage, rubble, un-permitted fill materials, municipal wastes, industrial wastes, or agricultural wastes which produce floating solids, scum, oil slicks, material discoloration, visible gassing, sludge deposits, sediments, slimes, algal blooms, fungus growth, or other offensive effects may not be discharged or caused to be discharged in surface waters of the state.	(See Note# 1 below)
	ARSD 74:51:01:07	Establishes that no materials may be discharged or caused to be discharged which affect the pH of the receiving waters by more than 0.5 pH units. This does not apply to pH fluctuations of more than 0.5 pH units attributable to natural influences.	(See Note# 1 below)
	ARSD 74:51:01:08	Prohibits taste- and odor-producing materials. Materials which will impart undesirable tastes or undesirable odors to the receiving water may not be discharged or caused to be discharged into surface waters of the state in concentrations that impair a beneficial use.	(See Note# 1 below)
	ARSD 74:51:01:11	Establishes for the protection of wetlands as surface waters of the state. The discharge of pollutants from any source, including indiscriminate use of fill material, may not cause destruction or impairment of wetlands	(See Note# 1 below)
	ARSD 74:51:01:12	Establishes criteria for the biological integrity of surface waters of the state. All waters of the state must be free from substances, whether attributable to human-induced point source discharges or non-point source activities, in concentrations or combinations which will adversely impact the structure and function of indigenous or intentionally introduced aquatic communities.	(See Note# 1 below)

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
	ARSD 74: 51:01:14	Establishes allowable concentrations of radioactive iodine, radium, strontium, and tritium. The average dissolved concentrations including the naturally occurring or background concentrations of iodine-131, radium-226, strontium-89, strontium-90, and tritium may not exceed the following concentration limits: iodine-131, 5 pCi/L; radium-226, 5 pCi/L; strontium-89, 100 pCi/L; strontium-90, 10 pCi/L; and tritium, 300 pCi/L.	(See Note# 1 below)
	ARSD 74:51:01:15	Establishes allowable concentrations of miscellaneous radionuclides. For all radio nuclides not listed in § 74:51:01:14, the average dissolved concentration limits in surface waters of the state are 1/150 of the corresponding maximum permissible concentration in water for continuous occupational exposure for a 168-hour week as contained in pages 24 to 91, inclusive, of Handbook 69.	(See Note# 1 below)

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
	ARSD 74:51:01:16	Establishes that where there is a mixture of dissolved radionuclides in surface waters of the state, the following relationship must be satisfied: $\frac{C}{L} + \frac{C}{L} + \ldots + \frac{C}{L} = 1.00$ With C denoting the average concentration or the respective radionuclide and L denoting its concentration limit established in § 74:51:01:14 or 74:51:01:15.	(See Note# 1 below)
	ARSD 74:51:01:18	Establishes criteria for suspended radionuclides. For radionuclides associated with suspended materials in the water, the average concentration limits are 1/150 of the corresponding maximum permissible concentration in water (insoluble form) for continuous occupational exposure for a 168-hour week as contained in pages 24 to 91, inclusive, of Handbook 69. In stream sedimentation of those materials may not produce solids beds and result in noncompliance, because of leaching, with the provisions of § 74:51:01:14, 74:51:01:15, or 74:51:01:16.	(See Note# 1 below)
	ARSD 74:51:01:19	Establishes that the maximum concentration for any one sample may not exceed three times the average concentration limits of radio nuclides specified in §§ 74:51:01:14 to 74:51:01:18, inclusive.	(See Note# 1 below)
	ARSD 74:51:01:34	Establishes the anti-degradation policy for surface waters of the state.	(See Note# 1 below)
	ARSD 74:51:01:38	Establishes policy for anti-degradation of water quality reviews for non-point source	(See Note# 1 below)

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
		discharges to surface waters of the state. Non-point sources shall be reviewed as feasible by the board Non-point source discharges shall be controlled utilizing cost-effective methods and reasonable best management practices.	
	ARSD 74:51:01:42	Establishes the beneficial uses of surface waters of the state. The beneficial use classification of surface waters of the state established in this section are not to be construed as limiting the actual use of such waters. The classification designate the minimum quality at which the surface waters of the state are to be maintained and protected.	(See Note# 1 below) .
	ARSD 74:51:01:52	Establishes criteria for wildlife propagation and stock watering waters.	(See Note# 1 below)
	ARSD 74:51:01:55	Establishes toxic pollutant criteria. Toxic pollutants at levels which are or may become injurious to public health, safety, or welfare; plant, aquatic, and animal life; or the existing or designated uses of waters may not be present in the surface waters of the state. The toxic pollutants to which this section applies are the priority pollutants and chemicals in 40 C.F.R. Part 131 (July 1, 1995) and any other toxic pollutants or substances determined by the secretary to be of concern at a specific site. Appendix B at the end of this chapter lists the priority pollutants and chemicals for which specific numerical criteria have been adopted by the board. The limits at the site are based on risk based values and may over shadow set levels. However the citation gives guidance for the issue	(See Note# 1 below)
Uses Assigned to Streams	ARSD 74:51:03	Establishes the uses assigned to streams in the state.	

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
	ARSD 74:51:03:01	Establishes that the beneficial uses of South Dakota streams include irrigation and wildlife propagation and stock watering. All streams in South Dakota are assigned the beneficial use of irrigation and wildlife propagation and stock watering.	(See Note# 1 below) .
Groundwater Quality Standards	ARSD 74:54:01	Establishes the maximum concentration limits for groundwater in the state of South Dakota.	
	ARSD 74:54:01:04	Establishes standards for groundwater of 10,000 mg/L TDS concentration or less.	This ARAR is outside the scope of this removal action so it will not be dealt with during this action.
	ARSD 74:54:01:05	(Applicable) specifies that groundwater shall not contain potential toxic pollutants. Potential toxic pollutants must be non-detectable in groundwater at detection limits of the currently acceptable sampling and analytical techniques as approved by the secretary in § 74:03:15:05 until a maximum contaminant level (MCL) is set by the EPA.	This ARAR is outside the scope of this removal action so it will not be dealt with during this action.

Note# 1- South Dakota has designated uses (wildlife and livestock watering) and as such establishes certain water standards for Schleichart Draw and Pete's Creek. Consolidating and capping waste material at the Project area will reduce storm-related non-point source loading to these tributaries. However, achieving designated uses and stream standards are likely beyond the scope of this source control removal action. Furthermore construction-related impacts will be minimized to the extent practicable

STATE- LOCATION SPECIFIC

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
Wetlands as Surface Waters	ARSD 74:51:01:11	Established for the protection of wetlands as surface waters of the state. The discharge of pollutants from any source, including indiscriminate use of fill material, may not cause destruction or impairment of wetlands	(See Note# 1 below)

STATE- ACTION SPECIFIC

Standard, Requirement Criteria Or Limitation	Citation	Description	ARAR Status for the Riley Pass Project
Mined Land Reclamation	SDCL 45-6B-37	Final grading requirements.	Relevant and Appropriate
	SDCL 45-6B-39	In those areas where revegetation is part of the reclamation plan, land shall be revegetated in such a way as agreed upon by the operator, the local conservation district and the landowner which establishes a diverse, effective and long-lasting vegetative cover that is capable of self-regeneration and at least equal in extent of cover to the natural vegetation of the surrounding area.	Relevant and Appropriate
	SDCL 45-6B-40	Requirements for the removal and handling of topsoil.	Relevant and Appropriate
	SDCL 45-6B-41	Reclamation operations must be planned and conducted to minimize disturbance to the prevailing hydrologic balance and to prevent material damage to the prevailing hydrologic balance.	Relevant and Appropriate
	SDCL 45-6B-42	Protection from slides subsidence or damage and control of high walls.	Relevant and Appropriate
	SDCL 45-6B-43	All surface areas shall be stabilized and protected to effectively control erosion and air and water pollution.	Relevant and Appropriate
	SDCL 45-6B-44	Establishes requirements for the proposed reclamation plan, including copies to adjacent landowners, approval of the plan, consultation with the landowner and local authorities and the reclamation of all affected land	Relevant and Appropriate
Solid Wastes	ARSD 74:27:15:03	This Criteria sets standards that all solid waste disposal sites must meet. These	This is not an ARAR for the

		requirements apply to any person involved in any aspect of the management of solid waste and rubble sites, including recycling, processing transporting, storing, or disposing of solid waste.	Project area

Reclamation of Tailings Which Cannot Meet Treatment Standards	ARSD 74:29:05:12	Establishes criteria for the reclamation of tailings which cannot meet treatment standards. Tailings which have been treated and cannot meet the criteria established in § 74:29:05:08 or which cannot feasibly be treated shall be reclaimed so that infiltration into, percolation through, and discharge from such tailings are minimized. Discharges from tailings must comply with the provisions of a groundwater discharge plan pursuant to chapter 74:54:02 or a surface water discharge permit pursuant to chapter 74:54:01, as applicable. The reclamation plan for such tailings disposal sites and tailings disposal practices shall be based on a detailed pathway and fate analysis augmented by engineering plans and specifications and monitoring data. Revegetation must comply with the general reclamation requirements of § 74:29:07:06.	This is not an ARAR for the Project area
Minimum Reclamation Requirements	ARSD 74:29:07:01	Establishes the general requirements for all reclamation types.	Relevant and Appropriate
	ARSD 74:29:07:03, and 04	Gives general backfilling, and grading requirements.	Relevant and Appropriate
	ARSD 74:29:07:06	Specifications for the vegetative cover and performance are provided.	Relevant and Appropriate
	ARSD 74:29:07:07	Establishes the requirements for topsoil management during mining activities in addition to SDCL 45-6B-40.	Relevant and Appropriate
	ARSD 74:29:07:08	Reclamation operations must be planned and conducted to minimize disturbance to the prevailing hydrologic balance and to prevent material damage to the prevailing hydrologic balance.	Relevant and Appropriate
	ARSD 74:29:07:18	Establishes the requirements for specific types of reclamation.	Relevant and Appropriate
	ARSD 74:29:07:20	Rangeland planting requirements.	Relevant and Appropriate
	ARSD 74:29:07:22	Post mining wildlife requirements.	Relevant and Appropriate
	ARSD 74:29:07:23	Post mining reclamation requirements.	Relevant and Appropriate

	ARSD 74:29:07:27	Post mining permanent surface impoundment.	Relevant and Appropriate

7. Project Schedule

Implementation of the proposed action will begin immediately following execution of this Action Memorandum. Construction is expected to begin in summer, 2010. Completion of the construction activities required to implement the proposed action will require at least four years to complete, depending upon available funding.

8. References

Pioneer Technical, 2006. Final Engineering Evaluation/Cost Analysis (EE/CA), Riley Pass Uranium Mines, Harding County, South Dakota. Prepared for the U.S.D.A.-Forest Service, October, 2006.

Portage Environmental Incorporated, 2006. Final Human Health and Ecological Risk Assessment, Riley Pass Uranium Mines, South Dakota. Prepared for U.S.D.A Forest Service, May, 2006.

EPA, 1993. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. EPA/540-R-93-057. Office of Emergency and Remedial Response. Washington D.C.

EPA, 2005 Ecological Soil Screening Levels for Arsenic Interim Final OSWER Directive 9285.7-62, March 2005.

USFS, 1964. U. S. Department of Agriculture, Forest Service Northern Region, April 1964, Impact Report Surface Mining Activity in Custer National Forest South Dakota.

USFS, 2006 Community Involvement Plan, Riley Pass Abandoned Uranium Mines, Sioux Ranger Dist, Custer National Forest, April 2006.

B. Estimated Costs

The preliminary estimated cost to implement this action is $3,211,000. The total cost of the Removal Action, including design, construction oversight, and post-removal site control is estimated at $ 4.2 million.

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

If no action is taken to stabilize and isolate acutely contaminated materials and to eliminate surface exposures of wastes with concentrations of contaminants the Forest Service has determined exceed risk-protective levels from water, contaminated sediment from the Project area will continue to impact the surrounding drainages. This situation along with the continued exposure of human and environmental receptors to these materials will continue to present an unacceptable risk to human and ecological receptors.

VII. OUTSTANDING POLICY ISSUES

None

VIII. ENFORCEMENT

Although the USDA Forest Service specifically denies any liability in this situation, it will be the "lead agency" for all response actions occurring on National Forest System Lands, as defined by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR part 300, and all response actions will be undertaken in a manner not inconsistent with the NCP.

IX. APPROVAL

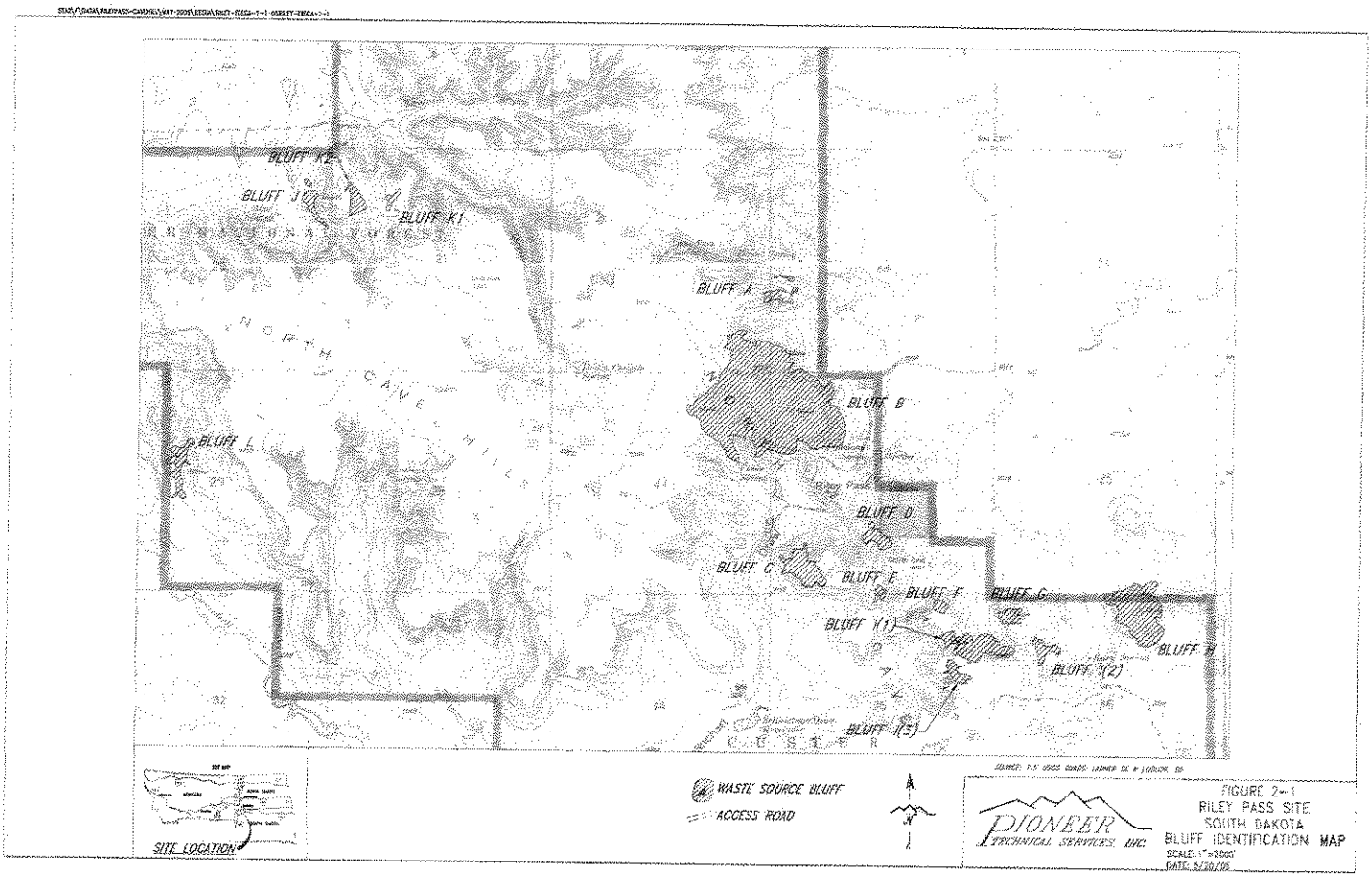
This decision document represents the selected Removal Action for the Riley Pass Uranium Mines project for Bluffs A, F, I, J and K within the Custer National Forest, Harding County, South Dakota, developed in accordance with CERCLA as amended, and consistent with the NCP. This decision is based upon the administrative record for the Project area.

Conditions at the Riley Pass Uranium Mines project for Bluffs A, F, I, J and K meet the NCP Section 300.415(b)(2) criteria for a Removal, and I recommend your approval of the Removal Action:

Mary Beth Marks
On-Scene-Coordinator

4/27/2010
Date

ATTACHMENT 1 – Bluff Identification Map



I concur with the recommendation to implement the proposed action as described in this Action Memorandum for the Riley Pass Uranium Mines project for Bluffs A, F, I, J and K:

Kurt Hansen — 4-28-10

Kurt Hansen
District Ranger
Sioux Ranger District

Date

I concur with the recommendations to implement the proposed action as described in this Action Memorandum for the Riley Pass Uranium Mines project for Bluffs A, F, I, J and K:

Mary Erickson — 4/28/10

Mary Erickson
Acting Forest Supervisor
Custer National Forest

Date

I concur with the recommendation to implement the proposed action as described in this Action Memorandum for the Riley Pass Uranium Mines project for Bluffs A, F, I, J and K:

Bob Kirkpatrick — 5/4/2010

Bob Kirkpatrick
Regional CERCLA Coordinator
USDA-FS Northern Regional Office

Date

I approve of the proposed removal action as outlined in the Action Memorandum and attached Engineering Evaluation/Cost Analysis for the Riley Pass Uranium Mines project for Bluffs A, F, I, J and K Harding County, South Dakota.

Leslie A C Weldon — 5/6/10

Leslie Weldon
Regional Forester

Date