

**ACTION MEMORANDUM**

**RILEY PASS URANIUM MINES SITE  
REMOVAL ACTION**

within the  
**NORTH CAVE HILLS LAND UNIT**

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

**February, 2007**

## ACTION MEMORANDUM

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## 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 B, C, D, E, G, and H, as well as associated retention ponds within the Riley Pass Uranium Mines site, located on the Custer National Forest, in Harding County, South Dakota. These areas (subsequently referred to as the Project area), which comprises a portion of the larger Riley Pass Uranium Mines site, are defined in the Riley Pass Abandoned Uranium Mines Final Engineering Evaluation and Cost Analysis (EE/CA) (the Final EE/CA). A map showing these areas is provided as Attachment 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, molybdenum, thorium, uranium, and radium<sup>226</sup> 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 Bluffs and features (identified above) for which a responsible party has been identified [Tronox Worldwide, LLC (Tronox), a corporate successor to Kermac Nuclear Fuels]. As described in Section VIII of this Action Memorandum, Tronox will conduct the proposed actions set forth in this Action Memorandum under a settlement agreement with the U.S.D.A Forest Service.

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 and is attached to this memorandum as supporting documentation (Attachment 2). 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**

This 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 this Action Memorandum has been provided as Attachment 3. This attachment also provides, as appropriate, clarification of how these terms overlap and relate to one another.

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. The mines addressed in this Action Memorandum were operated by Kermac Nuclear Fuels Corporation and cover approximately 200 acres of highwalls, pit floor, and spoils. For purposes of identification, the acreage is broken into six individual bluffs. These bluffs are described below (see enclosed figure). 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 B**

Bluff B encompasses approximately 150 acres of spoils piles (overburden), highwalls,

and open pits. Bluff B has an estimated spoils volume of 1,140,000 cubic yards. Approximately 65,600 cubic yards of acutely contaminated material (primarily in lignite-bearing spoil piles) exist on Bluff B. Riley Pass, a significant historic pioneer wagon route during the 1890s, is approximately 500 feet north of the Project area.

The waste materials (spoils/overburden) have been a major source of sedimentation to Pete's Creek to the east of Bluff B and Schleicht Draw to the southeast. A majority of the bluff is either barren or sparsely vegetated and shows signs of severe wind and surface water erosion. Sediment from the east half of the Project area is currently being carried approximately .75 mile and deposited on the main access road to Riley Pass and the adjoining private property. Sediment basins have been installed and maintained by the USFS in Upper Pete's Creek and Schleicht Draw. However, due to the amount of sediment eroding from the Project area, frequent maintenance of the basins is required.

Due to the predominant soil type present, sandy clay and silty clay, soil piping and tunneling with occasional sink holes are present. Piping and large gullies are most prevalent in areas where the overburden was placed along or below the rim-rocks. Some of the pipes that have formed are 10 to 15 feet in diameter, and gullies up to 25 feet in depth have formed in places subject to concentrated surface water flow.

The mined pit floors are generally at or near bedrock. Some spoils have been placed along the edges that eroded to the land below Bluff B. Small, shallow ponds have formed in some of the areas creating small retention basins, which during snowmelt and small storm events assist in controlling some of the surface water erosion. Water from these ponds most likely evaporates or seeps through the bedrock during the summer months.

The analytical results for soil samples collected from Bluff B during a sampling investigation that occurred in 1999 show concentrations greater than three times background for radium<sup>226</sup> and uranium<sup>235</sup>.

### **Bluff C**

Bluff C encompasses approximately 10 acres with good vegetative cover of the spoils piles and exposed bedrock. This bluff is approximately 4,257 feet south, southeast of Bluff B. Spoils piles and berms are small in nature and are scattered throughout the Project area. Based on visual estimation, there is approximately 600 cubic yards of spoils materials present at Bluff C. There are no signs of active erosion from the berms or spoil piles and existing vegetation cover at the Project area is approximately 85 to 90%.

The analytical results for soil samples collected during the 1999 Project area investigation from Bluff C show concentrations greater than three times background for arsenic, molybdenum, thorium, uranium<sup>223</sup>, and uranium<sup>235</sup>. The samples were taken along the toe of the southwest berms and spoils piles.

### Bluff D

Bluff D encompasses approximately 5.2 acres, with good vegetative cover of the spoils piles and berms. Bluff D is approximately 4,157 feet southeast of Bluff B. There are some areas of exposed bedrock located within the Project area. There are no active signs of erosion from the berms or spoil piles. Vegetation cover at the Project area is approximately 85 to 90%. There are small areas of naturally exposed bedrock in locations that have not been disturbed by mining activities.

The analytical results for soil samples collected during the 1999 Site investigation from Bluff D show concentrations greater than three times background of arsenic, molybdenum, uranium, radium<sup>226</sup>, and uranium<sup>235</sup>. Locations of materials with elevated concentrations of these contaminants include the bedrock/un-vegetated areas located on the northeast side of the bluff.

### Bluff E

Bluff E encompasses approximately two acres, with good vegetative cover of the spoils piles and berms. Bluff E is approximately 5,355 feet southeast of Bluff B. There are some areas of exposed bedrock located within the. There are no signs of erosion from the berms or spoils piles and vegetation cover at the Project area is approximately 90 to 95%.

The analytical results for soil samples collected during the 1999 site investigation from Bluff E showed concentrations greater than three times background of radium<sup>226</sup> and uranium<sup>235</sup>. The samples were taken on the southeast and west sides of the bluff.

### Bluff G

Bluff G encompasses approximately five acres, of which approximately two acres consist of exposed bedrock. This bluff is approximately 7,698 feet southeast of Bluff B. There are also several bare and eroding steep (1.5H:1V) slopes, where the materials have been pushed off the rimrock. Sampling results indicated one acutely contaminated area has been left on top of the bluff. The greater portion (approximately 90%) of the top of the bluff has been excavated down to bedrock with very little vegetation present. On some of the less steep slopes, vegetation is present with approximately 40 to 60% vegetative cover. The southwest steep slope appears to be very difficult to regrade due to excessive steepness and limited access to the slope. Equipment access to the bluff would be difficult and would entail traveling through Bluffs I<sub>1</sub> and I<sub>2</sub> and then traveling across a small saddle that has been filled in with waste materials. This is the only bluff where access is an issue. Currently, the materials in the saddle are sparsely vegetated and there are no signs of erosion.

The largest spoils pile is located below the rimrock on the southwest side of the bluff. It



encompasses approximately one acre with extremely steep side slopes (1.5H:1V), very little vegetation, and severe erosion gullies and rills present on the face of the slope. Spoils material volume is estimated to be approximately 46,000 cubic yards. A smaller, more vegetated spoils pile (approximately 40 to 60% vegetation cover) is located along and below the rimrock on the southeast side of the bluff, it encompasses approximately half an acre, with an estimated volume of approximately 23,400 cubic yards.

There are several berms/spoils piles along the north and east side of the bluff. Surface erosion is localized to two areas on the berms/spoils piles on the north side of the bluff. An area of acutely contaminated materials located within the spoils pile on the east side. The volume of this material is estimated to be approximately 300 cubic yards.

Additionally, a small spoils pile is located in a saddle between Bluffs I<sub>1</sub> and G. While the mining was taking place, these materials were used as road construction material between the bluffs and covers approximately half an acre with an estimated volume of approximately 550 cubic yards. The spoils material is poorly vegetated, but is moderately stable, showing very little surface erosion.

The analytical results for soil samples collected during the 1999 site investigation from Bluff G show concentrations more than three times background for arsenic, molybdenum, uranium, radium<sup>226</sup>, and uranium<sup>235</sup>.

## **Bluff H**

Bluff H encompasses approximately 30 acres. Bluff H is approximately 10,274 feet southeast of Bluff B. The Project area consists of several spoils piles (approximately 553,850 cubic yards) that have been placed along and over the rimrock edges. These slopes are generally very steep (1.5H:1V) and show signs of severe water erosion, especially on the northwest and northeast spoils piles. Vegetation growth on the side slopes is very limited (<10% cover). There is a pit area with unstable highwalls on the southwest portion of the Project area.

A portion of the spoils piles on the north and northeast side of the bluff is currently located on private property. A spoils pile of approximately 1.1 acres in size with an estimated volume of 54,350 cubic yards is located on the northwest corner of the bluff. The slope is extremely steep (1.5H:1V) and barren of vegetation. There is one large erosion gully located on the south portion of the spoils pile. Water and sediment from this gully flow into an intermittent dry draw/drainage. However, some of the sediments are being deposited on private property located adjacent to Bluff H.

The spoils pile located on the northeast end of the bluff is moderately vegetated. There are erosion gullies and rills that are transporting sediment onto private property and into an intermittently dry draw/drainage. Approximately one third of this spoils pile is currently situated on private property. A large spoils pile located on the west side of bluff encompasses approximately three acres, with an estimated volume of 340,150 cubic yards. The spoils are sparsely vegetated with numerous erosion gullies and rills. One large erosion gully (approximately 12 feet in depth) is located on the south end of



the spoils pile, and drains into an intermittent dry draw/drainage.

A spoils pile containing approximately 159,340 cubic yards of spoils, and encompassing approximately 4 acres is located on the south end of the bluff. This spoils pile is moderately vegetated with limited signs of surface erosion.

The analytical results for soil samples collected from Bluff H during the 1999 site investigation show concentrations greater than three times background of arsenic, molybdenum, uranium, radium<sup>226</sup>, and uranium<sup>235</sup>. Radiation surveys identified an area of acutely contaminated material (estimated at 22,000 cubic yards) in the western portion of this Bluff.

## **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.

## **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 primarily administers the area, but a small fraction of the Project area is also situated on private land. 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.

Schleichart Draw Reservoir was constructed as a stock water dam and unrelated to the abandoned uranium mines, as was the Schleichart Draw Ducks Unlimited Pond located below Schleichart Draw Reservoir. Sediments from the mines, mainly Bluff B, have been transported to the reservoir. Bluff B is approximately 1.25 miles away from Schleichart Draw Reservoir and approximately 1.5 miles away from the Schleichart Draw Ducks Unlimited Pond. Schleichart Draw Reservoir was reported to have been a trout pond for a number of years prior to mining.

### **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<sup>226</sup> 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<sup>226</sup> 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 two 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:

- 1965-The Forest Service moved a segment of the Riley Pass road that was being buried by overburden from Bluff B.
- 1973-After negotiations with Kerr McGee (predecessor to Tronox), the company constructed flow control dikes and diversion ditches at Bluff B. In addition, another portion of the Riley Pass road was relocated.
- 1989-The Forest Service constructed five sediment retaining ponds to trap sediment eroding from Bluffs A and B.
- 1990-The Forest Service had sediment removed from two of the five sediment retaining ponds.
- 1991-Denver Knight Pièsold of Denver, Colorado, was retained by the Forest Service to evaluate existing conditions, develop plausible response action alternatives and provide a cost estimate for each alternative. Denver Knight Pièsold's investigation was limited to Bluff B. The 1990 and 1991 investigation included surface water quality analyses and radiological measurements.
- 1996-The Forest Service sent Kerr McGee Corporation (predecessor to Tronox) a CERCLA 104 (e) letter notifying them of potential liability under CERCLA. The Forest Service conducted a time critical removal action to remove sediment from the sediment retaining ponds.
- 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 Project area.
- 2004-The Forest Service retained Portage Environmental Incorporated to gather additional samples and information to produce a comprehensive Human Health and Environmental Risk Assessment. In addition, the Forest Service conducted a time-critical removal action to remove sediment from the sediment retaining ponds.
- 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.

In January of 2006 Tronox was sent a formal demand for reimbursement of costs incurred by the Forest Service for all actions taken to date at the Project area. Negotiations with Tronox were conducted to reach a settlement agreement under which the proposed actions in this Action Memorandum will be conducted by Tronox. Tronox voluntarily performed the installation of preliminary re-vegetation test plots on Bluff B. A Responsiveness Summary to public comments received was prepared, and a Final EE/CA incorporating a revised final risk assessment was prepared and released.

To date The Forest Service has expended over \$637,464 for response actions taken at the Riley Pass Uranium Mines site to address those bluffs and features addressed by this Action Memorandum.



## **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 Project area 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 Schleicht 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  $1 \times 10^{-4}$  (1 in 10,000)]. The risk assessment determined that the risk levels for maximally exposed individuals could potentially be as high as  $3 \times 10^{-3}$ . 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  $1 \times 10^{-6}$  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 Schleicht 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 Schleicht 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 Project area, while acute aquatic life water standards for copper are exceeded in all water sources at the Project area, including Schleicht 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.

INDIVIDUAL BLUFF	PREFERRED ALTERNATIVE	ESTIMATED COST*
Bluff B	Alternative 5	\$12,943,004.00
Bluff C	Alternative 3	\$409,734.00
Bluff D	Alternative 3	\$494,099.00
Bluff E	Alternative 3	\$454,222.00
Bluff G	Alternative 5	\$730,150.00 - \$1,217,060.00
Bluff H	Alternative 5	\$2,070,587.00

\* The estimated cost for reclamation of bluffs are preliminary and may vary as the Removal Action progresses

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