

4.4.2.3 Alternative 2 – No Action

The No Action Alternative would preclude disturbance of the vegetation community and soils on North Rasmussen Ridge and minimize future effects on the Sheep Creek and Angus Creek subwatersheds. However, mining would continue at the Central Rasmussen Ridge Mine until ore was exhausted. The final portion of the Central Rasmussen Ridge pit would not be backfilled and could contribute to wind and water erosion of soils and exposure and oxidation of selenium sources from the pit wall that may increase the available soluble sources of selenium for plant uptake. Potential indirect impact would include increased sedimentation in the No Name Creek drainage that is tributary to Sheep Creek and may increase the potential for selenium exposure to plants and animals in the subwatershed.

4.4.3 Irreversible and Irretrievable Commitment of Resources

Soil loss caused by natural erosion or compaction induced by mining would be irretrievable and irreversible. Approximately 72 acres of land associated with the pit walls in Panel B would not be reclaimed under both the Proposed Action and Alternative 1. Soils from the 72 acres would be salvaged and spread on other areas during reclamation. New man-made features, such as the North Rasmussen Ridge Mine pits, or surficial deposits (pit backfill areas, waste rock dumps and growth media storage areas) created during mining and modified during reclamation, would be irreversible and irretrievable engineered features at the conclusion of project activities under the Proposed Action.

Loss of soil fertility and reduced biological function, vegetative productivity, and land use potential would be irretrievable but not irreversible. It is generally thought that microorganisms will naturally reestablish themselves in salvaged and replaced growth media. The time required for soil reestablishment depends upon a number of factors: physical and chemical characteristics and water dynamics of the growth media, the manner in which topsoil salvage and storage was handled during mining, the rate of vegetation establishment, and the rate of natural inoculation of the growth media (BLM and Forest Service 2002).

Soils will be salvaged from all soil complexes on site, except for wetland soils. Soils would be salvaged from depths ranging from 9 to 60 inches. The soils would be collected by bulldozer, loaded into trucks, and transported to the growth media storage area. Approximately 1,015,716 cu yd would be salvaged. The growth media would be sufficient to cover all reclaimed areas with 2 to 3 feet of cover for revegetation.

No irretrievable or irreversible commitment of watershed resources has been identified for the Proposed Action.

Under Alternative 1, the extraction of clay or limestone for use in constructing the impermeable cap would be irreversible and irretrievable.

4.4.4 Residual Impacts

Loss of soil or interruption of natural soil development, decreased permeability, decreased available water holding capacity, breakdown of soil structure, and loss of organic matter content would be reversed over an undetermined amount of time by renewal of natural development after soil has been redistributed and reclaimed. The potential exposure of seleniferous materials in waste rock could have residual impacts on the topsoil growth media; however, BMPs identified in the North Rasmussen Ridge Supplemental Mine and Reclamation Plan (Agrium 2001) would substantially reduce the impacts.

The residual impacts under Alternative 1 would be similar to the Proposed Action, with the following exceptions. Placement of an impermeable cap would greatly reduce exposure of meteoric water to ore and waste shale zones that contain potentially seleniferous materials. This procedure would further limit the residual impacts associated with exposure of water to seleniferous materials to less than the impacts anticipated under the Proposed Action.

No additional residual adverse effects for watershed resources have been identified for the No Action Alternative.

4.4.5 Mitigation Summary

Project design features, BMPs, and the Proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to soils and watersheds.

The following mitigation measures are proposed to reduce impacts. Mixing soils of high fragment content with soils of fewer fragments would dilute coarse fragments and maximize vegetative growth. Timing soil salvage operations to coincide with direct placement on areas to be reclaimed would also maximize the potential for soil production and reduce soil loss.

4.5 VEGETATION, RIPARIAN AREAS, AND WETLANDS

Under the Proposed Action, center waste shales containing elevated concentrations of selenium would be selectively placed in middle and deep areas of the open pit. This material would then be covered with 8 to 10 feet of non-seleniferous limestone and chert overburden to reduce the potential for selenium uptake by deep-rooted vegetation. Impacts from establishment of noxious weeds may result from ground disturbance. Ecotoxicological impacts to native and planted vegetation are considered minor based on the high toxicological thresholds and planned BMP actions.

4.5.1 Direct and Indirect Impacts

4.5.1.1 Proposed Action

Vegetation types and associated acreages affected by the Proposed Action are summarized in **Table 4.5-1**. This table is based on information from the baseline vegetation study (Maxim 2001c).

Under the Proposed Action, all disturbed areas that are amenable would be reclaimed. Vegetation would be re-established by the first growing season following cessation of mining to reduce the exposure time of bare, unvegetated surfaces to potential erosion and the effects of the surrounding environment. Of the 269 acres disturbed under the Proposed Action, 197 acres, or 73 percent of the total disturbed area, would be reclaimed.

**TABLE 4.5-1
VEGETATION TYPES AND ESTIMATED AFFECTED
ACREAGES UNDER THE PROPOSED ACTION**

Vegetation Types	Affected Acres
Aspen	0
Conifer	68.6
Mixed Aspen Conifer	192.5
Sagebrush	8.1
TOTAL	269.2

According to the proposed reclamation plan, disturbed areas would be reclaimed using a USFS-approved seed mixture primarily made up of grasses. Some shrubs and trees would also be planted in backfill areas in the pit. Reclaimed areas would represent a shift in the composition of the plant community from conifer, aspen/conifer mix, and sagebrush communities to a plant community dominated by perennial grasses.

Under the Proposed Action, potentially seleniferous material would be selectively placed in the middle and deep layers of the open pit. Potentially seleniferous material includes center waste shale and the hanging wall and footwall mud. Eight to ten feet of non-seleniferous limestone and chert overburden would then be used to cover the seleniferous material. The chert and limestone would serve as a barrier to limit the potential for selenium uptake by plants. An average of 2 to 3 feet of growth media would be placed on top of the overburden layer to facilitate establishment of vegetation. Selenium uptake by plant species used in reclamation, as well as any that become naturally established later, is not likely to cause adverse effects to plant populations. However, it may pose a problem to herbivorous wildlife, cattle and sheep if selenium indicator or bioaccumulator plants begin to thrive on uncovered or insufficiently covered seleniferous waste rock materials (Section 4.6).

The placement of growth media on top of the limestone and chert overburden has been used to reclaim several areas at the south and central areas of Rasmussen Ridge Mine. Three studies have been undertaken at the Rasmussen Ridge Mine to document uptake of selenium by vegetation growing on reclaimed waste rock dumps. In 1999, TRC collected 24 vegetation samples from the slopes of the reclaimed South Rasmussen Dump (TRC 1999). In 1999, Maxim collected five samples from the top of this same waste rock dump. This dump was revegetated in 1995 and 1996. Selenium values in vegetation samples ranged from less than 0.5 to 2.9 milligrams selenium per dry weight kilogram of vegetation (mg/kg), with a mean value of 1.3 mg/kg and a median value of 1.1 mg/kg. Three vegetation samples taken from run of mine waste rock had selenium concentrations that exceeded 2.0 mg/kg, but concentrations of total selenium in all three of these samples were below 5.0 mg/kg.

In 2001, Greystone collected 22 vegetation samples from the North Dump, that was comprised only of limestone and chert, and reclaimed in 1998 and 1999. Concentrations of selenium in vegetation samples ranged from 0.43 mg/kg to 3.00 mg/kg and all vegetation samples contained less than 5.0 mg/kg selenium dry weight (Greystone 2002).

The BLM and the USFS have established interim guidelines for levels of selenium in vegetation growing on reclaimed sites. According to the interim standards, the following conditions must be met:

- Fifty percent of vegetation measured over the surface of the reclaimed mine area must contain concentrations of selenium less than 5 mg/kg dry weight.
- Forty-five percent of vegetation measured over the surface of the reclaimed mine area may contain selenium at concentrations ranging between 5 mg/kg and 10 mg/kg dry weight.
- No more than 5 percent of vegetation measured over the surface of the reclaimed mine area may contain concentrations of selenium greater than 10 mg/kg dry weight, and no more than 0.5 percent of the vegetation measured over the surface of the reclaimed area can exceed 20 mg/kg selenium dry weight.

The results of the previous analyses of vegetation indicate that both the reclaimed North Dump and the South Rasmussen backfill meet all of these vegetation standards. A number of studies at the Rasmussen Ridge Mine have documented uptake of selenium by vegetation growing on reclaimed waste rock dumps. Data are available for selenium levels in soil and vegetation samples collected from the South Rasmussen backfill and North Dump. The results of these studies are summarized in **Table 4.5-2**.

**TABLE 4.5-2
CONCENTRATIONS OF SELENIUM IN SOIL AND VEGETATION IN
SAMPLES COLLECTED FROM THE RECLAIMED
NORTH DUMP AND SOUTH RASMUSSEN BACKFILL**

Sample ID	Total Se in Soil (mg/kg)	Extractable Se in Soil (mg/kg)	Corresponding Veg Sample(s) ID	Total Se in Veg (mg/kg)	Vegetation Species
South Rasmussen Backfill					
1	2.0	<0.001	1	0.2	Orchardgrass
2	<1.0	0.016	2	1.0	Alfalfa
3	<5.0	0.017	3	<1.0	Timothy
4	1.0	0.021	4	<1.0	Thickspike wheatgrass
5	<1.0	0.021	5	<1.0	Alfalfa
North Dump					
SS-1	2.31	0.02	VS-1A	1.32	Perennial bunchgrass
SS-1	2.31	0.02	VS-1B	1.50	Annual forb
SS-2	2.41	0.02	VS-2A	0.68	Perennial bunchgrass
SS-2	2.41	0.02	VS-2B	0.56	Sagebrush
SS-3	2.73	0.01	VS-3	0.43	Perennial bunchgrass
SS-4	2.10	0.01	VS-4	0.53	Perennial bunchgrass
SS-5	1.63	0.01	VS-5	0.51	Perennial bunchgrass
SS-6	2.55	0.01	VS-6	0.46	Perennial bunchgrass
SS-7	2.25	0.01	VS-7A	0.51	Perennial bunchgrass
SS-7	2.25	0.01	VS-7B	0.54	Sagebrush
SS-8	2.95	0.01	VS-8A	0.67	Perennial bunchgrass
SS-8	2.95	0.01	VS-8B	1.85	Sagebrush
SS-9	2.53	0.03	VS-9	3.00	Perennial bunchgrass
SS-10	1.85	0.01	VS-10	0.53	Perennial bunchgrass
SS-11	1.82	0.01	VS-11A	0.78	Perennial bunchgrass
SS-11	1.82	0.01	VS-11B	1.34	Annual forb
SS-12	3.45	0.03	VS-12	1.12	Perennial bunchgrass
SS-13A	1.52	0.02	VS-13A	0.57	Perennial bunchgrass

**TABLE 4.5-2 (CONT.)
CONCENTRATIONS OF SELENIUM IN SOIL AND VEGETATION IN
SAMPLES COLLECTED FROM THE RECLAIMED
NORTH DUMP AND SOUTH RASMUSSEN BACKFILL**

Sample ID	Total Se in Soil (mg/kg)	Extractable Se in Soil (mg/kg)	Corresponding Veg Sample(s) ID	Total Se in Veg (mg/kg)	Vegetation Species
SS-13B	1.70	0.01	VS-13B	0.55	Alfalfa
SS-14A	2.70	0.02	VS-14A	0.87	Perennial bunchgrass
SS-14B	1.52	0.03	VS-14B	1.20	Alfalfa
SS-15	3.98	0.02	VS-15	0.74	Smooth brome
South Rasmussen Backfill					
			V-1	0.5	Intermediate wheatgrass
			V-2	1.7	Intermediate wheatgrass
			V-3	1.3	Intermediate wheatgrass
			V-4	<0.5	Intermediate wheatgrass
			V-5	<0.5	Orchard grass
			V-6	<0.5	Orchard grass
			V-7	0.8	Intermediate wheatgrass
			V-8	0.7	Intermediate wheatgrass
			V-9	1.1	Intermediate wheatgrass
			V-10	1.1	Intermediate wheatgrass
			V-11	1.0	Intermediate wheatgrass
			V-12	0.6	Intermediate wheatgrass
			V-13	1.8	Intermediate wheatgrass
			V-14	1.9	Intermediate wheatgrass
			V-15	2.6	Intermediate wheatgrass
			V-16	1.0	Intermediate wheatgrass
			V-17	1.5	Intermediate wheatgrass
			V-18	1.6	Intermediate wheatgrass
			V-19	2.6	Intermediate wheatgrass

**TABLE 4.5-2 (CONT.)
CONCENTRATIONS OF SELENIUM IN SOIL AND VEGETATION IN
SAMPLES COLLECTED FROM THE RECLAIMED
NORTH DUMP AND SOUTH RASMUSSEN BACKFILL**

Sample ID	Total Se in Soil (mg/kg)	Extractable Se in Soil (mg/kg)	Corresponding Veg Sample(s) ID	Total Se in Veg (mg/kg)	Vegetation Species
			V-20	<0.5	Intermediate wheatgrass
			V-21	0.9	Intermediate wheatgrass
			V-22	2.9	Intermediate wheatgrass
			V-23	1.1	Intermediate wheatgrass
			V-24	1.8	Intermediate wheatgrass

SS = soil sample
VS or V = vegetation sample

The results of these studies indicate that topsoil materials used for reclamation of both the South Rasmussen Backfill and North Dump are generally considered marginally suitable for use in reclamation based on their concentrations of total selenium. In all but three samples, total selenium levels in soil samples are below the draft USFS guideline of 5.0 mg/kg. Soil is considered suitable for use in reclamation based on concentrations of extractable selenium. Concentrations of extractable selenium in all soil samples were below 0.1 mg/kg. In spite of the marginal concentrations of total selenium, vegetation samples contained less than 5 mg selenium/kg dry weight vegetation. The results of the previous vegetation analyses indicate that both reclaimed areas meet all of the USFS Draft Guidelines.

Under the Proposed Action, a grass seed mixture has been developed to encourage uptake of water from the upper soil horizon and minimize rooting depths. The majority of the rooting mass for the selected grass species would occur within the top 3 feet of soil. The majority of roots would therefore be present in the layer of growth media, with potentially seleniferous materials located at greater depths. Native trees and shrubs would also be planted as part of the reclamation program. The rooting depths for these species are greater than the grass to be used in the reclamation seed mixture. A number of deep-rooting native species currently present in the study area could also become established in reclaimed areas as a result of natural succession processes. These species and reported maximum rooting depths are summarized in **Table 4.5-3**.

**TABLE 4.5-3
MAXIMUM ROOTING DEPTHS REPORTED
FOR TREES PRESENT IN STUDY AREA ¹**

Species	Maximum Rooting Depths Reported (feet)
Subalpine fir	>13
Lodgepole pine	>10.8
Douglas-fir	32.8
Quaking aspen	>9.8

¹ BLM and USFS 2002

As shown in **Table 4.5-3**, the rooting depths reported for Douglas-fir and subalpine fir exceed 13 feet (8 to 10 feet overburden plus 2 to 3 feet of growth media). However, the majority of root mass for shrubs and trees is expected to occur between the surface and 13 feet below the ground surface. Therefore, the risk of selenium accumulation in future shrub or forest communities would be low.

The proposed seed mixture is mostly grass species and indicates that grasses are likely to dominate the reclaimed area for several decades after planting. Wyoming big sagebrush also could invade the replanted areas and dominate the sites in 20 to 50 years. Sagebrush transpires much less water than do grasses, as they have a leaf area index that is less than one-quarter that which was used in the infiltration modeling. This would mean that substantially more water would infiltrate in the 30 to 100-year time frame than is currently predicted by infiltration modeling. Given the level of uncertainty in the predictive modeling, the difference in infiltration is not expected to dramatically affect the fate and transport of COPCs into the groundwater.

Most of the merchantable timber that exists in the North Rasmussen Ridge areas was logged in the 1980s. Plant communities with timber resources include conifer and mixed aspen/conifer vegetation types. Under the Draft Forest Plan for the Caribou Targhee National Forest (USFS 2001), the lease area is designated as a forest restoration prescription. Areas under this designation contribute to the Allowable Sale Quantity and are consequently considered a potential timber resource. However, the study area is not considered a cost-effective timber producing area (an area with high potential for production of wood fiber), and therefore has not received a “timber management area” prescription. The baseline survey characterized the conifer forest as having a relatively open canopy and numerous downed trees, which indicates that timber resources in the study area are likely of limited quality and quantity.

Noxious Weeds

The removal of native vegetation would increase the potential for expansion of non-native plants, including noxious weeds. Non-native plants colonize disturbed areas and, once established, may reduce the diversity in native plant communities. Several species of noxious weeds have already become established within the mining lease area, including Canada thistle and yellow toadflax. Known occurrences of Canada thistle and yellow toadflax, along with other noxious weeds, are

currently monitored and chemically treated, as required, on an annual basis at the Rasmussen Ridge Mine.

Wetlands

Wetlands located along No Name Creek, Sheep Creek, and Reese Canyon Creek are all outside of the proposed disturbance footprints and are, therefore, not expected to be disturbed by mining. Any sediment loading carried by surface water runoff may create the possibility that selenium would reach the wetlands. Selenium tends to accumulate more in still-water environments, such as wetlands and around beaver dams as a result of changes in reduction-oxidation potential, acid-base potential changes, and reduced oxygen levels. Wetland vegetation and aquatic and terrestrial wildlife that use wetland habitat could thus be exposed to selenium. Under the Proposed Action, the open pit or East Haul Road would intersect small portions of the Reese Canyon Creek and No Name Creek drainages. Culverts would be placed to maintain flow in these drainages. Culverts would be installed during the dry season and no wetlands would be affected. Flow after culverts are installed is expected to maintain wetland hydrology below the disturbance. A wetlands function and values assessment characterized the Sheep Creek and Reese Canyon wetlands as important for groundwater discharge and recharge. The Proposed Action would not disturb any wetlands and, through the use of culverts, is not expected to adversely affect any wetlands functions. Some minor reductions in flow to these wetlands would occur as a result of runoff being retained by the pits and sediment control structures.

4.5.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Alternative 1 would affect 320 acres. Alternative 1 would result in a larger disturbance footprint than the Proposed Action because a 4:1 slope would be used to construct the cap, thus reducing the storage capacity and requiring construction of an external dump. The total disturbance of the external dump would be an additional 26 acres and 25 acres for a clay quarry. Plant communities affected by Alternative 1 would primarily include aspen/conifer and conifer forest. A small portion of sagebrush would also be affected under Alternative 1. Construction of the waste rock storage facility would also require additional permitting and reclamation efforts.

Similar to the Proposed Action, Alternative 1 would use selective placement of potentially seleniferous material. In addition to selective placement of material, Alternative 1 also includes construction of an impermeable cap. The potential for plant roots to encroach on seleniferous materials would be reduced by construction of an engineered layer. The impermeable cap would also reduce the potential for water to infiltrate the seleniferous material and thus minimize leaching of selenium through the soil column into underlying groundwater. Therefore, the cap would limit the potential for uptake of selenium by plants. Deep rooting Douglas-fir would not be planted under this alternative.

4.5.1.3 Alternative 2 – No Action

Alternative 2, No Action, would result in no additional impacts in the study area. The No Action alternative would preclude mining and any associated disturbance at North Rasmussen Ridge.

Mining would continue at Central Rasmussen Ridge until all ore is removed. According to the approved mine plan for Central Rasmussen Ridge, 35 acres would not be reclaimed because material would not be available to backfill a portion of the Central Rasmussen Ridge open pit. There would not be any impacts from selenium contamination associated with this alternative relative to the Proposed Action. However, the unreclaimed acreage at the Central Rasmussen Ridge mine could contribute selenium to the environment and affect vegetation. Under this alternative, the Central Rasmussen Ridge Mine and Reclamation Plan would be modified to address potential environmental effects from closure without complete backfill.

4.5.2 Irreversible and Irrecoverable Commitment of Resources

Approximately 72 acres of vegetation would be lost permanently under the Proposed Action. Permanent loss of vegetation would occur in areas of pit disturbance that would not be reclaimed when the mine closes. The majority of permanent loss of vegetation would occur in existing mixed aspen/conifer forest. The loss of timber within the project area and for the haul road would be an irreversible commitment of resources because of the long period required for regeneration of this type of forest. Even with planting and natural succession, it is expected that these forests would require 100 to 200 years to recover to their current structure and level of complexity.

There is not likely to be irreversible or irretrievable commitment of resources as a result of selenium impacts on vegetation. Native vegetation that would remain within the project area and adjacent to the project area probably has a relatively high toxicological threshold for selenium because of local adaptation. A study showed vegetation sampled near a seep contained an order of magnitude more selenium than vegetation sampled 160 meters from the seep, suggesting some selenium immobilization may have occurred along the flow path (Mackowiak et al 2002). No studies in the literature based on field data provide evidence of selenium toxicity thresholds for plants (Skorupa 1998). Reclamation of mined areas would cover seleniferous waste rock materials, thus preventing exposure to planted native and non-native grasses.

4.5.3 Residual Impacts

A residual adverse impact would occur if existing forests were not eventually replaced through reclamation and subsequent natural succession.

4.5.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to upland vegetation, riparian areas, and wetlands. Additional mitigation measures are not deemed necessary.

4.6 TERRESTRIAL WILDLIFE

The Proposed Action would disturb wildlife habitat during construction and mine operations. Potential effects to wildlife would also include habitat loss and potential effects from exposure to

selenium. The majority of habitat affected would be restored to habitat that would be dominated by perennial grasses with limited trees and shrubs.

4.6.1 Direct and Indirect Impacts

4.6.1.1 Proposed Action

The Proposed Action would result in the permanent loss of wildlife habitat as well as a shift in the composition of plant communities. The Proposed Action would result in the temporary loss of 269 acres of wildlife habitat (192 acres of mixed aspen/conifer, 69 acres of conifer, and 8 acres of sagebrush/grassland). Within the project area, this represents a loss of 37 percent of mixed aspen/conifer, 16 percent of conifer, and 3 percent sagebrush habitat. No aspen or riparian habitat would be lost under the Proposed Action. Following reclamation, the Proposed Action would result in the permanent loss of 72 acres (27 percent) of wildlife habitat. Permanent habitat loss would result from mainly rock highwalls. Approximately 197 acres of wildlife habitat would be reclaimed under the Proposed Action. The majority of permanent habitat lost would include mixed aspen/conifer and conifer forest. Reclamation would result in a shift in the composition of the plant community from aspen, conifer, and sagebrush to communities dominated by perennial grasses.

Mammals

Big Game

Habitats located adjacent to and within the project area may experience a reduction in usage during mine operations. However, some individuals may show some habituation to mine activities and would continue to use these areas. Construction and use of haul roads would result in increased traffic and would improve access to North Rasmussen Ridge. Traffic would not likely result in any increase in wildlife mortalities and injuries, because wildlife usage of this area may already be reduced in response to current mining activities associated with Central Rasmussen Ridge. Studies (Thomas et al. 1979, Lyon 1983) have also shown that increased densities of open roads and increased human activity reduce the effectiveness of elk habitat. No new public access roads would be constructed.

Based on previous revegetation efforts, the forage production on reclaimed lands would increase from the current range of 400 pounds to 800 pounds of usable forage per acre dry weight to between 1,200 to 1,600 pounds dry weight per acre. An increase in grass productivity would be beneficial to elk, which tend to prefer grass forage. However, loss of shrub habitat would reduce the quality of deer habitat.

The Proposed Action is not expected to directly affect critical winter deer or elk range. No critical winter deer or elk habitat is located within the study area. Critical winter deer and elk habitat is located just east of the proposed disturbance but would not be directly affected by the Proposed Action. Indirect effects on critical winter deer and elk habitat would be similar to existing conditions since vehicle and human activity associated with the Proposed Action would be similar to current levels. Although detailed records have not been kept, mine personnel report that two deer have been killed on the site in the last five years.

Collins (1991) reported that there were no known elk or deer migration routes in the Rasmussen Ridge area. However, the 1997 Central Rasmussen Ridge Mine Environmental Assessment (BLM 1997) noted that there was a known deer migration route that crossed the Central Rasmussen Ridge Mine area. This corridor extended from the Sheep Creek area to Soda Hills. In the case that deer found a migration route that may be affected by the North Rasmussen Ridge project, it is expected that deer may be further displaced and would have to find an alternative migration route between Sheep Creek and Soda Hills. During the winter months, this diversion could have a negative effect on energy reserves, although this effect is not expected to be a major one.

The Proposed Action would result in the loss of some moose foraging and cover habitat. No riparian areas that may be used as moose foraging habitat would be lost under the Proposed Action. However, approximately 261 acres of moose habitat (comprised of mixed aspen/conifer and conifer forest) would be lost under the Proposed Action. The loss of moose foraging and cover habitat would not be substantial due to the large home range of moose and the availability of other quality habitat outside of the project area.

Carnivores

The Proposed Action would result in the temporary and permanent loss of habitat for carnivores. Impacts to species that have large ranges, such as black bear, coyote, badger, bobcat, and mountain lion would likely be negligible due to habitat availability outside the project area. Local badger and weasel populations would be directly affected because of their smaller ranges and burrowing behavior. The Proposed Action may result in some mortalities or displacement of carnivores due to increased activity associated with construction and mining. No indirect effects resulting from loss of prey base are expected based on the availability of prey within and outside the project area. Prey populations would also recover quickly following cessation of mining operations.

Bats

Bats are sensitive to impacts, including effects associated with new mining disturbances. It is expected that the Proposed Action would have minor effects on local bat populations. Conversion of some forest habitat to grasslands would represent a loss of foraging and roosting habitat. However, this habitat loss would not be critical due to the availability of foraging and roosting habitat within and outside the project area. Noise and vibration from blasting may also have indirect effects on bats using the area.

Raptors

Raptors that occur in the study area would be directly and indirectly affected by the Proposed Action. Direct disturbances would include loss of foraging habitat, temporary reduction in prey base, and loss of historical nesting territory. The Proposed Action would initially reduce habitat for a number of prey species, including mice, voles, ground squirrels, and rabbits. However, additional foraging habitat exists within and adjacent to the project area. Based on prey availability within and adjacent to the project area, effects of the Proposed Action on raptors would not affect population liabilities and would therefore not be critical. Prey populations would also recover quickly following cessation of mining operations. Some raptor mortalities

may occur from raptor/vehicle collisions when raptors feed on road kill, especially during periods of high vehicle activity such as the construction period.

Upland Game Birds

Two upland game birds, the blue grouse and ruffed grouse, were observed during baseline studies. Habitat for the blue grouse and ruffed grouse would be disturbed under the Proposed Action. Habitat for the blue grouse in the study area includes conifer forest, mixed aspen/conifer forest, and mixed shrub. Ruffed grouse habitat in the study area includes aspen and mixed aspen/conifer forests. Habitat lost would include approximately 37 percent of mixed aspen/conifer forest, 16 percent conifer forest, and 3 percent of sagebrush within the project area. Loss of habitat for the blue and ruffed grouse would be long-term since final reclamation would emphasize establishment of communities dominated by perennial grasses. However, this habitat loss would not likely affect blue grouse and sage grouse population viability due to the availability of additional habitat within and outside the project area.

Sage grouse and sharp-tailed grouse were not observed during baseline studies. Although they were not observed, baseline studies indicated that both species could occur in the study area. However, habitat for the sage grouse and sharp-tailed grouse is considered marginal to non-existent. Approximately 8.1 acres of mixed sagebrush/grasslands would be lost under the Proposed Action. Since the quality of this habitat was deemed marginal for sage and sharp-tailed grouse and since this represents only a six percent loss of habitat available within the project area, the effects of habitat loss are not expected to be critical. Rasmussen Valley west of Rasmussen Ridge has historically supported sage grouse strutting grounds, but these areas would not be affected by the Proposed Action.

Waterfowl

Direct and indirect effects to waterfowl under the Proposed Action would be limited. The Proposed Action would not result in the removal of any riparian or wetland habitat. Riparian areas and wetlands may be indirectly impacted by increased sedimentation and erosion during mine operations. However, indirect impacts to waterfowl habitat, including intermittent drainages and wetlands, are expected to be limited by implementation of BMPs and by restricting construction during periods of seasonal water flow. Creation of a pit lake at North Rasmussen is not expected under the Proposed Action.

Migratory Birds

Migratory birds use all habitat types within the project area. The Proposed Action would result in the temporary loss of 197 acres and the long-term loss of 72 acres of songbird habitat. Bird species associated with mixed aspen/conifer would be most affected. Potential direct effects associated with the Proposed Action would include direct mortality, forced movement, and stress related to increased noise and human activity. Loss of habitat could also result in a reduction of species diversity. Studies in Rocky Mountain forests have found, for example, that resident species are generally less abundant in recent clear-cut and undercut forests. Indirect effects include increased competition between displaced individuals and neighboring birds.

Amphibians and Reptiles

Surface disturbance activities associated with the Proposed Action would result in some mortalities and habitat loss to amphibians and reptiles. Construction of a new haul road could also increase mortalities and could isolate population segments. The isolation of population segments would be a short-term impact since the natural drainage would be restored following cessation of mine operations. Surface disturbances such as road embankments and the open pit would represent non-natural barriers that would restrict movement of amphibians and reptiles. Increased sediment loads that could affect amphibians and reptiles are not expected because BMPs would be implemented under the Proposed Action.

USFS Management Indicator Species

The USFS Caribou National Forest has identified three wildlife species as management indicator species (**Table 3.8-3**); potential impacts are discussed below:

- Columbian sharp-tailed grouse (*Tympanuchus phasianellus columbianus*)
- Sage grouse (*Centrocercus urophasianus*)
- Northern goshawk (*Accipiter gentilis*)

Suitable habitat for the Columbian sharp-tailed grouse exists downslope and somewhat near, but not within, the study area. No direct or indirect impacts to this species are anticipated. Potential impacts to Columbian sharp-tailed grouse are discussed in additional detail in Section 4.8.

Suitable habitat does not exist within or near the study area for the sage grouse. Although strolling grounds are located in the Rasmussen Valley, no strutting grounds are known to be present in the project area. No direct or indirect impacts to this species are anticipated from activities within the study area.

The northern goshawk occurs in the study area and may be affected through loss of foraging habitat. However, these effects would not likely be significant due to the large range of Northern goshawks and potential impacts to Northern goshawk are discussed in additional detail in Section 4.8 the availability of other foraging habitat within and outside the project area.

Selenium

An indirect effect, chronic selenium poisoning, may occur to carrion-feeders and predators (such as bobcat, mountain lion, coyote, and raptors) via bioaccumulation and biomagnification of selenium in animal tissues gained from contaminated forage or water. Impacts to terrestrial wildlife may occur via selenium uptake in plant forage if seleniferous mine waste rock is left exposed or is not covered with a layer of non-seleniferous topsoil during or after the life expectancy of the Proposed Action of 8 years. Big game species (mule deer, elk, and moose) are known to forage on vegetation in the project area, and black bear and badger are known to forage and dig in soil in the project area. Other species, including upland game birds, songbirds, small mammals, reptiles, and amphibians, can also be affected. These species might be susceptible to acute or chronic selenium poisoning if local populations spend a significant amount of time in

the project area. However, big game and black bear tend to range over large areas, and their behavior would tend to reduce risk of exposure and subsequent adverse impacts. The maximum tolerance level for selenium is estimated to be 2 milligrams selenium per kilogram of food for large mammals such as cattle, sheep, horses, and pigs (NRC 1980). Levels that exceed the maximum tolerance level can cause chronic selenium toxicity. The pooling of water in depressions above these seleniferous materials, if present, would allow ingestion of water and consuming vegetation and insects that grow in or inhabit the water. Mammals and birds may use downgradient seeps and springs as sources of drinking water in the fall, when some creeks are dry. Selenium poisoning has been confirmed in many salamanders at the Gay Mine at the Fort Hall Indian Reservation (Idaho) and the nearby Smoky Canyon Mine. Concentrations in some individuals are 10 to 100 times the normal level in animal tissue (USGS 2001a, 2001b). Selenium in exposed seleniferous waste rock can be leached through the soil to underlying alluvial water, the source of some seeps and springs. Concentrations of 0.5 milligrams selenium per liter of drinking water are considered toxic to large mammals such as cattle (Gough et al 1979). This potential effect is expected to be minor because of the low concentration of selenium in soils and plants on reclaimed areas (see sections 4.4 and 4.5).

The latest water quality sampling event for the potentially affected water bodies was in 2000 (Maxim 2001b). The concentrations of selenium that range from less than the practical quantitation limit of 0.001 to 0.004 mg/L are just below the state water quality standard for aquatic life of 0.005 mg/L. There is a potential for the concentrations of selenium to cause adverse impacts through bioaccumulation and biomagnification in the aquatic food chains. These impacts would occur to waterfowl that feed in or raise young in these water bodies. Based on the historical trend of increased phosphate mining of 1 to 2 percent per year (BLM and USFS 2002) and elevated levels of selenium in the Blackfoot River, concentrations of selenium in the surface waters and sediment of the Blackfoot River watershed could increase. However, BMPs and other controls implemented in recent years have led to reductions in impacts from sediment caused by mining and timber production (BLM and USFS 2002).

4.6.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Alternative 1 would result in a larger disturbance footprint because a 4:1 slope would be used to construct the cap, thus reducing the storage capacity of the open pit. As a result of the reduced storage capacity, an external waste rock dump would be constructed for the surplus waste rock together with a clay quarry would remove an additional 51 acres of wildlife habitats. Alternative 1 would result in the removal of an additional 17 percent of wildlife habitat compared to the Proposed Action. Construction of the waste rock dump and clay quarry would represent a temporary loss of an additional 51 acres of wildlife habitat compared to the Proposed Action. Habitat lost through construction of the waste dump would affect mostly mixed aspen/conifer and conifer forest as well as small portions of sagebrush habitat.

The potential for plant roots to encroach on seleniferous materials would be reduced by construction of an engineered layer. The impermeable cap would also reduce the potential for water to infiltrate seleniferous material, which would reduce the potential for mobilization of selenium. Installation of an impermeable cap on the overburden pile would likely reduce

leaching of selenium to alluvial water and subsequent contamination of seeps and springs. The impermeable cap would also reduce the potential for selenium to be mobilized to reach surface pools and surface water runoff. However, since the impermeable cap would not be installed until after mining has been completed, it would not reduce the effects that would occur during mine operations discussed under the Proposed Action. Therefore, the impacts to threatened and endangered species under Alternative 1 would be the same as the Proposed Action until the impermeable cap is in place.

4.6.1.3 Alternative 2 – No Action

Alternative 2, No Action, would result in no additional impacts in the study area. The No Action alternative would preclude mining and any associated disturbance at North Rasmussen Ridge. The No Action alternative would maintain the current status of wildlife and wildlife habitat in and around the study area. According to the approved mine plan for Central Rasmussen Ridge, 35 acres would not be reclaimed under the no action alternative because material would not be available to backfill a portion of the Central Rasmussen Ridge open pit, which represents a permanent loss of wildlife habitat within the Central Rasmussen Ridge area. The open pit at Central Rasmussen Ridge Mine would have exposed ore and waste rock remaining in the hanging wall. A pit lake could also form in the Central Rasmussen pit, which may pose a risk to wildlife such as waterfowl.

There would be no new impacts to terrestrial wildlife from selenium if the No Action alternative were adopted at the North Rasmussen Ridge Mine site. Existing concentrations of selenium in surface waters may seasonally fluctuate similar to current seasonal patterns. The assumed bioaccumulation and biomagnification of selenium in aquatic life and to terrestrial food chains (amphibians and waterfowl) would continue at the present rate for the near future if the No Action alternative were adopted.

4.6.2 Irreversible and Irrecoverable Commitment of Resources

The loss of conifer, mixed aspen/conifer forest, and sagebrush habitat is considered an irreversible commitment of resources and would have long-term minor impacts on many wildlife species. Although the reclamation plan would help to re-establish grassland vegetation in disturbed areas after mining operations end, it would take a long time for forest habitat to re-establish its current level of maturity and complexity. Reclamation would, however, provide habitat in the meantime for species common to early successional areas. Recovery of early succession prey species, such as deer mice and other rodents, would also help to re-establish a prey base for predators. Recovery of species that depend on the forest such as hairy woodpeckers, forest raptors, and pine martens would not occur for hundreds of years. Therefore, the loss of biological diversity in and around the project area would also be considered an irreversible commitment of resources. However, this commitment of resources would represent the loss of 37 percent, 16 percent, and 3 percent of mixed aspen conifer, conifer, and sagebrush habitat within the project area, respectively. No aspen or riparian habitat resources would be irreversibly committed under the Proposed Action.

It is possible that some terrestrial wildlife may be adversely affected by selenium contamination during the life of the Proposed Action or Alternative 1. These impacts are anticipated to be limited in magnitude and areal extent and, therefore, represent a minor irretrievable commitment of resources that is offset by the value of the phosphate minerals extracted.

4.6.3 Residual Impacts

No residual adverse effects on terrestrial wildlife are expected beyond those described in Section 4.6.2.

4.6.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan are the elements of the Proposed Action designed to reduce environmental impacts to terrestrial wildlife. The following mitigation measures are proposed to reduce impacts. Based on previous revegetation efforts, the forage production on reclaimed lands would increase from the current range of 400 pounds to 800 pounds of usable forage per acre dry weight to between 1,200 to 1,600 pounds dry weight per acre. Reclaimed areas would have a higher productivity, which would help to re-establish summer range for big game species.

Impacts to raptor habitat would be avoided, for example, removal of raptor nests would be avoided to the extent feasible. However, some impacts to foraging habitat, such as development of the open pit, would be unavoidable. In these cases, mitigation would be implemented, including the following:

- Conduct a detailed raptor survey prior to construction to identify any raptor nests within areas to be cleared.
- Locate the proposed project components to avoid loss or modification of nesting habitat, and use of appropriate buffer areas;
- Enhance foraging habitat to increase attractiveness to raptors as part of the reclamation effort; and
- Improve existing nesting sites.
- In the case that raptor nests are identified within the Study area, the District or Forest Biologist would be contacted.
- Develop a plan to mitigate any impacts associated with raptor nest removal with the District or Forest Biologist.

4.7 FISHERIES AND AQUATIC RESOURCES

4.7.1 Direct and Indirect Impacts

4.7.1.1 Proposed Action

Under the Proposed Action, the East Haul Road would intersect intermittent portions of Reese Canyon Creek and No Name Creek. The Proposed Action would result in 150 linear feet of disturbance in Reese Canyon Creek. Culverts would be placed to maintain flow in the drainage.

Culverts would be installed during the dry season and are therefore not expected to have any impacts on downstream aquatic habitat. Flow following culvert installation is expected to maintain the existing surface hydrology. The East Haul Road extension would also parallel a portion of the lower segment of the West Fork of Sheep Creek. The extension is not, however, expected to affect the stream because BMPs to prevent erosion and sedimentation would be implemented.

Construction is not expected to have adverse impacts on No Name Creek, Reese Canyon Creek, or Sheep Creek since these activities would occur during no-flow periods. No Name Creek is an intermittent stream that is commonly dry during summer, fall, and winter (Maxim 2001a). Reese Canyon Creek is a spring-fed stream that is also dry during some periods of the year. During Maxim's August 2000 survey, the stream was dry in some reaches and had low flow in others. Sheep Creek is located outside of the disturbance footprint for the Proposed Action and would therefore not be directly affected by construction.

Reese Canyon Creek, No Name Creek, and Sheep Creek could be affected by development of the open pit and road construction. Clearing of vegetation within the study area could contribute to increased amounts of siltation in local drainages. An increase in the amounts of suspended sediment in runoff could adversely affect fish and aquatic invertebrates if discharged to local streams. However, implementation of the proposed BMPs, including construction of sediment ponds, establishment of buffer areas around drainages, and use of erosion control measures, would help to prevent sediment and runoff water from discharging into streams. BMPs would also be implemented to control runoff and sedimentation from the East Haul Road extension. No impacts to aquatic habitats are expected as a result of erosion or sedimentation after BMPs have been implemented. However, runoff trapped in the pit or sediment control structures would reduce surface flow in these drainages which could impact downstream aquatic habitat.

There may be an adverse ecological impact if selenium bioaccumulates in the food chains of local aquatic communities. Selenium, in particular, is especially toxic to fish and is highly bioaccumulative in aquatic food chains. The presence of other project-related trace metals is not expected to cause adverse impacts to fisheries and aquatic resources because they are not as toxic as selenium, nor are they found in relatively high concentrations. Montgomery Watson (2000) concluded that selenium was the major element of concern associated with phosphate mining in the Blackfoot River watershed when compared with other elements (such as cadmium, manganese, nickel, vanadium, and zinc).

In a study on cutthroat trout fed varying selenium-enhanced diets ranging from 1.4 to 10 ppm seleno-methionine, no clinical signs of selenium toxicity were observed nor were differences in reproductive performance, i.e. fecundity, egg hatchability, noted, although in all dietary groups, egg fertility and hatchability were lower than that observed in eggs from wild cutthroat trout. Groups of fish fed a non-selenium control diet for 32 weeks after having been fed diets containing various increased levels of selenium for 48 weeks returned to near baseline levels, indicating depuration of whole body levels of selenium over this time (Hardy and Moller 2002).

Adverse impacts to the fisheries and aquatic resources of Sheep Creek, Reese Canyon Creek, and No Name Creek, as well as their related downstream water bodies (Angus Creek and Blackfoot

River), may occur via several exposure scenarios. Surface water runoff may carry rock particles that contain selenium to the creeks via erosion gullies and road ditches. Selenium can reside in streambed sediments and the water column to be taken up directly by rooted aquatic plants, plankton, invertebrates in sediment, aquatic insects, and fish. Although the state chronic water quality standard is 5 micrograms of selenium per liter of water, the literature estimates low to moderate hazards to aquatic life at concentrations of 2 to 5 micrograms selenium per liter of water (Lemly 1996; Skorupa 1998).

The Proposed Action and Alternatives were evaluated for compliance with the 1995 INFISH, which was adopted as part of the Caribou National Forest Plan in 1995. INFISH is designed to protect riparian areas and fisheries from degradation as a result of new or existing activities. Riparian Habitat Conservation Areas (RHCA) were established adjacent to designated fisheries or streams to protect the riparian areas and fisheries. No Name Creek is considered an INFISH category 4 stream – seasonally flowing or intermittent. The RHCA for No Name Creek is 50 feet wide on either side of the stream (USFS 1998).

Under INFISH, proposed activities that could degrade RHCAs must be evaluated to assess compliance with the interim Riparian Management Objectives (RMOs) and mineral management standards and guidelines. The study area contains six mineral management standards and guidelines, and analysis indicates that the project is in compliance with all six under the interim strategy.

4.7.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Similar to the Proposed Action in the pit backfill, Alternative 1 would use selective placement of potentially seleniferous material. In addition to selective placement of material, Alternative 1 also includes construction of an impermeable cap. The potential for plant roots to encroach on seleniferous materials would be reduced by construction of an engineered, impermeable layer. The impermeable cap would also reduce the potential for water to infiltrate seleniferous material, which would reduce the potential for mobilization of selenium. Installation of an impermeable cap on the overburden backfill would likely reduce leaching of selenium to alluvial water and subsequent contamination of seeps and springs. The impermeable cap would also eliminate contamination by selenium from exposed seleniferous waste rock of surface pools and surface water runoff that leads to nearby creeks. However, installation of the impermeable cap after mining has been completed would not reduce the risks discussed under the Proposed Action that are associated with exposed seleniferous rock during the 8-year life of the project.

4.7.1.3 Alternative 2 – No Action

Alternative 2, No Action, would result in no additional impacts in the North Rasmussen Ridge site. No Action would preclude mining and any associated disturbance at North Rasmussen Ridge. No Action would maintain the current status of aquatic wildlife populations and fisheries in and around the study area.

There would be no new impacts to fisheries and aquatic resources from selenium if the No Action alternative is selected at the North Rasmussen Ridge Mine site. However, there is potential for a pit lake to form in the remaining Central Rasmussen Ridge pit. Exposed ore and waste rock in the Central Rasmussen Ridge pit could mobilize selenium into that lake. Existing concentrations of selenium in surface waters may seasonally exceed the state water quality standard for the protection of aquatic life. Bioaccumulation and biomagnification of selenium from aquatic life through terrestrial food chains (amphibians and waterfowl) would continue at the present rate for the near future if the No Action alternative is adopted.

4.7.2 Irreversible and Irrecoverable Commitment of Resources

There would not be an irreversible or irretrievable commitment of resources as a result of changes in the physical habitat within or near the project area related to either the Proposed Action or Alternative 1. However, it is possible that the Proposed Action or Alternative 1 may contribute to a continuing decline of water quality, associated fisheries, and aquatic resources within the Blackfoot River watershed as a result of contamination by selenium, considering the impacts of other phosphate mines in the area. Degradation of water quality is considered an irretrievable commitment of resources. The decrease in quality of fisheries may become an irreversible commitment of resources if certain sensitive fish species or their primary prey species (invertebrates) are extirpated from any streams. Reclamation of the open pit and haul roads should permanently stabilize these areas and would minimize the potential for the release of sediment to Reese Canyon Creek, No Name Creek, and Sheep Creek. Road culverts placed in the Reese Canyon Creek and No Name Creek drainages would be removed after mining operations end. Both drainages would then be re-contoured to approximate their original topography.

4.7.3 Residual Impacts

No residual effects on fisheries and aquatic resources are expected beyond those described in Section 4.7.2.

4.7.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to fisheries and aquatic resources. Additional mitigation measures are not deemed necessary.

4.8 THREATENED, ENDANGERED, AND SPECIAL STATUS SPECIES

4.8.1 Direct and Indirect Impacts

Refer to the Biological Assessment and Biological Evaluation documents (Greystone 2003a and b) available from the BLM and USFS for more detailed information on the following species.

4.8.1.1 Proposed Action

Threatened and Endangered Wildlife Species

Yellowstone Population of Gray Wolf

Wolves could potentially travel through the study area or near the study area, but their foraging range is very extensive and makes the selenium exposure potential insignificant. Predation by the gray wolf on contaminated prey that has ranged outside of the study area is a reasonable possibility, although biomagnification via this particular food chain is minimal. Such predation would probably occur very infrequently, due to the extremely large foraging range. The loss of forest habitat and associated potential prey related to the Proposed Action would be insignificant to the gray wolf. The study area would have a high level of human activity for the project duration and wolves are expected to avoid such areas. Thus, no adverse effects to the gray wolf are expected to occur because of the Proposed Action. The determination for the gray wolf is that the Proposed Action is not likely to jeopardize the continued existence or adversely modify proposed critical habitat of the gray wolf. The gray wolf is not expected to frequent the study area or Rasmussen Ridge, due to the high levels of human and mechanized activity. Insignificant effects (i.e., unmeasurable) may occur via the consumption by the gray wolf of selenium-contaminated prey near the study area.

Canada lynx

Although Canada lynx may pass through the study area, they would not be expected to frequent areas subject to regular, high levels of human and mechanized activity. Predation by the Canada lynx on selenium-contaminated prey that have ranged outside of the study area is a reasonable possibility, although biomagnification via this particular terrestrial food chain is minimal. Such predation would occur very infrequently, due to the large foraging range. Therefore, the Canada lynx is not likely to encounter toxic exposures to selenium. The Proposed Action would eliminate much of the habitat on Rasmussen Ridge that the Canada lynx might use as linkage between preferred habitats. The high levels of human activity associated with the Proposed Action would create a deterrent effect that extends much beyond the ground footprint of the study area. The determination for the Canada lynx is that the Proposed Action may affect, but is not likely to adversely affect, the species. The Canada lynx is not expected to frequent the study area or Rasmussen Ridge, due to the high levels of human and mechanized activity. Insignificant effects (i.e., unmeasurable) may occur via the consumption by the Canada lynx of selenium-contaminated prey near the study area.

Bald Eagle

The Proposed Action is not anticipated to negatively affect the bald eagle because the study area does not include, nor would it impact, known winter roost sites, breeding territories, or winter feeding areas. However, a large elk wintering area that is adjacent to the east side of the study area could attract bald eagles due to elk mortalities caused by severe weather. Predation by the bald eagle on selenium-contaminated terrestrial prey or carrion outside of the study area is a reasonable possibility, although biomagnification via this particular terrestrial food chain is considered minimal. Additionally, the bald eagle may consume fish and waterfowl within the Blackfoot River watershed that contain selenium bioaccumulated via food chain pathways. Such

predation would probably occur infrequently, due to the large foraging range of the bald eagle, and current levels of selenium in fish and waterfowl are not expected to adversely affect the bald eagle or other predators. Therefore, no incidental take to bald eagles is expected to occur because of the Proposed Action. The determination for the bald eagle is that the Proposed Action would have no effect. Insignificant effects (i.e., unmeasurable) may occur via the infrequent consumption by the bald eagle of selenium-contaminated prey and carrion near the study area and within the Blackfoot River watershed.

Yellow-billed cuckoo

The yellow-billed cuckoo is listed as a candidate species by USFWS. No populations of yellow-billed cuckoo were observed in the study area during baseline studies. The yellow-billed cuckoo is not expected to occur in the study area because area elevations are at the limit of its range. According to USFS information, the only potential yellow-billed cuckoo habitat within the Caribou-Targhee National Forest is located on the Palisades Ranger District. Data indicate that only a few breeding pairs of yellow-billed cuckoo remain in Idaho, primarily in southwestern Idaho. The Proposed Action is not likely to adversely affect the yellow-billed cuckoo since it is not expected to occur in the study area.

USFS Sensitive Plant Species

Cache's beardtongue is considered to be endemic to the Bear River Range, southwest of Montpelier, Idaho. No populations of the species were observed in the study area, nor considered likely to occur. The Idaho CDC did not list any documented occurrences of Cache's beardtongue in or near the study area (Maxim 2001c). As a result, Cache's beardtongue is not expected to occur in the study area.

Payson's bladderpod was not found in the study area and limited potential habitat was identified (Maxim 2001c). Based on the results of baseline studies and the marginally suitable habitat in the study area, potential adverse effects to Payson's bladderpod are unlikely, since no populations are known to occur in the study area.

Starveling milkvetch was not observed and no potential habitat was identified during baseline studies. Based on the results of baseline studies, no adverse effects to starveling milkvetch are likely since no populations are known to occur in the study area.

USFS Sensitive Wildlife Species

Spotted Bat

Suitable roosting habitat for the spotted bat does not exist within the project area. The spotted bat was not observed or captured during bat survey efforts at the project area during the summer of 2000 (Maxim 2001b). It is unlikely that the spotted bat uses the project area for roosting or foraging. The spotted bat would not likely be affected by food chain uptake of selenium, but would be impacted by loss of foraging habitat within the project area. The Proposed Action may adversely impact individuals, but not likely result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability over its range. The Proposed Action's effects on the spotted bat are expected to be insignificant.

Townsend's big-eared bat

There are no known habitats suitable for day or night roosting within or near the project area. The species was not observed or captured during bat survey work conducted in 2000 (Maxim 2001b). The lack of detections and habitat in the project area suggest that the Proposed Action would not adversely affect populations, including food chain uptake of selenium. The Proposed Action may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability over its range. The Proposed Action's effects on the Townsend's big-eared bat are expected to be insignificant.

Wolverine

No evidence of wolverine presence was observed during biological field surveys in 2000 (Maxim 2001b), and there has not been a local sighting since 1977. The nearest sightings are from the Preuss Range and the Bear River Range, 27 miles south and about 23 miles south, respectively (BLM and FS 2001). Suitable habitat for this species does occur, however, within the project area. Although wolverines may pass through the project area, wolverines would not be expected to frequent areas subject to high levels of regular human activity. The Proposed Action would cause the loss of potential wolverine habitat. No direct or indirect impacts to this species are anticipated from potential selenium contamination of surface soils, surface water, or vegetation. The Proposed Action may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability over its range. The Proposed Action's effects on the wolverine are expected to be insignificant (non-measurable).

Trumpeter Swan

No trumpeter swans were observed during baseline studies and no suitable habitat for this species exists within or adjacent to the project area (Maxim 2001b). The use of the project area by trumpeter swans is considered unlikely based on the lack of habitat. The Proposed Action would not create additional potential trumpeter swan habitat, such as pit lakes or tailings ponds. Food chain uptake of selenium and consequent impacts are not expected to occur because of the Proposed Action. The Proposed Action would have no impact on the trumpeter swan.

Harlequin Duck

Suitable habitat for harlequin duck does not exist within the project area, and this species was not observed within the project area during biological surveys conducted in 2000 (Maxim 2001b). Harlequin ducks may use local fast-flowing streams during migration stopovers, but are not expected to nest locally or remain in the project area for extended periods, as its breeding range does not include Rasmussen Ridge. The Proposed Action would have no impact on the harlequin duck.

Northern Goshawk

The project area represents potential northern goshawk foraging habitat. Northern goshawk surveys were conducted using amplified goshawk vocalizations in May and July of 2000 (Maxim 2001b). Several individuals were observed, even though no nests were located, thus supporting the possibility that nesting pairs may occur within or near the project area. The Proposed Action

would result in the loss of approximately 269 acres of potential foraging habitat for northern goshawk. Displacement of northern goshawk could result in increased competition between displaced goshawks and other resident predators. Increased competition could cause increased mortalities and/or decreased reproduction rates. The Proposed Action may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend toward federal listing, or a loss of species viability over its range. The Proposed Action's effects on the northern goshawk would be insignificant.

Columbian Sharp-tailed Grouse

This grouse species is not expected to occur within the project area, due to the lack of suitable habitat (i.e., extensive grassland or shrub habitats). Of the marginally-suitable habitat that is present, only a small percentage of the total habitat present in the project area would be affected by the Proposed Action. Previous survey efforts did not document the occurrence of this species in the project area (Maxim 2001b). Columbian sharp-tailed grouse have been observed seven miles south of the project area. The Proposed Action would have no impact on the Columbian sharp-tailed grouse.

Boreal Owl

Potentially suitable habitats within the project area were surveyed for boreal owl during the spring of 2001, but no boreal owls were heard or observed during this survey effort (Maxim 2001b). Species occurrence, although unlikely, is possible within the project area, due to the existence of suitable habitat. The Proposed Action may result in adverse effects to the boreal owl due to habitat loss, but not from food chain uptake of selenium. The Proposed Action may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability over its range.

Flammulated Owl

Results of surveys conducted during the spring of 2001 reported audible detections of owls vocalizing within the project area. However, no nest locations were documented as part of the baseline studies (Maxim 2001b). The Proposed Action would result in the loss of aspen, conifer, and aspen/conifer mix habitat, and these areas represent potential flammulated owl habitat. Removal of occupied flammulated owl habitat would result in displacement of flammulated owls, causing increased competition between displaced owls and other resident predators. Increased competition could result in increased mortalities and/or decreased reproduction rates. The Proposed Action may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability over its range.

Great Grey Owl

No audible or visual observations of this owl were made during survey efforts for the species conducted in the spring of 2001 (Maxim 2001b). This species is likely to occur within the project area, because of the occurrence of suitable habitat within and adjacent to the project area and a nesting occurrence several miles east of the study area recorded by the Idaho Conservation Data Center. Loss of forest and forest edge habitats would reduce potential great gray owl foraging habitat. Displacement of great gray owls would result in increased competition between

displaced owls and other resident predators. Increased competition could result in increased mortalities and/or decreased reproduction rates. The Proposed Action may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend toward federal listing or a loss of species viability over its range.

Three-toed Woodpecker

No evidence of three-toed woodpecker was observed in 2000, although potential habitat exists within the project area (Maxim 2001b). Individuals of the species responded to calls at the nearby Smoky Canyon Mine and a pair was observed six miles south of the Smoky Canyon Mine (BLM 2001). Effects to three-toed woodpeckers would include habitat loss through conversion of aspen and conifer stands to stands of grass and interspersed shrubs and young trees. The Proposed Action may adversely impact three-toed woodpecker populations if they exist within or adjacent to the project area. The Proposed Action may adversely impact individuals, but not likely to result in a loss of viability on the planning area, nor cause a trend to federal listing or a loss of species viability over its range.

Sage Grouse

No sage grouse leks would be affected by the Proposed Action. The proposed loss of 8 acres of sagebrush habitat (considered marginal for sage grouse) would represent a long-term but reversible loss, as sagebrush is expected to reinvade the reclaimed area over two or three decades. The Proposed Action is not expected to have any effect on sage grouse.

Spotted Frog

The spotted frog was not observed during biological surveys of the project area conducted in 2000 (Maxim 2001b), although suitable habitat exists near the project area within the riparian corridor of the potentially affected creeks, including beaver ponds. This species has not been found on the Caribou National Forest (Green 1997 in Keysor 2002b). Groves and others (1997, pg. 12, in Keysor 2002b) do not identify southeast Idaho as part of the predicted range of the spotted frog. Increased sediment loads can affect amphibians such as the spotted frog, as can the use of herbicides near waterbodies. Salamanders, another amphibian species, have been adversely affected by selenium contamination at the nearby Smoky Canyon Mine and another phosphate mine in southeast Idaho (USGS 2001a, 2001b). The Proposed Action may adversely impact individual frogs, but is not likely to result in a loss of viability on the planning area, nor cause a trend toward federal listing or a loss of species viability over its range.

Yellowstone Cutthroat Trout

Potential effects to Yellowstone cutthroat trout because of the Proposed Action include loss of habitat quality or quantity and reproductive impairment from uptake of selenium and its toxic effects. The Proposed Action is not expected to have direct effects on fisheries located in the lower reaches of Sheep Creek, but may contribute to cumulative selenium contamination in downstream water bodies. Under the Proposed Action, a number of Best Management Practices would be implemented to limit the potential migration of selenium and other trace metals or contaminants to existing surface water resources. Surface water concentrations of selenium have been measured as high as 100 times greater than the state chronic water quality standard in nearby Smoky Creek, a creek that has been impacted by the Smoky Canyon Mine (BLM 2001,

Appendix B). Concentrations of cadmium, lead, and zinc also measured greater than the state chronic water quality standards for aquatic life. These impacts to Smoky Creek have occurred despite extensive mitigation measures. The Proposed Action may adversely impact individuals, but is not considered likely to result in a loss of viability on the planning area, nor cause a trend toward federal listing or a loss of species viability over its range.

Bonneville Cutthroat Trout

The Bonneville cutthroat trout was not documented during baseline studies and is not expected to occur within the study area (Maxim 2001a). The species does not occur in the Snake River Basin. Therefore, the Bonneville cutthroat trout does not occur in the study area. As a result, no adverse effects are expected for Bonneville cutthroat trout. The Proposed Action would have no impact on the Bonneville cutthroat trout.

4.8.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Alternative 1 would affect 320 acres. The additional surface disturbances associated with the external waste rock facility and clay quarry under Alternative 1 would represent an additional loss of foraging habitat for a number of species, including the northern goshawk, flammulated owl, and three-toed woodpecker. Determination statements for threatened and endangered species would be the same under Alternative 1 as under the Proposed Action.

Similar to the Proposed Action, Alternative 1 would use selective placement of potentially seleniferous material. In addition to selective placement of material, Alternative 1 also includes construction of an impermeable cap. The impermeable cap included in Alternative 1 would further reduce the potential for exposure to selenium for threatened, endangered, or sensitive plant and wildlife species.

Some additional habitat would be lost under the Alternative 1, while risks of selenium exposure would be reduced. In both cases, these changes would not be enough to warrant a change in determination statements.

The contribution to cumulative impacts from selenium contamination to threatened and endangered species would be less than under the Proposed Action after the impermeable cap is in place. Contamination of the Blackfoot River watershed by this alternative would be the same as under the Proposed Action until the impermeable cap is in place.

4.8.1.3 Alternative 2 – No Action

Alternative 2, No Action, would result in no additional impacts in the study area. The No Action alternative would preclude mining and any associated disturbance at North Rasmussen Ridge. The No Action alternative would maintain the status of threatened, endangered, and sensitive wildlife populations in and around the study area. According to the approved mine plan for Central Rasmussen Ridge, 35 acres would not be reclaimed under the No Action alternative because material would not be available to backfill a portion of the Central Rasmussen Ridge pit, which would represent a permanent loss of wildlife habitat within the Central Rasmussen Ridge

area. The Central Rasmussen Ridge pit could potentially form a pit lake. Exposed ore and waste rock in that pit could potentially mobilize selenium into the lake.

Existing concentrations of selenium in surface waters may seasonally exceed state chronic water quality standards and water consumption toxicity thresholds for aquatic life and terrestrial wildlife. Bioaccumulation and biomagnification of selenium from aquatic life through terrestrial food chains (amphibians and waterbirds) would continue at the present rate for the near future if the No Action alternative is adopted.

4.8.2 Irreversible and Irretrievable Commitment of Resources

The loss of conifer, mixed aspen/conifer forest, and sagebrush habitat represents an irreversible commitment of resources through the long-term loss of foraging habitat for some threatened, endangered, and sensitive species. Although the reclamation plan would help to re-establish vegetation in disturbed areas after mining operations end, it would take many years for disturbed areas to re-establish the current level of maturity and complexity. Local recovery of species that depend on the forest, such as flammulated and boreal owls, northern goshawks, great gray owls, and three-toed woodpeckers, would be limited until these forests become re-established.

4.8.3 Residual Impacts

The primary residual impacts to threatened, endangered, and sensitive species would be the loss of forest habitat. Development of a mature forest that may be used by flammulated and boreal owls and possibly as foraging habitat for northern goshawks, great gray owls, and three-toed woodpeckers would only occur after an extended period. Even with planting and natural succession, it is expected that these forests would require decades to recover to their current structure and level of complexity.

4.8.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to threatened, endangered or sensitive species. Additional mitigation measure are not deemed necessary.

4.9 GRAZING MANAGEMENT

4.9.1 Direct and Indirect Impacts

4.9.1.1 Proposed Action

The Proposed Action would affect (has already affected) two USFS grazing allotments as well as state and private allotments currently leased by the Idaho Citizens Grazing Association. Grazing has been temporarily suspended on mine leases, including approximately 79 acres would be directly affected in the Rasmussen Valley Cattle Allotment and 130 acres in the Sheep Creek Sheep Allotment. The Proposed Action has also affected 60 acres of state and private lands. State and federal lands outside mine lease holdings would continue to be used to graze livestock.

Over the short term, availability of forage for livestock or wildlife would be reduced. However, the long-term effect on the availability and quality of forage is expected to be neutral or improved. A total of 269 acres would be removed from production during mining, although the number of animals grazing on the allotment may not be reduced. The acres removed from production could result in additional grazing pressure on the remaining areas of the allotments that are not affected by the proposed development.

Currently, Unit 1A of the Rasmussen Valley Cattle Allotment cannot be used for grazing, due to mining activity. The Proposed Action would extend the mine through the north end of this unit. Before mining began, this unit supported 205 cattle for 48 days, which is 23 percent of the grazing use on this allotment. This unit contains about 2000 acres that are no longer practical to graze because of mining activities. Even though the mine directly disturbs only a small portion of the total area within the unit, it does affect the whole unit. Permitted cattle numbers may be reduced by about 85 head due to the mining activity. It is unlikely that sheep numbers would have to be reduced.

The potential for plant roots to take up selenium into the above-ground edible parts of the plant from seleniferous waste rock would be reduced by the application of layers of limestone rock and chert over the seleniferous waste rock. Comments in the vegetation section (section 4.5.2) describe wetland plants and legumes having higher levels of selenium than dryland plants and non-legumes. Selenium toxicity thresholds in plants have not been demonstrated (Skorupa 1998). No grazing would occur during the active life of the mine.

4.9.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Alternative 1 would affect the same USFS grazing allotments as well as state and private allotments currently leased by the Idaho Citizen's Grazing Association. Alternative 1 would result in a larger disturbance to grazing allotments when compared with the Proposed Action. The total disturbance would be increased by 51 acres through construction of an external waste rock facility and a clay quarry. If a synthetic liner is used, additional disturbance would only be 26 acres.

4.9.1.3 Alternative 2 – No Action

Alternative 2, No Action, would result in no additional impacts in the study area. No Action would preclude mining and any associated disturbance at North Rasmussen Ridge. Mining would continue at Central Rasmussen Ridge until all ore is removed. According to the approved mine plan for Central Rasmussen Ridge, 35 acres would not be reclaimed because material would not be available to completely backfill the open pit. Alternative 2 would not contribute any additional selenium contamination that could affect quality of grazing.

4.9.2 Irreversible and Irretrievable Commitment of Resources

About 72 acres of grazing resources are likely to be permanently lost as a result of implementation of the Proposed Action or Alternative 1, as forage plants would not be re-

established on the pit walls of the partially backfilled portion of Panel B. Additionally, 35 acres at Central Rasmussen Ridge would not be reclaimed.

4.9.3 Residual Impacts

No residual impacts are expected beyond the irreversible losses of forage identified in the previous section. Until vegetation becomes re-established, grazing forage for livestock would be reduced.

4.9.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to livestock grazing.

The following mitigation measures are proposed to reduce impacts. Based on past revegetation efforts, the forage production on reclaimed lands is expected to increase from an average of 400 to 800 pounds of usable forage per acre air dry weight to between 1,200 to 1,600 pounds per acre air dry weight. When mining reclamation is completed, and cattle are again allowed to graze the area, it would be necessary to build a fence along the ridge between No Name Creek and Sheep Creek. This fence would keep the cattle off the sheep allotment.

4.10 RECREATION

The area of analysis for recreation is bounded on the east by Sheep Creek, on the north and west by the boundary of the National Forest, and on the south by the Blackfoot River Road, with emphasis on the North Rasmussen Ridge Mine area. The potential effect of construction and operation of the proposed North Rasmussen Ridge Mine on recreation has two aspects: the first is the amount of recreation opportunity that is created by the proposed project and the second is the amount of recreation opportunity that is removed from recreational use. Local residents in Caribou County value forest land for recreation in part because of the proximity to their homes. The main issue identified in the scoping process is the potential change in access for recreation in the analysis area.

4.10.1 Direct and Indirect Impacts

4.10.1.1 Proposed Action

Existing recreation uses in the analysis area include the Mill Canyon campground and dispersed recreation. The Mill Canyon campground would not be disturbed by mining because the proposed mine would be located at least 5 miles from the campsite. Traffic on the existing haul road from the proposed mining operations would not affect the campsite.

Dispersed recreational use of these lands is limited as a result of restricted public access. Access into the North Rasmussen Ridge Mine would be restricted to ensure the safety of the public and mine employees. Haul roads constructed within the lease area would be closed to the public and would be reclaimed once the roads are no longer needed. The proximity of the proposed North

Rasmussen Ridge Mine to existing mining operations indicates that little dispersed recreation would be displaced by implementation of the Proposed Action. In general, adequate opportunities for recreation exist on public lands in the Soda Springs Ranger District to absorb any activity that might be displaced by the North Rasmussen Ridge Mine.

Construction, reclamation, and operations at the North Rasmussen Ridge Mine would not change current traffic levels on USFS roads that access the Rasmussen Ridge area, or on roads that provide access to any other USFS lands in the analysis area. The mining equipment and vehicles required would be located on site for the duration of mining. Traffic by employees of the mine on the existing access road that connects with the Blackfoot River Road would continue at current levels throughout the life of the mine.

Existing hunting opportunities in the analysis area would not be substantially affected by the proposed mining operations. Hunters would continue to have access to the southern portion of the analysis area, including the Mill Canyon campground, and along FDR roads 506 and 346. Hunting opportunities would still be available outside of the closed area and throughout the rest of the analysis area.

There would be no direct effects to recreational fishing because of the proposed mining operations as no closures are proposed for areas that currently support fish. Potential effects to the fisheries resource are described in the section on wildlife resources.

Once mining operations have ceased and public access is reopened, recreational opportunities would again be available in most of the area that was closed for public safety. Backfill area C would continue to be closed for safety. This alternative would be consistent with Forest-wide and Soda Springs Ranger District standards and guidelines for dispersed recreation and ROS classes of Semi-Primitive Motorized and Roaded Natural.

4.10.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Alternative 1 is similar to Proposed Action in the siting of most project facilities and the life of the project. The impacts to access on local roadway network would be identical to the impacts that would be experienced in the Proposed Action.

4.10.1.3 Alternative 2 – No Action

Existing mining operations have resulted in closure of certain areas for public safety. Portions of the closed area were formerly used by the public, primarily for hunting. Because of the ephemeral nature of the streams and drainages, there has been no effect to recreational fishing in the existing closure area. These conditions would be expected to continue under the No Action Alternative until operations at the Central Rasmussen Ridge Mine area have ceased and the area is reopened for public access.

4.10.2 Irreversible and Irretrievable Commitment of Resources

No irreversible or irretrievable commitment of recreation resources would be expected from implementation of the Proposed Action or alternatives.

4.10.3 Residual Impacts

Minor residual impacts to recreation resources would be expected from implementation of the Proposed Action or alternatives. Hunters and others who have used the North Rasmussen Ridge area would find the topography and vegetation have changed after reclamation is complete.

4.10.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to recreation. The following mitigation measures are proposed to reduce impacts. After mining and reclamation are completed, all area roads that were closed by the mining operation would again be open for public access. The rim of the pit walls would be posted with signs, fences, or other barriers to warn recreationists of the potential hazard of falls.

4.11 VISUAL RESOURCES

4.11.1 Direct and Indirect Impacts

4.11.1.1 Proposed Action

Short-term, localized effects to the visual character of the landscape would result from removal of vegetation, including timber, and exposure of soils of contrasting color and texture during construction and mining associated with the Proposed Action. Short-term effects to visual resources would occur over the life of the project. The Proposed Action would be located in an area that is generally unseen by public viewers. The activities associated with the Proposed Action would be visible in the background distance zone from a limited portion of Henry Cutoff Road. Because of the adjacent hilly terrain, disturbances associated with the Proposed Action would not be visible from the other public roads in the area. The potential viewers of the study area would be a limited number of local ranchers, mine personnel, USFS employees, and occasional visitors, such as hikers and hunters.

The visual quality objective (VQO) for the study area as defined in the Forest Plan is Modification or Maximum Modification. The VQOs of Modification or Maximum Modification allow the greatest change in the landscape, including management activities that dominate the original characteristic landscape. The corresponding SIO would be low.

The study area is considered to have typical scenic attractiveness, defined as ordinary or common scenic quality. Because the landscape of the study area is generally not visible to the average observer and is in the background view from Henry Cutoff Road, the constituent

analysis of the area results in a concern level of 3, or of low visual public concern (USFS VMS Map).

The Scenic Class of the study area ranges from 5 to 6, or of low public value. Areas of existing modification to the natural landscape include views of the existing mine activities of the South and Central Rasmussen Ridge Mines.

After mine closure is complete, long-term visual impacts would be reduced by reclamation and revegetation. Reseeded areas may appear as a somewhat different color and texture compared with the background landscape. The existing characteristic landscape would not be retained. The reclaimed landscape may mimic surrounding topography and vegetative cover would be predominantly grasses.

4.11.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Potential environmental effects from implementation of Alternative 1 would be essentially the same as for the Proposed Action. Alternative 1 would require an external waste rock facility that would encompass an additional 26 acres on the southwest side of Panel A. The outer face of the waste rock facility would be an area of different color and line that would not be present under the Proposed Action. However, the facility would be only 1,500 feet long and would not constitute a large structure when viewed from a distance. The visual effect of Alternative 1 would be acceptable in the Modification VQO. Additional visual effects on the sagebrush/grass community would result from the clay quarry (about 25 acres) associated with the source for one of the cap materials.

4.11.1.3 Alternative 2 – No Action

Under implementation of Alternative 2, there would be no mining or associated disturbance at North Rasmussen Ridge. The existing mine at the Central Rasmussen Mine would continue to be visible under the No Action alternative. The VQO of the Central Rasmussen Ridge Mine area is Modification and allows management activities to visually dominate the original characteristic landscape.

When reclamation is complete, there would be minimal long-term modification of the visual resources of the reclaimed areas compared with the undisturbed landscape as seen in background views along a portion of Forest Road 243.

4.11.2 Irreversible and Irretrievable Commitment of Resources

The existing characteristic landscape would not be retained. The reclaimed landscape may mimic surrounding topography and vegetative cover would be predominantly grasses. Irreversible commitment of resources could occur if re-establishment of plants through reclamation is unsuccessful.

4.11.3 Residual Impacts

After reclamation is complete, minimal residual impacts to the visual quality of the study area would be expected as a result of implementation of any of the alternatives. There would be minimal modification of the visual resources in background views along a limited number of public roadways from the contrasting color and texture of the disturbed areas compared with the undisturbed landscape. Under any of the alternatives, the areas to be disturbed are not generally visible from traveled roadways.

4.11.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to visual quality. Additional mitigation measures are not deemed necessary.

4.12 LAND USE, ACCESS AND TRANSPORTATION

4.12.1 Direct and Indirect Impacts

4.12.1.1 Proposed Action

Land Use

Under the Proposed Action, short-term effects to land use in the North Rasmussen Ridge Mine area would occur from displacement of the existing land uses by mining-related facilities and activities over the 8-year life of the project. Surface disturbances associated with the Proposed Action are summarized in **Table 2.2-2**. Short-term effects to land use associated with the Proposed Action would be displacement of a total of 269 acres of rangeland, consisting of 98 acres of state and 171 acres of USFS lands. The state and federal lands outside the mining leases that would not be directly affected by active mine operations would continue to be used to graze livestock.

For this alternative, all disturbed areas that are amenable to reclamation would be reclaimed and revegetated as described in Section 2.2.3.4, Reclamation. After reclamation is complete, long-term disturbances would displace a total of 72 acres of rangeland, consisting of 37 acres of state land and 35 acres of USFS land. Approximately 27 percent of the total disturbance cannot be reclaimed, such as areas of exposed highwall or steep cut slopes. Under the proposed North Rasmussen Ridge Supplemental Mine and Reclamation Plan (Agrium 2001), disturbed areas would be reclaimed using non-seleniferous material and a seed mixture primarily made up of grasses. After reclamation is successful, the rangeland (in terms of forage production and carrying capacity) may be improved compared with existing conditions, as analyzed in Section 4.9, Grazing Management.

Access and Transportation

Under the Proposed Action, public access and the volume of traffic on existing transportation facilities would remain similar to the current conditions related to the existing Central Rasmussen Ridge Mine. Ore produced from the North Rasmussen pits would continue to be hauled by truck to the Wooley Valley rail loading facility (tipple). The haul routes would include using the East Road Extension (a new haul road), the existing West Road, and the existing haul road from the mine to the tipple. One new haul road would be constructed to provide access to the North Rasmussen pit and to accommodate ore and waste rock haulage. This new road would be constructed by extending the approved East Road from the Central Rasmussen Ridge Mine northward and parallel to the proposed North Rasmussen pit. The new haul road would be constructed primarily within the boundary of the lease and would not be open to the public. There are no public access crossings along the proposed route for the new haul road. As haul and access road is no longer needed for mining, it would be reclaimed to USFS and IDL specifications. Accordingly, additional opportunities for public access to the study area are unlikely to result from the Proposed Action.

Little or no increase in vehicular traffic is anticipated to occur under the Proposed Action. The existing 400 employees at the Central Rasmussen Ridge Mine would continue mining at the North Rasmussen Ridge Mine and would commute daily on the local roads over the 8-year life of the project. Employees would commute from Soda Springs, Montpelier, and other communities via U.S. Highway 30 and State Highway 34. In addition, a limited number of contract personnel may be employed temporarily for a short-term construction phase of the project.

4.12.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Under Alternative 1, short-term surface disturbance would displace 320 acres of existing rangeland. Long-term disturbances would affect 72 acres of rangeland. The total surface disturbance associated with Alternative 1 would be increased by 51 acres compared to the Proposed Action because of the use of an external waste rock dump and a clay quarry. Approximately 23 percent of the total disturbance associated with this alternative would not be reclaimed.

Under Alternative 1, the potential effects to public access and traffic volume on the existing transportation facilities would be the same as were analyzed for the Proposed Action.

4.12.1.3 Alternative 2 – No Action

Under Alternative 2, there would be no mining or associated disturbance at North Rasmussen Ridge. This alternative would involve continued mining at the Central Rasmussen Ridge Mine until all ore was recovered. As shown in **Table 2.1-1**, this alternative would involve short-term disturbance of 231 acres. After mine closure, 85 percent of the short-term disturbance would be reclaimed and revegetated. Long-term disturbance would affect 35 acres that would not be

reclaimed because material would not be available to backfill the open pit at Central Rasmussen Ridge (**Figure 2.1-2**).

Under Alternative 2, public access, the volume of traffic, and road conditions would remain unchanged from the current state until closure of the Central Ridge Rasmussen mining area. Ore produced from the Central Rasmussen pits would be hauled by truck to the Wooley Valley rail loading facility. The existing 400 employees at the Central Rasmussen Ridge Mine would continue to commute daily on the local roads. Employees would commute from Soda Springs, Montpelier, and other communities via U.S. Highway 30 and State Highway 34. After closure and reclamation are complete, vehicular traffic to the study area would likely decline.

4.12.2 Irreversible and Irretrievable Commitment of Resources

There would be irreversible or irretrievable impacts to land use under implementation of any of the alternatives because unreclaimed areas would be permanently removed from rangeland uses. Under the Proposed Action, 72 acres of rangeland cannot be reclaimed because of the steep cut slopes. For Alternative 1, 72 acres of rangeland would not be reclaimed. Under implementation of Alternative 2, 35 acres of the Central Rasmussen pit would not be backfilled and would remain in an unreclaimed state as per the approved mine plan.

There would be no irreversible or irretrievable impacts to access or transportation resources as a result of implementation of any of the alternatives.

4.12.3 Residual Impacts

Residual impacts to land use resources would result from any of the alternatives because the unreclaimed areas would be permanently removed from rangeland and recreational uses. These residual adverse impacts would be minor when compared with the overall availability of rangeland and recreational resources in the regional area.

There would be no residual adverse impacts to access or transportation resources as a result of implementation of any of the alternatives.

4.12.4 Mitigation Summary

Project design features, BMPs, and the proposed Reclamation Plan (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts to access, transportation, and land use. After mining ends, Sheep Creek Road would be reopened to the public, pending IDFG and USFS approval.

4.13 CULTURAL AND NATIVE AMERICAN CONCERNS

4.13.1 Direct and Indirect Impacts

The entire area of potential effect of the Proposed Action and the alternatives has been inventoried for the presence of cultural resources. No eligible cultural resources have been found

in the project area. The North Rasmussen phosphate occurs in the Meade Peak Member of the Permian Aged Phosphoria Formation, which is overlain by the Rex Chert Member of the same formation. Chert and porcellanite facies of the Phosphoria Formation farther east in the Bighorn and Pryor Mountains produce distinctive cherts and porcellanites that were highly valued by prehistoric populations as raw material for manufacturing stone tools. In general, the chert and porcellanite that occurs in the chert facies of the Phosphoria Formation in extreme western Wyoming, Utah, and southeastern Idaho is fossiliferous and impure (Miller 1991). These western varieties of Phosphoria cherts have not been consistently identified in archaeological assemblages. Cultural resource inventories in the project area have not identified any culturally modified Phosphoria chert or porcellanite. The chert and porcellanite in these deposits that were reasonably accessible to primitive technology were not of adequate quality to be attractive.

If any eligible cultural resources were present within the area of proposed mine, ground-disturbing activities, including surface storage of waste rock, would destroy the cultural resources. There could also be indirect impacts to nearby resources. No eligible cultural resources have been identified in the project area, and no direct or indirect impacts would occur.

4.13.1.1 Proposed Action

All of the areas of proposed disturbance have been inventoried for cultural resources, and no historic properties that may require avoidance, monitoring or mitigation have been identified.

4.13.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

This alternative is essentially the same as the Proposed Action except for the construction of a layer of impermeable material between the seleniferous waste rock and the applied growth media. Differences in design would increase the surface area that would be disturbed outside the perimeter of the pit by 51 acres. However, no historic properties have been identified in this proposed additional area, and no adverse impact is anticipated.

4.13.1.3 Alternative 2 – No Action

The No Action Alternative would preclude mining and development in the North Rasmussen Ridge area, but approved mining at the Central Rasmussen Ridge Mine would continue. No eligible cultural resources have been identified in this area, and there would be no adverse effect to known historic properties.

4.13.2 Irreversible and Irretrievable Commitment of Resources

No eligible cultural resources have been identified in the project area. Consequently, there would be no irreversible and irretrievable commitment of resources.

4.13.3 Residual Impacts

This project would not result in residual impacts to cultural resources.

4.13.4 Mitigation Summary

Because no cultural resources have been identified in the project area, no mitigation measures would be necessary.

4.14 SOCIOECONOMICS

4.14.1 Direct and Indirect Impacts

4.14.1.1 Proposed Action

The analysis area for the socioeconomic environment is Caribou and Bear Lake counties. Actions or decisions that influence the economic feasibility of the mining operations would also be reflected in the socioeconomic environment. Mine economics have an effect on employment; property tax payments; royalties going to schools, roads and bridges; net proceeds of mining tax revenues; and local purchases by Agrium and its employees and Washington and its employees.

Implementation of the Proposed Action would allow open pit operations to continue for an estimated 8 additional years based on the proposed mine plan (Agrium 2001). Implementation of the North Rasmussen Ridge Mine project would result in sustained employment at the mine, allow for further diversification of the local economy, enhance community stability, and provide for continued payment of local, state, and federal taxes by Agrium, its employees, Washington, and its employees. Local government fiscal conditions in particular depend on sustained economic activity and continued revenues from sales and use taxes and property taxes. Without implementation of the proposed expansion project, existing operations at the Central Rasmussen Mine are estimated to continue at current levels through 2003, when reserves in the Central Rasmussen pit would be exhausted, limiting the volume of ore available to Agrium's fertilizer plant. As a result, approximately 400 mine and plant employees would be laid off, revenues from property taxes would be lost, and payment of other taxes and the purchase of goods and services would be reduced.

The Proposed Action would not cause adverse impacts to the socioeconomic resources of Caribou and Bear Lake counties. The proposed action requires no new workforce, and generates only moderate tax revenues. Consequently, no increases in housing or community service demands would occur and existing and planned facilities would not be adversely affected. The operation of the project would add revenue to the Caribou County tax base. Economic benefits to Bear Lake County would be limited to the circulation and recirculation of personal income earned as wages paid to employees. A major percentage of the current workforce resides in Bear Lake County. No additional employees would be hired for the proposed mine expansion, and no impacts to the counties from additional pressure on county services and housing would be expected.

Population

It is anticipated that the project workforce would consist of local contract workers who have been employed in ongoing mining operations at the Central Rasmussen Ridge Mine. No changes in employment or population are anticipated as a direct result of the Proposed Action. There would be no increase in population as a direct impact from the ongoing operations at the Central Rasmussen Ridge Mine or the proposed operations at the North Rasmussen Ridge Mine. The labor pool in Caribou and Bear Lake counties would be able to meet the needs for additional workers in the event that additional contract employees would be required for any phase of the proposed project.

Economy and Employment

Short-term impacts to socioeconomic resources would be relatively minor. It is unlikely that the Proposed Action would have a perceptible impact on the economy of Caribou County. The primary economic sectors are services and agriculture. The services sector consists largely of recreation and tourism-related establishments. Proposed activities would not affect tourist visits to the region. The initial development phases of the proposed project would require purchases of equipment and supplies; however, the economic benefits to the affected counties would be limited.

Long-term impacts would be beneficial for the life of the proposed mine. There would be beneficial impacts to the county tax base as a result of the North Rasmussen Ridge Mine operations. Caribou County would receive revenues from property taxes, fees, and permits. Additional personal income would be generated for residents in Caribou County, Bear Lake County, and the State of Idaho by circulation and recirculation of dollars paid out as salaries, business expenditures, and as state and local taxes.

No property taxes would be paid on the mine, as the proponent does not own the mining property. However, property taxes on Agrium's fertilizer plant and other mining property would be an estimated \$1.2 million in 2002. In 1999, Caribou County received more than \$7 million in total property taxes. It is anticipated that property tax revenues would be slightly higher for 2002, so that Agrium would contribute an estimated 15 percent of total property taxes in the county.

Royalties on the mined ore are paid to federal agencies at about \$0.75 to \$0.85 per wet ton mined. A certain amount then comes back to the communities to be used for schools, roads, and bridges. Between 2004 and 2011, the estimated range of production would be 1.1 million to 1.9 million tons of ore per year. The estimated royalties paid to the county would range between \$0.8 million to \$1.4 million for each year of production at the North Rasmussen Ridge Mine.

Expenditures made for equipment, energy, fuel, operating supplies, and other products and services benefit businesses in the counties and the state. The estimated purchases made directly by Agrium in 2002 for initial development phases would be about \$300,000. In addition, Agrium's annual payments to the contractor include purchases of diesel fuel, parts, and supplies.

Housing

No changes in employment or population are anticipated as a direct result of implementation of the Proposed Action. Any additional employees are likely to be local hires; therefore, it is unlikely that there would be any demand for additional temporary or permanent housing within or near the analysis area. In the event that additional contract workers are hired from outside of the affected counties, housing needs likely can be met with the existing supply, depending on the vacancy rates during the period of operations. The majority of available housing units in the project area are located in the communities of Soda Springs and Montpelier. In Soda Springs, the rental vacancy rate in 2000 was 28.9 percent, and the homeowner vacancy rate was 2.2 percent. The 2000 rental vacancy rate in Montpelier was 25.8 percent, and the homeowner vacancy rate was 16.4 percent. No adverse impacts to housing availability and services are therefore expected. There would be sufficient rental units to house the project workforce.

Community Services

Construction, operation, and maintenance of the proposed project would not increase or decrease the need for police, fire, medical, or other community resources in the project area. The project would not cause an increase in the local population in Caribou and Bear Lake counties; therefore, no increases for county and community services are anticipated. The local population increases considerably on an annual basis during the tourist season, and the counties are accustomed to meeting the needs of the seasonal increases in population.

No increases in employment or population are anticipated from implementation of the Proposed Action or Alternative 1. Therefore, increases in existing levels of domestic water usage in Caribou or Bear Lake Counties are not expected, and no effects on existing domestic water facilities would occur. In addition, existing organized public water systems would not be used for any portion of mining operations. Therefore, no effect on domestic water systems would occur. Wastewater disposal requirements in Caribou County or the cities of Soda Springs or Montpelier are not anticipated to increase with implementation of either action alternative.

Similarly, no county-wide effects on solid waste collection or disposal are anticipated as a result of increases in the population. Solid waste generated at the project site would continue to be hauled from the site and disposed of at an approved landfill.

Community effects on law enforcement, fire protection, medical facilities, schools, parks and recreation, or public libraries are not anticipated with implementation of any action alternative.

4.14.1.2 Alternative 1 - Proposed Action with Impermeable Capping of Backfilled Area

Alternative 1 includes all of the socioeconomic effects described under the Proposed Action. Impacts to the socioeconomic structure of Caribou and Bear Lake counties, including population, housing, and employment, are identical for the Proposed Action. Impermeable capping of backfilled waste rock may require additional expenditures for supplies or equipment, but any

additional revenues realized from these purchases by vendors within the counties or the state would not be greatly different than purchases made for the Proposed Action.

4.14.1.3 Alternative 2 - No Action

Selection of the No Action Alternative would result in a decline in employment at the existing Central Rasmussen Ridge Mine beginning in 2003 based on current mine economics. It is likely that many of those workers currently employed by Agrium and Washington would relocate if other local employment were not available, resulting in a slight reduction in the overall county population.

The projected loss of employment could lead to negative effects on overall stability of the community. Although many current Agrium and Washington employees could be hired at other mining projects in the area, a substantial number would become unemployed and might leave the area to seek other employment. Large fluctuations in employment would not provide for a stable community environment.

The No Action Alternative would generally have no effect on existing public utilities and services. However, tax-based revenues and other sources of municipal funding related to mining operations would be negatively affected if the Central Rasmussen Ridge Mine closes. Subsequently, Caribou County's ability to fund certain utilities and services could be jeopardized. This effect may be less if employees find jobs at other mine operations in the county, which would be unlikely.

Selection of the No Action Alternative would result in a reduction in sales, use, and property tax revenues generated by Agrium mining operations. There would be losses in revenues from taxes paid by Agrium, its employees, Washington, its employees, and by secondary businesses and their employees, resulting in a decrease in Caribou and Bear Lake County's overall revenues

4.14.2 Irreversible and Irretrievable Commitment of Resources

There would be no irreversible or irretrievable commitment of social or economic resources associated with the Proposed Action or alternatives.

4.14.3 Residual Impacts

The Proposed Action and Alternative 1 would not have residual effects on social or economic resources. Alternative 2, No Action, could result in some social dislocations and economic changes in county and local revenues beginning in 2003, when mining at the Central Rasmussen Ridge Mine would cease.

4.14.4 Mitigation Summary

No specific mitigation measures for socioeconomic resources have been identified.

4.15 ENVIRONMENTAL JUSTICE

On February 11, 1994, Executive Order 12898, “Federal Action to Address Environmental Justice in Minority Populations and Low-Income Populations” was published in the Federal Register (59 FR 7629). The order requires federal agencies to identify and address disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations. The Proposed Action is an expansion of an existing facility that is surrounded by National Forest System lands, and would not affect any area made up of low-income housing or affect low-income populations.

The U.S. Census identified 714 residents, or 9.6 percent of the total population, who live below the poverty level in the urban areas of Caribou County. Residents who live below poverty level were not identified for rural areas between Soda Springs and the Rasmussen Ridge Mine. The proposed project is on federal leases and is not located within the corporate limits of any urban community or in any populated rural area. The Proposed Action would not affect any area that contains populations living under the poverty level.

The population of Caribou County is predominantly white (96.0 percent, according to the 2000 Census). The Hispanic population accounted for 4.0 percent. Other minority groups in Caribou County constitute a small percentage of the total population. No areas were identified in the county that consisted of predominantly minority populations. Neither the Proposed Action nor Alternative 1 would disproportionately affect minority populations.

4.16 HAZARDOUS MATERIALS AND WASTE

4.16.1 Direct and Indirect Impacts

4.16.1.1 Proposed Action

An accidental spill of hazardous materials or wastes associated with the Proposed Action is unlikely to pose environmental or public health and safety risks. As shown in **Table 2.2-6**, most of the hazardous materials to be used for the Proposed Action would be stored in above-ground tanks in the existing shop area at the Central Rasmussen Ridge Mine. The capacity of the existing secondary containment facilities is adequate to hold the entire contents of the largest tank within the storage area, including freeboard for precipitation. Fuel leaks from the truck filling area would be contained in the haul road retention pond D and would not likely reach No Name Creek or other drainages. Less than 100 kilograms of hazardous waste (waste solvents) would be generated per month. Compliance with the procedures and training defined in the existing approved SWPPP would minimize the potential for spills or leaks of hazardous materials or wastes. Agrium’s mining contractor, Washington Group, also has a Spill Prevention Plan (SPP) in place to prevent spills and to direct responses if a spill does occur.

Wastes generated by drilling would be handled as described in Section 2.2.2.2, Waste Dump and Backfill Design. Waste produced from the mining process would be placed in the backfilled portions of the Central Rasmussen pit and mined-out areas of the North Rasmussen pits as they become available.

The Proposed Action is unlikely to pose safety hazards to the public related to the proposed route for transporting hazardous materials and wastes. Under the Proposed Action, the proposed storage area for hazardous materials would be the existing shop area at the Central Rasmussen Ridge Mine and the haul route for hazardous materials and wastes would be the same route that is currently used at the Central Rasmussen Ridge Mine. The primary transportation route from Soda Springs to the shop at the existing Central Rasmussen Ridge Mine would be via State Highway 34, Blackfoot River Road, and the existing haul road to the mine site.

4.16.1.2 Alternative 1 – Proposed Action with Impermeable Capping of Backfilled Area

Potential risks associated the hazardous materials or wastes for Alternative 1 would be the same as were analyzed for the Proposed Action. Under Alternative 1, the hazardous materials and wastes, quantities used and stored on site, and storage locations would be the same as were analyzed for the Proposed Action (**Table 2.2-6**). Under Alternative 1, hazardous materials and wastes would continue to be transported along the same route that is currently used for the Central Rasmussen Ridge Mine.

4.16.1.3 Alternative 2 – No Action

The hazardous materials or wastes for Alternative 2 would not pose any risks to the environment or public health and safety. Under Alternative 2, there would be no mining or associated disturbance at North Rasmussen Ridge. This alternative would involve continued mining at the Central Rasmussen Ridge Mine until all ore was recovered. For Alternative 2, the hazardous materials and wastes, quantities used and stored on site, and storage locations would continue to be used at the Central Rasmussen Ridge Mine (**Table 2.2-6**). No significant spills or leaks of fuel have occurred during operation of the existing mine facilities (Agrium 2002).

4.16.2 Irreversible and Irretrievable Commitment of Resources

No long-term effects to health and safety from hazardous materials would result from implementation of any of the alternatives.

4.16.3 Residual Impacts

No residual adverse impacts to health and safety from hazardous materials would result from implementation of any of the alternatives.

4.16.4 Mitigation Summary

Project design features and BMPs (see Chapter 2) are the elements of the Proposed Action designed to reduce environmental impacts from hazardous materials. No specific mitigation measures are proposed to address hazardous materials and wastes, as the handling and storage of those materials are already controlled by a body of laws and regulations. The regulatory framework for hazardous materials and wastes was presented in Section 2.2.3.6.