

Buckhorn Access Project

Chapter II

Alternatives Including the Proposed Action

INTRODUCTION

The discussion of alternatives is the foundation of the Environmental Assessment process (40 CFR 1502.14). This foundation consists of the development of a reasonable range of alternatives. The Forest Service has explored and evaluated numerous potential components of the alternatives during the selection and development of the alternatives which includes the No Action Alternative and the Proposed Action. In total, five alternatives (four action and the no action alternatives) have been developed for full evaluation in this Environmental Impact Statement (EIS).

This chapter includes reclamation, mitigation, and monitoring measures which are associated with the implementation of any of the action alternatives. The existing environment and environmental consequences associated with each of the action alternatives are analyzed in Chapter III, Affected Environment and Environmental Consequences. The existing environment at the various component locations were thoroughly described in the 1997 Crown Jewel Mine FEIS completed by the Forest Service and the Washington Department of Ecology.

FORMULATION OF ALTERNATIVES

Introduction

Alternatives were developed and analyzed to address environmental and social issues, to respond to public and agency concerns and input, and to satisfy regulations of the National Environmental Policy Act (NEPA). Scoping, as discussed in Chapter I, was used to identify concerns and potential issues. Key issues were identified in an interdisciplinary process by the Interdisciplinary Team using information gathered during public and internal scoping, site specific knowledge of the analysis area, resource expertise, and professional judgment.

The key issues were used to formulate the alternatives by emphasizing resolution of one or more issues within an alternative. Management requirements, mitigation measures, and monitoring requirements were incorporated into the development of the alternatives. The objective of developing and reviewing the alternatives is to provide the agency decision-maker and the public with a reasonable range of alternatives for consideration.

Prior to the formulation of the action alternatives, several determinations were made that provide guidance in alternative development. The following paragraphs summarize these determinations.

Regional Forester Amendment #2 – The decision notice for the Continuation of Interim Management Direction Establishing Riparian Ecosystem and Wildlife Standards for Timber Sales (Regional Forester’s Amendment #2, 1995) establishes various standards depending on the relationship of existing late and old structure (LOS) stands to historical ranges of variation. These standards do not apply to this project. This project is not a timber sale although about 390,000 board feet of right-of-way timber would be transferred under a settlement contract to the proponent or decked for later sale by private landowners.

Riparian Habitat Conservation Areas - Direction from the Inland Native Fish Strategy (INFISH, 1995) applies to this project. Of particular concern would be the standards and guidelines for Roads Management and Minerals Management.

Forest Service Roadless Area Conservation FEIS and ROD and Interim Directive for Inventoried Roadless Areas – The Roadless Area Conservation FEIS and ROD and Interim Directive do not apply to any portion of the proposed project area. The Jackson Creek Inventoried Roadless Area (IRA) is directly adjacent to the proposed Nicholson Creek Haul Route, but no activities, including no timber removal or road construction/reconstruction, would occur within the Inventoried Roadless Area.

Project alternatives were developed as a result of numerous meetings and discussions of scoping comments and review of issues submitted. The issues and comments received from both the public and government agencies formed the basis for the selection of the alternatives presented in this EIS.

The assembled alternatives are described and compared in Table II-5, Comparison of Components by Alternative. Additional details concerning project alternatives, including representative figures and tables, are found in the Alternative A through Alternative D sections later in this chapter.

Alternative A (No Action) and Alternative B (Proposed Action) are required to be analyzed by NEPA. Alternatives B1, C, and D were developed to address issues and concerns identified during the scoping process and in an effort to alter or reduce the magnitude of certain effects on individual resources (i.e. effects on deer winter range and other wildlife, effects on adjacent residents, effects on the recreating public, etc.)

Identification of Project Components

The first step in developing alternatives involved identifying the Project components. Components (facilities or activities) include:

- Ore Haul Routes,
- Supply Haul Routes,
- Employee Transportation,
- Ore and Supply Transportation Operating Schedule,
- Project Fence,
- Infiltration Gallery, Dosing Tank, and Pipeline,
- Utilities (power, telephone, and data line),
- Reclamation,
- Water Monitoring,
- Dust Suppression Techniques, and
- Water Tower Access Route.

Development of Options

The second step in developing alternatives consisted of developing options for the project components. These options considered for each facility are based on location, design, operational, or reclamation methods. Options were either included in alternatives fully considered

or rejected for the reasons stated below. Additional information regarding consideration of options can be found in the project analysis file.

Options to be considered in detail were assembled into three other project alternatives and were compared to the No Action Alternative (Alternative A) and the Proponent's proposal (Alternative B).

Management, Mitigation, and Monitoring

From the start of the Crown Jewel Project in 1992 to the present, there have been numerous discussions regarding management, mitigation, and monitoring measures. Environmental management and mitigation guidelines, as well as monitoring and control measures, must ensure that the final actions conform to the applicable laws relating to this project. The intent of these constraints, guidelines, and mitigation measures is to ensure that adverse environmental impacts are avoided, minimized, or otherwise reasonably mitigated during construction, operation, closure, and post-closure of the Project.

Following completion of the NEPA process, and a decision on the selected alternative, the Proponent must provide final engineering design, reclamation, and closure plans for the selected alternative. The Proponent would be required to modify the Plan of Operations to incorporate any stipulations set forth in the Record of Decision (ROD), as necessary, and must file reclamation performance securities acceptable to the Forest Service. These securities would not be released until the Forest Service determines that adequate reclamation has been successfully completed and no other remediation measures are necessary. Any changes to the project after the decision would be reviewed and may or may not require a revised NEPA analysis or decision depending on the scope or magnitude of the change.

Alternatives Considered but Eliminated From Detailed Study

Original Crown Jewel Project

The Crown Jewel Project Final EIS (Forest Service and Washington Department of Ecology, 1997) analyzed six action alternatives and the No Action Alternative. All of the action alternatives considered different proposals for on-site processing of ore. Although these alternatives were fully developed in that EIS, which is incorporated by reference in this EIS, and are therefore within the range of alternatives for this EIS, these alternatives were eliminated from detailed study in this EIS because they had already been studied, the mining claims were patented in late 2004, the relatively greater area of disturbance, the overall adverse impacts to the environment from the alternatives in the Crown Jewel Project on National Forest System land, and the State Pollution Control Hearing Board voiding of State permits necessary for on-site milling. The Crown Jewel Project information is available for public review at the Tonasket Ranger District or at the Okanogan Valley Office.

Dry Gulch Milling and Tailings Disposal

As discussed in the original Crown Resources Plan of Operations (Crown Resources, 2003), milling and tailings disposal at Dry Gulch near the mine site would be an alternative to transporting the ore to the Kettle River Operations for processing. The general public disadvantage of this alternative is the need for increased disturbance and environmental impacts associated with the development of the processing facilities, and particularly a tailings facility, at Dry Gulch. The public advantage of the development of this facility would be the replacement of

the 47 mile, one way, haul to the Kettle River facilities with a 7 mile, one way, haul to Dry Gulch; the decreased impacts on certain Okanogan and Ferry County roads; and the use of approximately 85% less diesel fuel for ore transport activities. However, the impacts of this alternative on National Forest System land would be similar to the impacts discussed in Alternative D. The proponent amended the 2003 Plan of Operations with the 2005 Plan of Operations, dropping the Dry Gulch mill proposal. The Forest Service has no authority to compel the development of a new mill and tailings facility on private lands, but has fully evaluated the route across National Forest System lands to the end of the Forest Service right-of-way.

Components Considered but Eliminated from Detailed Study

Ore Haul Routes

Because the existing mill outside Republic is proposed to be used to process the ore, a logical ore haul route would need to be designated to allow this transportation of ore. Options considered but eliminated included these routes or variations on these routes on National Forest System land:

- Follow existing road FR 3575-140 to the upper and lower portals:
 - A possible access route to the upper and lower portals is Forest Road 3575-140. This route was not considered feasible because much of the road grade was greater than 8.5% so a new road location would need to be established and the first 0.2 miles from the lower portals would be a steep adverse haul for the loaded ore trucks.
- From Toroda Creek Road (OCR 9495) to FR 3550 (Marias Creek) to FR 3550-125 to new road to Cow Camp (2 variations), to new road to the Lower Portal;
- From OCR 9495 to FR 3550 to FR 3550-125 to FR 3550-130 to new road to Cow Camp, to new road to the Lower Portal;
- From OCR 9495 to FR 3550 (Marias Creek/Bear Trap Canyon) to new road to Cow Camp, to new road to Lower Portal:
 - The three bullets above all related to different versions of the Marias Creek haul route considered. Five different versions of the Marias Creek (FR 3550) route to the lower portal were considered including trying to follow FR 3550-130, continuing up Bear Trap Canyon on FR 3550, and three versions off the 3550-125 road. The route selected to be considered as the Marias Creek haul route was the safest route, had similar wildlife impacts to deer winter range as the other 4 alternatives considered, and had less impacts to riparian areas and wetlands than the routes above.
- From OCR 9495 to FR 3575 to FR 3575-100 to FR 3575-120 to Cow Camp, to new road to Lower Portal:
 - Two versions of the Nicholson haul route were considered that would not require a Forest Plan amendment for Management Area 14-18 for road use. The route that followed FR 3575-100 to the ridge top was eliminated because of safety concerns with the steep grades and sharp curves, though it was shorter than the FR 3575 to FR 3575-150 route selected to be considered. The route that followed FR 3575-100 would have required a Forest Plan amendment for MA 14-17 for road use during the winter. This would have only changed the deer winter range area impacted from MA 14-18 to MA 14-17.
- A route going west from the patented land with access staying on private and state land:

- As part of the scoping process, the Forest Service reviewed other suggested routes that would be remotely feasible without the use of Federal land (BLM and Forest Service). The only route that might meet this was to follow the patented claims through section 14 to the Triple Creek Ranch road in section 15. This route was not feasible without going over Federal lands since it would require steep road grades and road construction through rock cliffs if it did not involve Federal lands.
- Rail shipping of ore:
 - As part of the scoping process, it was recommended to consider rail shipping of the ore to the mill. This option was not carried forward because the necessary infrastructure would have been cost prohibitive. In addition, to accommodate necessary grades for rail use, the amount of new ground disturbance on National Forest System land would be greater than for transport of the ore with trucks.
- Single lane road with intervisible turnouts:
 - As part of the scoping process, it was recommended to consider a single lane ore, supply and employee access road. The present roads are generally 17 – 18 foot wide thus exceed the standard for a single lane road. This option would require numerous turnouts based on design criteria, alignment, grade, speed, and safety due to steepness of the road and year-around use. Having a one lane road with turnouts would require constructing a vehicle turnout about every 250 feet, constantly varying the widths along the road, for safety and to minimize delay time. A minimum length vehicle turnout for a traffic service level (TSL) A road is approximately 175 feet in length for a full-length turnout from start to end (50' tapers on both ends and 75' minimum turnout length). Furthermore, the additional road width for a turnout on a TSL "A" road is 10 feet minimum, generating a total road width of 28 feet, plus 3 feet of ditch. 70% of the road would be effectively double lane, thus it was decided to construct the entire road as a double lane road. Refer to the Transportation Report in the analysis file for a more complete explanation by the project engineer.

The benefits of improving the road to a 31-foot two-lane road (24-foot running surface, 3 –foot ditch, and 2 feet shoulder on each side) include: improved traffic flow since traffic would be less congested; fewer delays since the increased road width would accommodate the increased traffic volume; and increased safety to passenger cars and trucks by allowing two-way traffic to travel in separate lanes, drivers would have more room to react to hazards, significantly reducing the risk of head-on collisions and other accidents. Under Alternative B1, gravel portions of the road across National Forest System land and right-of-ways would be returned to their present 17 to 18 foot running surface width, with intervisible turnouts, during reclamation.
- Construct and operate a one-way road system:
 - As part of the comments on the preliminary Environmental Assessment, it was suggested that the Forest Service consider a one-way road system for ore, supply, and employee access. This alternative is not a viable alternative from a safety standpoint. Two of the three haul routes considered have residences along portions of the road. The lower portions of the Nicholson Creek route, about 2.3 miles in length, and most of the Cow Camp route would have to be reconstructed to a double lane standard to provide safe passage of the private landowners to get to and from their homes. The use of a one-way system of roads would increase impacts to recreation, fish/aquatics, weeds, wildlife, and hydrology, thus it was decided to not consider this option further.

- Eliminate any new road construction:
 - Heavy ore haul trucks cannot operate safely of the current grades on portions of the Marias Creek road, necessitating a road allowing for grades that are less steep. Alternatives C and D do not require any new road construction, except the 0.6 miles of construction on National Forest System land from private land at Cow Camp to the mine site. The remainder would be reconstruction of existing roads to a double lane standard. This new section of road can not be eliminated since the existing 3575-140 road is too steep to allow for safe operation of ore haul trucks (see above).

Supply Haul Routes

Options considered but eliminated included:

- Allow supplies to be delivered via all feasible routes, whatever is the easiest for the supplier:
 - Supply traffic would be restricted to designated access routes to decrease roads requiring upgrading and maintenance, to limit disturbance to residences adjacent to forest roads, and to limit wildlife, aquatic, and other resource impacts from noise, dust, road widening, and snow plowing.

Employee Transportation

Employees would commute from various locations in Ferry and Okanogan Counties to the mine site and back every workday. Most of the employees are likely to be mine employees from previous mining operations in Ferry County. An estimated 70% of the work force would be local hires during the construction, operations, and reclamation phases.

Options considered but eliminated included:

- Required carpooling, van pooling or company busing:
 - Employees would be encouraged by the Proponent to carpool to the mine site. Requiring carpooling, van pooling or company busing would be difficult to enforce due to management responsibilities, employee shifts, and employee residence locations. A number of employees would have to use individual vehicles to access the site even if busing was required;
- Restricting employee access during snow free months to the ore haul route:
 - Restricting employee access during snow free months to the ore and supply haul route would be nearly impossible to enforce. It would be difficult, or impossible to restrict which roads employees use since access roads are open to the public for much of the year. It is estimated that about 75% of the employees would use the ore and supply haul route to access the mine site since that would be the highest quality, quickest road into the site for most employees; and
- Allowing snow plowing of other access routes than the ore and supply haul route:
 - It is not desired to allow snowplowing of another route besides the ore haul and supply route to minimize winter disturbance to wildlife, in particular mule deer. Under Alternatives C and D, access on Forest Roads 3550, 3550-125 and 3550-130 would be restricted, December 1st to March 31st, to decrease deer winter range disturbance. Snow plowing of portions of Forest Roads 3575, 3575-150, and 3575-100 would not

be allowed except under Alternative C. The Proponent may request, and the Forest Service would consider, allowing the plowing of Forest Road 3575-120 from the Pontiac Ridge road to Department of Natural Resource managed land if a number of employees desired to use this route as access during the winter. Winter access by commercial vehicles on this route would not be allowed.

Ore and Supply Transportation Operating Schedule

The ore and supply transportation operating schedule can be divided into two categories: operating season and daily operating period.

Operating Season

Options considered but eliminated included:

- Shutting off ore haul and supply traffic during spring break-up:
 - Suspending ore haul and supply traffic during spring break-up was eliminated from consideration since the Proponent would be responsible for maintenance of the haul road across National Forest System land and rights-of-way and any costs from damaging the road would be borne by the mining company. The road design includes a frost-free design to minimize the potential for damage during spring break up. However, should environmental damage occur, the Forest Service would shut down haul until repairs were made. This would happen at any time of the year, and not just during spring break-up in accordance with Forest-wide Forest Plan standard and guideline 17-2 (LRMP, 4-50). The Environmental Impact Statement discusses the impacts from a potential several week shut-down of County roads and additional haul prior to and after spring break-up on County roads.
- Closing the mine haul and access route down 4 months per year to protect deer winter range:
 - Eliminating haul from December 1st to March 31st to protect deer winter range was not considered reasonable access under the laws effecting mining and access. This closure would require increasing haul trucks by about 33% the remainder of the year and the creation of larger ore storage areas at the mine and mill to accommodate stockpiling assuming mill production stayed approximately the same year-round. This increase in haul trucks the remaining 8 months of the year would decrease much of the wildlife benefits of this proposal. Alternatives C and D consider haul routes which avoid most deer winter range or are on designated open roads in deer winter range. Also considered was using a different haul route during this period but this would have required upgrades to an additional road and much of the effects to wildlife would have been just moved to a different location.
- Reduce/eliminate ore transport during the summer to minimize stress to wildlife and fish during high heat and low water conditions:
 - Eliminating haul during the summer to protect wildlife and fish from stress, high heat, and low water conditions, was not considered reasonable access under the laws affecting mining and access. This closure would require increasing haul trucks by about 25% the remainder of the year and the creation of larger ore storage areas at the mine and mill to accommodate stockpiling assuming mill production stayed approximately the same year-round. This increased haul 9 months a year would decrease much of the wildlife benefits of this proposal. Flow augmentation is

proposed for July, August, and September starting in Year 1 (1st year after construction) of mining to increase summer flows in Roosevelt adit and Year 3 in the headwaters of Marias Creek. These increases are expected through about Year 16 to off-set decreases in summer flows. Generally, wildlife would be less active during the hotter parts of the day and this is when most ore transport would be happening. Alternatives C and D eliminate ore transport on Sunday, and on Saturday and Sunday respectively. Reducing ore transport at one time would just cause increases in ore transport at another time since the mill needs about 1,500 tons of ore a day to operate most efficiently.

Daily Operating Period

Under the proposed action, hauling of ore across National Forest System land would be limited to 6:00 a.m. to 6:00 p.m. daily, 7 days a week, 365 days a year, although empty haul trucks would be allowed to travel across National Forest System lands at other times. Most haul would take place on Monday through Friday, but haul would not be further restricted on Saturday or Sunday. Alternatives B1, C, and D considered restrictions on this haul period including no haul trucks, either full or empty, outside 6:00 a.m. to 6:00 p.m., no haul on Sundays, and no haul on Saturdays or Sundays.

Under the proposed action, supply haul would be concentrated mostly between 6:00 a.m. and 6:00 p.m. with some hauling of supplies outside of these hours, as need. Under the other action alternatives, supply haul would be limited to 6:00 a.m. to 6:00 p.m., except for infrequent unplanned shortages. Supply haul would be restricted to Monday to Friday under these alternatives to reduce heavy truck traffic on Forest Roads on weekends.

Options considered but eliminated included:

- No haul on Saturdays, Sundays and Federal Holidays (10 days/year):
 - No haul on Saturdays and Sundays was considered in Alternative D. There was not a good environmental reason to restrict haul on Federal Holidays. The Company would not likely be hauling on Christmas, New Years, Thanksgiving, or 4th of July;
- No haul on Sundays and major holidays (Christmas, Thanksgiving, 4th of July and New Years):
 - No haul on Sundays was considered in Alternatives C and D. The Company would not likely be hauling on Christmas, New Years, Thanksgiving, or 4th of July; and
- Limit haul to ½ hour after sunrise until ½ hour before sunset but no longer than 6:00 a.m. to 6:00 p.m. for loaded or unloaded trucks. Employees would be van pooled to work to minimize other vehicle interruptions during this daylight period provided for wildlife movement:
 - Limiting haul by loaded or unloaded trucks to ½ hour after sunrise until ½ hour before sunset, but no longer than 6:00 a.m. to 6:00 p.m. was considered. Operations would be limited at both ends of the day approximately 159 days/year and in either the morning or evening an additional 34 days per year. Haul would vary from about 7 ½ hours per day to 12 hours per day depending on the time of year. This would mean that the number of loads hauled per day would vary from approximately 34 trips to 55 trips per day to keep the number of trucks working somewhat constant. Greater

amounts of ore storage would be needed at the mine and at the mill to accommodate stockpiling. The other possibility would be to have a greater number of trucks hauling ore on the shorter permitted haul days. All of these possibilities would cause inefficient use of the haul trucks and be difficult on employees due to constantly changing work shifts. Disturbance from employee traffic would still have been present outside these hours, but reduced by required van pooling. If more haul trucks are utilized, increased frequency of haul trucks would somewhat defeat the wildlife objectives of this measure to allow wildlife to more safely cross the haul road.

Project Fence

The proposed action would involve fencing about 74 acres of unpatented mining claims on National Forest System land in with about 220 acres of private land controlled by the Proponent. This fence would be about 1.7 miles in length on National Forest System land. Total disturbance from the placement of the fence on National Forest System lands is less than 4 acres. The fence is expected to remain in place until approximately Year 12 – 15, depending on reclamation success.

Options considered but eliminated included:

- Placement of the fence on the property boundary between National Forest System land and private land:
 - The two main reasons for the placement of the project fence are: 1) the fence provides additional buffer around the area of operations for safety, and 2) the fence denotes the boundary of “safe” public access in terms of ambient air quality standards. The Proponent has no reasonable alternative in the placement of the project boundary fence if state air permitting requirements are to be met except to enclose a larger area which would slightly decrease soil disturbance by placing the fence in already disturbed areas. The proposed project fence line and enclosure of National Forest System lands are uses reasonably incident to prospecting, mining, and processing operations under the General Mining Laws and are legitimate uses of the Proponent’s unpatented mining claims.

Infiltration Gallery, Dosing Tank, and Pipeline

An infiltration gallery, dosing tank and pipeline are needed to dispose of treated mine water and to mitigate the effects of mine dewatering and water use in the Nicholson Creek drainage. The gallery consists of two rows of perforated pipe approximately 400 feet in total length, 200 each in length, spaced approximately 20 feet apart, buried to a depth of approximately 4 - 5 feet to infiltrate treated water into the ground similar to a drain field. Other configurations such as a single 400 foot pipe could be considered, but all configurations considered would have a similar total area of ground disturbance. Manholes would be installed at approximately 500 foot intervals along the conveyance pipeline for maintenance purposes. Total pipeline length from the mine water treatment building to the dosing tank is about 4,640 feet. The peak design flow into the dosing siphon system is 40 gallons per minute. Monitoring during the start up of the infiltration system would limit discharges to 20 gpm. If 20 gpm does not result in adverse impacts, the discharge rate could be increased. Treated water would be discharged at the infiltration gallery only during mining, a period estimated to be about seven years in length. The FEFLOW model predicts that the infiltration gallery would operate at capacity throughout the life of the mine, with

the exception of the first year of mining when mine inflows may not initially exceed the consumptive use requirements by 20 gpm (SFEIS, 3.7-39).

Potential alternative infiltration sites are limited by topography; the presence, adequate thickness, and permeability of underlying soils; location relative to the dewatering cone of depression, Nicholson Creek drainage and the mine site; available area; and presence of sensitive resources such as wetlands (Lentz, 2006). Options considered but eliminated included:

- All facilities located entirely on private land near the mine site (e.g. in place of proposed stormwater retention pond):
 - Minimum criteria for infiltration facilities cannot be met on private lands: (1) Most of the area is outside the extent of glacial sediments, and soils that are present have inadequate thickness or permeability; (2) natural slopes on private lands are too steep to assure landform stability or, if mechanically modified, would result in greater surface disturbance and (3) all private land within the Nicholson and Marias Creek drainages lie within the mine dewatering cone of depression, adding to infiltration and drain back from other planned facilities. Golder Associates did five infiltration tests on selected test pits on private land. Their testing indicated that while the Lower Portal and down-gradient area is suitable for the management and infiltration/dispersion of up-gradient surface water runoff, stormwater, and septic effluent, infiltration of additional water (treated mine water) would overload the capacity of the soils and bedrock leading to premature surfacing of infiltrated water. Therefore, the area down-gradient of the Lower Portal can not accommodate the infiltration of all treated mine water (Golder Associates, 2005).
- All facilities located on National Forest System land above Forest Road 3575-120 with the infiltration gallery and dosing tank on gently- to moderately-sloping benches and spur crests in the vicinity of the Gold Bowl drainage:
 - Soil types and configuration beneath these potential sites are inadequate to accommodate peak design flows. About 30 test pits were dug and water infiltration was tested on a number of these test pits to determine where best to place the infiltration gallery. The peak design flow into the dosing siphon system is 40 gallons per minute. The FEFLOW model assumed that the infiltration gallery would operate at 20 gpm capacity throughout the life of the mine, with the exception of the first year of mining when mine inflows may not initially exceed the consumptive use requirements by 20 gpm (SFEIS, 3.7-39). The gallery has to be able to handle up to 20 gallons per minute (gpm) of input for long periods. No sites tested in the location above Forest Road 3575-120 were found suitable to handle 20 gpm of long-term input so these sites are not technically suitable.
- A pipeline route, including road, which goes directly, cross country to the dosing tank from the water treatment plant:
 - The pipeline route that follows partially reclaimed Forest Roads 3575-142 and 3575-127 was considered more suitable, though it is longer, since most of the route was previously disturbed and only reclaimed five years ago and is less steep, than a new route that went mostly cross-country. All but about 300 feet of this route was previously disturbed. The cross country route would have resulted in greater new land disturbance and resource impacts due to steeper slopes and grades and a road along most of the route would not have been feasible. This pipeline road would be closed to

- the public, as it is presently, and reclaimed at the end of operations to near present topography.
- Requiring all water to be treated and dispersing all water directly to the headwater creeks on private lands, with no infiltration gallery:
 - Discharge to surface water would result in most water quickly running downstream rather than being returned to the ground to provide baseflows to Nicholson Creek through the dry season.
 - Although most water dispersed into creeks would flow downstream, some would return to the underground mine and would have to be re-pumped and retreated since all headwater streams on private lands are within the dewatering cone of depression.
 - Discharge of all water to the Roosevelt Adit:
 - The intent of water discharge to the infiltration gallery and the water augmentation sites is to offset impacts of mine dewatering in those impacted drainages. Roosevelt Adit flows are expected to decrease up to 13 gpm as a result of mine dewatering⁶. Peak min dewatering discharges could exceed 100 gpm (WADOE FSEIS, page 64) which would almost triple average annual flows (31 gpm, FSEIS, page 64), rather than generally offsetting lost flows. This increased volume would likely cause detrimental erosion, possibly damaging wetlands, or even re-routing surface flow down Marias Creek.

Utilities (power and telephone lines)

Options considered but eliminated on National Forest System land or right-of-way included:

- Overhead Utility Access:
 - Utility lines would be buried instead of being above ground on National Forest System land to decrease the visual impact and the amount of land that would need to be cleared on National Forest System land. An underground line would be easier to maintain in a remote area. Reclamation of an underground line would be less expensive and ground disturbing at the end of mining since the buried line can be left in the ground. Only cable junction points and short stretches of cable would need to be removed. One pole would be placed at the start of the Marias Creek route to transition from an overhead to an underground line.
- On-site power generation:
 - Any on-site electrical generators must be designed to meet the electric loads of the mine and other facilities. A back-up generator would be necessary so that one generator is operational at all times. Air quality limitations for the use of fossil fuels would also have to be considered and met. This option is not environmentally desirable since Okanogan County PUD and Ferry County PUD have available power, thus it was eliminated from further consideration. In addition, truck traffic would be increased in order to supply fuel for the generators. On-site generation would be used during construction for about 8 months until the mine site can be connected to the power grid. On-site generation would also increase noise disturbance of the mine.

Access of telephone and data line from either the Curlew or the Molson/Chesaw exchanges:

⁶ Golder 2006a indicates that only about 5 gpm would be needed at Roosevelt adit to offset water losses from mine dewatering during mining based on average annual recharge. The NPDES indicates that a maximum of 50 gpm could be added.

Originally, it was proposed that a new telephone and data line would be run into the mine site from either the Curlew or the Molson/Chesaw exchanges. It has since been determined that the existing telephone line up the 3575-120 road to Cow Camp would have adequate capacity to serve the mine. This line would be extended to the mine with most new soil disturbance in roadbeds. Another option being explored, which would have even less environmental impact, is telephone and data lines via a radio internet connection with Oroville. The radio tower would be located on private land and no ground disturbance on National Forest System land or rights-of-way would be associated with this radio connection. Effects in this EIS would be displayed based on extension of the telephone line since the ground disturbing effects on National Forest System land would be greater.

Reclamation

The reclamation program and techniques are included as management requirements and mitigation measures rather than component options for the alternatives. The Forest Service is required to approve (or deny) the reclamation plans for the Project. This is normally done through a final acceptance and approval of the Plan of Operations. A reclamation performance bond would be required.

A summary of the reclamation plans for National Forest System lands in the Project are presented in the Reclamation Measures section later in this chapter, and are an integral part of each action alternative. The Proponent's reclamation plan is set forth in the *Amended Plan of Operations for the Proposed Buckhorn Mt. Project on Lands Administered by the US Forest Service*, May 15, 2005 and Revised Reclamation Plan for the Buckhorn Mountain Project, June 2, 2006.

Options considered but eliminated included:

- Reclaim the haul route to a single lane, 12 foot wide road.
 - The present road is approximately 1 ½ lanes, 17 – 18' wide. Once a road is made a double lane gravel road with all the techniques in place to minimize erosion and sedimentation, reclaiming it to a single lane road, except returning the travel way to a single lane, would not be prudent because of the new soil disturbance and potential for additional soil erosion and sedimentation impacts on streams for the first few years after reclamation. Most erosion and sedimentation from roads happens in the first three years after disturbance. The sections of roads by private residences and with pavement on them would logically need to remain double lane. This would be approximately 0.5 miles on Alternative B1, 2.4 miles on Alternative C, and 1.3 miles on Alternative D. Because of how the road would likely be reclaimed, pulling back the outer edge of the road and placing it against the cut slope, little land would be returned to productive habitat. Some maintenance costs would be saved by reducing the road to a 12-foot traveled way. Maintaining the road at 2 lanes would provide greater sight distance for the traveling public, as well as providing safe opportunities for passing vehicles, enhancing safety. Alternative B1 proposes to return the graveled road surface back to its present 17 – 18 foot width, with intervisible turnouts, through pulling surfacing off a portion of the travel way and placing it on the portion that would remain. The area where the surfacing has been removed would be deep ripped and planted to grasses and herbs.

Dust Suppression Techniques

Options considered but eliminated on National Forest System land or right-of-way included:

- No dust suppression:
 - The option of no dust suppression was not considered since ore and supply haul, plus employee traffic, would create a large amount of dust from roads. This amount of dust was not considered environmentally acceptable or safe without dust suppression with a vehicle traveling the road, on average, every 2 – 3 minutes. The use of a dust suppressant would also reduce road maintenance costs by decreasing aggregate replacement and frequency of road blading.
- Dust suppression only using water:
 - Because the amount of roads needing dust suppression and the duration of the need, about 9 years, the option of only using water was eliminated due to the amount of water that would be required would have had adverse environmental effects on the Toroda and/or Myers Creek watersheds, particularly outside of the irrigation season. The use of a chemical dust suppressant would also reduce road maintenance costs by decreasing aggregate replacement and frequency of road blading.
- Dust suppression only using chemicals:
 - The option of only using a dust suppressant chemical was considered but eliminated since the combination of using a chemical suppressant, with light watering, is more effective at controlling dust in drier climates. Chloride compounds need a 20 – 30% relative humidity to absorb water from the air. One of the benefits of water is that it regenerates the chemical suppressant and makes it more effective and longer lasting reducing the need for chemical re-application. Chemical reapplication is expected to only take place once a year. The properties of chloride compounds allow them to attract and absorb moisture and retain it for an extended length of time.
- Dust suppression by paving the entire length of the ore and supply roads:
 - The option of paving the entire haul route was eliminated due to cost to install initially; safety of using a paved road in the winter on steep grades; the long-term cost to maintain the road; and the effects on timing of water run-off and their effect on sedimentation of streams.

Water Storage Tower Access Route

Options considered but eliminated included:

- Access from patented land via new access road:
 - The option of accessing the water tower via a new access road solely on patented lands was considered but dropped since the route would create a steep new road across steep side slopes that are not reasonably feasible if other routes of access are available.
- Access from patented land via FR 3575-140:
 - Another potential access route to the water tower site would be by using Forest Road 3575-140 from patented land. Because of the design of the ore haul route from the

upper portal to the lower portals, access to FR 3575-140 is not reasonably feasible from patented land.

ALTERNATIVES FULLY DEVELOPED

Alternative A – No Action Alternative

Under this alternative, new approvals for the use of National Forest System lands would not be granted. The No Action Alternative would preclude the installation of an infiltration gallery; the reconstruction, construction, and new use of roads; the installation of a new monitoring well; and the installation of utility lines on National Forest System land. Complete reclamation of previous exploration and development activities would commence at the first available opportunity, as approved in previous NEPA documents.

There would be no additional physical disturbance to National Forest System lands except what has been previously approved as part of environmental documents prepared for exploration and pre-development activities.

Reclamation on National Forest System lands under existing NEPA decisions for exploration and pre-development activities would consist of plugging and capping existing monitoring wells and piezometers, re-contouring access roads to monitoring wells, re-vegetation with grasses, shrubs, and/or trees of previously disturbed sites, removing weirs and water level recording equipment from existing surface water monitoring sites, and the monitoring of reclamation activities.

This alternative is required under the National Environmental Policy Act, and provides a baseline for comparison of effects. The Proponent, however, is entitled to reasonable access to their private lands and unpatented mining claims under ANILCA and the 1872 Mining Law, as amended.

Forest Plan Amendments Included in Action Alternatives

Due to the structure of mineral laws and regulations, the Forest Service's Minerals Management Programs are largely responsive in nature. A major part of these programs is responding to applications and proposals submitted from outside the agency. Forest Service responsibility for such mineral exploration and mining proposals lies mainly in providing reasonable surface protection and reclamation requirements within specified time frames and in assuring compliance of the same. Management implications for the Forest Service require that mineral exploration and development be facilitated while accommodating the needs and conservation of other resources to the fullest extent possible.

To provide the proponent with reasonable access to their private lands under ANILCA and unpatented mining claims under the 1872 Mining Law, if approved, the Forest Service would include amendments to the Okanogan National Forest Land and Resource Management Plan (Forest Plan). These amendments are part of this NEPA document. The Forest Plan did not attempt to accommodate potential large mining operations when developing Management Area Standards and Guidelines because of the difficulty in predicting actual locations or kinds of developments. It was expected that such operations would not be able to meet standards and guidelines developed principally for vegetation management projects (see page 4-21 of the Forest Plan). If an action alternative is selected, this decision would include non-significant amendments of the Forest Plan.

To implement this project, non-significant, site-specific amendments involving one Forest Plan Forest-wide standard and guideline, and three Forest Plan management area standards and guidelines are required under some alternatives. Most of Management Area (MA) 14 -19 was transferred to private ownership in the December 2004 patenting, leaving three small isolated areas behind. Under all action alternatives, MA 14-19 would be dissolved and combined with the two adjacent Management Areas due to the small area remaining in the Management Area after patenting.

Management Area 14-18 (Alternative B) would exceed Forest Plan Standard and Guideline MA 14-17A; limiting open road densities to two miles open to motorized use per square mile. The current road density in this Management Area is 3.8 miles per square mile. After proposed road construction, road density would increase to 4.2 miles per square mile in Alternative B. Although Management Areas 26-15 and 26-16 currently do not meet Forest Plan standards, project activities would not affect road densities in these management areas (except as described below) so no amendment is required.

Management Area 14-18 (Alternatives B and B1) would not meet Forest Plan Standard and Guideline MA 14 -17B; prohibiting motorized access in deer winter range, December 1st through March 31st, except for designated through routes. Portions of the Marias Creek haul route, Forest Road (FR) 3550-125, which is not currently designated as a through route, would be designated as a through route for project ore and supply haul and employee access during the winter for the life of the project. Closing the mining operation down for four months a year was not considered to provide reasonable access.

Snowplowing would be permitted in Management Area 14-18 under all alternatives along the designated ore and supply haul route, and FR 3575-143 to provide access to the water tower. These roads would not be open to the public from December 1st to March 31st.

Marias and Nicholson Creeks presently exceed Fisheries Forest-wide Standard and Guideline 3-3. "Fines in spawning areas (pool tail-outs and glides) should be maintained at less than 20 percent as the area weighted average." Fines in lower Marias Creek on National Forest System lands presently average 32 percent (Reach 3) and average 21 percent in Nicholson Creek (average of two reaches). In looking at the data for 79 individual pools, 80% of the pools in Marias Creek were below 20% embedded and thus met the guideline. About 40% of the remaining pools were more than 80% embedded which indicates these serve as sediment catchment pools. Though generally not considered good sites for spawning, such pools provide hiding and rearing habitat and thermal refuge for fish. Nicholson Creek is similar. All alternatives would slightly increase fines in Marias and Nicholson Creeks.

Because of the small size of MA 14-19 remaining, approximately 68 acres, after patenting, 66 acres of this Management Area would be combined with MA 26-15. Both Management Areas are Deer Winter Range emphasis. Standards and Guidelines for MA-26 are more restrictive of management activities so a higher level of protection to deer would be afforded under this combination. 2 acres of MA 14-19 would be combined with MA 25-18. A lower level of protection to deer would be afforded under this combination but the amount of area involved is not significant.

Some long-term effects would occur with the construction/reconstruction of the mine access roads, which would remain at the end of project activities. Forest Road 3550-125 would again be closed December 1st to March 31st in MA 14-18 at the end of ore haul.

The amendments would be non-significant as defined in 36 CFR, Part 219, 219.10, because the amendments would not result in any substantial changes in overall outputs or effects predicted in the Forest Plan. These amendments are non-significant amendments to the Forest Plan for the following reasons:

- **Timing:** The timing factor examines at what point over the course of the Forest Plan period the Plan is amended. Both the age of the underlying document and the duration of the amendment are relevant considerations. The Forest Service Handbook indicates that the later the time period, the less significant the change is likely to be. The Okanogan Forest Plan was approved in 1989, 17 years ago, and is currently being revised and a new Forest Plan should be signed in 2007.
 - The new Plan would incorporate new science regarding the location and management of deer winter range and would likely provide direction that supersedes the current deer management standards and guidelines.
 - The new Plan would incorporate new science regarding the management of fish habitat and would likely provide direction that supercedes the current management standards and guidelines and is similar to INFISH.
 - Use of Forest Road (FR) 3550-125, including new construction in Section 31, during the winter range closure period of December 1st to March 31st would be for a period of less than 10 years (Alternatives).
 - Snowplowing in Management Areas 14-18 and 14-19 would only be allowed on the designated ore and supply haul route, and Forest Road 3575-143 to provide access to the water tower. These roads would not be open to the public from December 1st to March 31st.
 - Alternative B1 would close roads in Bear Trap Canyon in Management Areas 14-18, 25-18 and 26-16 reducing project road density in all three Management Areas, so no amendment to Standard and Guideline MA 14-17A is needed in this alternative.
 - The fencing of much of lower Marias Creek off from cattle use, and the construction of hardened cattle crossing/watering areas in Marias Creek should decrease sediment delivery from trampling of stream banks by cattle.
 - Hydrologic modeling using the WEPP model and additional analysis outside the model indicates that there should be little change in stream sedimentation in these drainages due to the numerous erosion prevention measures incorporated as part of road construction/reconstruction for the mine haul route.
- **Location and Size:** Two of the three amendments only apply to MA's 14-18 and 14-19, an area of less than 1.2 square miles, 750 acres. The road totals about 1.5 miles in length within these MA's. The third amendment is to correct a technicality that is in the Forest Plan. The objectives of providing areas for fish reproduction are met. In looking at the data for 79 individual pools, 80% of the pools in Marias Creek were below 20% embedded and thus met the guideline.
 - The 1872 Mining Law and the amended Forest Plan, require that mining claimants be given reasonable access to mining claims. The newly patented lands are an inholding surrounded by National Forest System and Bureau of Land Management lands, and the mining claimant has no other reasonable access. The Alaska National Interests Lands Conservation Act of 1980 (ANILCA) also provides for access to non-federally

- owned land adequate to secure the owner reasonable use and enjoyment thereof under the Federal Land Policy and Management Act of 1976.
- The snowplowing amendment only applies to about 6 acres of land in these two Management Areas.
 - This does not change management direction for the rest of the 1.7 million acre Okanogan National Forest.
- Goals/Objectives/Outputs: The change would not alter the long-term relationships between the levels of goods and services projected by the Forest Plan.
 - The General Mining Law of 1872, as amended, established the statutory right of U.S. Citizens to explore for and/or develop mineral resources and encouraged such activity consistent with the Mining and Mineral Policy Act and the Federal Land Policy and Management Act. The regulations for implementing these laws require responsible federal agencies to include adequate provisions to minimize, to the extent practicable, and comply with other applicable federal and state laws and regulations.
 - Due to the structure of mineral laws and regulations, the Forest Service's Minerals Management Program is largely responsive in nature. A major part of the minerals management program will be responding to applications and proposals submitted from outside the agency. Forest Service responsibility for such proposals lies mainly in providing reasonable surface protection and reclamation requirements within specified time frames and in assuring compliance of the same. The basic objective will be to facilitate minerals exploration and development on National Forest System land while accommodating the needs and conservation of other resources to the fullest extent possible. This is acknowledged in the Forest Plan on page 4-21.
 - The goals of INFISH are being met by the project because adverse impacts to inland native fish are being avoided.
 - Management Prescription:
 - The designating of Forest Road (FR) 3550-125 and the new haul route to the Lower Portal as designated through routes, for the period of December 1st to March 31st, does not change any management prescriptions. It meets the structure of mineral laws and regulations and the Forest Service's Minerals Management Program.
 - The adding of MA 14-19 to MA 26-15 and MA 25-18 would change management prescriptions. In the case of MA 26-15, standards and guidelines would be more restrictive for timber harvesting and grazing use, but a higher level of protection would be provided for deer. The two acres added to MA 25-18 are considered incidental.

Components Common to All Alternatives

Water Monitoring

There presently are 9 monitoring wells and 20 surface water monitoring stations in use on all land ownerships. 7 of these monitoring wells (MW-1, -3, -4, -7, -9, -11, and -12) and 14 of these surface water monitoring/gauging stations are on National Forest System land (SW-1, -2, -5, -7, -9, -10, -11, -14, and GW-2) or are accessed off National Forest System roads. In addition, there

are at least five small diameter wells containing piezometers for measuring water heights on National Forest system land.

One new monitoring well location (MW-13) on National Forest system land, three new piezometers on National Forest land in the Myers Creek basin, staff gauges (a graduated board used for measuring water heights) at 17 seeps/springs (all but 2 on National Forest land), and 5 staff gauges and 10 mini-piezometers at Nicholson and Marias Creek headwater wetlands are planned. The one new monitoring well on National Forest System land is in the vicinity of the infiltration gallery; about 50 feet from the previously reclaimed site of monitoring well 3a. No alternatives to this new well on National Forest System land is being considered since the location is set by monitoring objectives. The location was agreed to on the ground by employees from the Washington Department of Ecology, Forest Service, and Kinross. This well location would require reopening about 300 feet of the previously reclaimed road used to access well 3a and extending the road about 50 feet. The exact monitoring frequencies of ground water and surface water stations on National Forest System land would be determined by the State of Washington, Department of Ecology in their water quality permits in coordination with the Forest Service. A copy of the draft NPDES permit can be viewed at WADOE's website at: http://www.ecy.wa.gov/programs/wq/permits/central_permits.html.

4 new piezometer wells would be installed in the vicinity of the infiltration gallery. Three of these wells would be shallow (15 – 20') paired wells with exist deeper piezometer wells (45 – 60'). One additional new shallow piezometer well would be placed about half way between two existing wells along Forest Road 3575-125 below the infiltration gallery. The piezometers/mini-piezometers and staff gauges would be placed in seeps, springs, and wetlands on both sides of Buckhorn Mountain to monitor changes in water levels during mining operations and refilling of the aquifer at the end of operations. These mini-piezometer wells would be about 3 feet deep and 2" in diameter and likely driven into the ground with a fence post driver or sledge hammer.

In addition, if Marias or Nicholson Creek roads are selected as the haul route, several new surface water monitoring sites would be placed in the lower reaches of these drainages to monitor surface water quality, including three State NPDES permit sites. See the alternative maps later in this chapter for approximate locations of the new monitoring well on National Forest System lands and the location of Forest Service required monitoring in Marias and Nicholson Creeks under Alternatives B, B1, and C.

Water Augmentation

Underground mining would cause direct flow reductions at seeps, springs, and stream headwaters near the mine from dewatering. Flow reductions would lag behind early mine development, increasing progressively with mine depth, and peak during refilling of the mine with water after the end of mining. The reduction in discharge from Roosevelt adit and in the headwaters of Marias Creek would be mitigated during July, August, and September by releasing treated water from the mine water treatment plant at these locations. A pipeline would run from the treatment plant to Roosevelt adit and then to the headwaters of Marias Creek. Flow would be split, with up to 13⁷ gpm going to lower Roosevelt Adit to augment flow and up to 3.5⁸ gpm going to a wildlife/stock watering tank and the wetlands at the headwaters of Marias Creek. A pipe would drain the overflow from the

⁷ Golder 2006a indicates only 5 gpm (annual average) may be needed to offset flow reductions from mine dewatering during mining. WADOEs draft NPDES (2006) indicates a maximum of 50 gpm could be added.

⁸ Golder 2006a indicates only 1 gpm (annual average) may be needed to offset flow reductions from mine dewatering during mining. WADOEs draft NPDES (2006) indicates a maximum of 10 gpm could be added.

trough to the wetlands. Additional water above the amount needed to replace flows can be discharged to the augmentation sites, but only when the additional water would not result in flows approaching bankfull discharge. Monitoring of flow at Roosevelt Adit and monitoring of wetlands would guide adjustment of flow supplementation (see the Alternative maps for the location of the pipeline and points of augmentation). If impacts to Roosevelt adit and the headwaters of Marias Creek are 20% or greater than predicted, then additional treated mine water would be discharged provided water is available from the mine dewatering system. Additional treated water (beyond the mitigation quantities and outside the mitigation period) may be discharged under the NPDES permit if more water than anticipated is encountered in the mine, and such augmentation can be done without erosion or streambank undercutting or deposition⁹. Any additional discharges in streams or to the infiltration gallery above flows needed to replace flows lost due to mine dewatering would be made in such a way that resulting stream flows would remain below bank full conditions.

Water discharged at the augmentation sites would be required to meet the more stringent of State or Federal standards for surface or ground water quality at the end of pipe. Limits would be set by the NPDES operating permit issued by the Washington State Department of Ecology. A copy of the draft NPDES permit can be viewed at WADOE's website at: http://www.ecy.wa.gov/programs/wq/permits/central_permits.html.

Project Fence

The proposed action would involve fencing about 74 acres of National Forest System land in with about 220 acres of private land controlled by the Proponent. This fence would be about 1.7 miles in length on National Forest System (NFS) land, and would be designed to exclude cattle from the enclosed lands. The area of disturbance is estimated to be less than 20 feet wide or a total area of disturbance of about 4 acres.

Water Guzzlers

Water guzzlers would be placed on NFS lands in the headwaters of Ethel Creek and the South Fork Bolster Creek, one, or more, each drainage, to provide replacement water sources for wildlife as a result of mine dewatering on private lands. These guzzlers would be placed on existing hardened sites and would have a barbed wire fence placed around them to protect them from cows. The Washington Department of Fish & Wildlife would approve the design for these devices which would be reviewed by the Forest Service prior to installation. Additional guzzlers may be placed at other hardened sites that are noxious weed free if additional water is determined to be needed on the west side of Buckhorn Mountain to offset losses of water from mine dewatering.

Infiltration Gallery and Supply Pipeline

An infiltration area for treated mine water would be constructed in the vicinity of the junction of Forest Roads 3575-120 and 3575-125. Approximately 4,640 feet of pipeline and access road would be constructed across National Forest System land to convey treated water to the infiltration area. A dosing tank (a water tank used to even out flows to the infiltration gallery which helps the system work more efficiently) for this facility would be located above Forest Road 3575-120. An infiltration gallery would be constructed to dispose of water from the underground mine. The gallery consists of two rows of perforated pipe approximately 200 feet in total length, spaced

⁹ WADOE's draft NPDES states that additional water could be added as long as it does not create slope instability or rise up to the ground surface beneath the gallery.

20 feet apart, buried to a depth of approximately 4 - 5 feet to infiltrate treated water into the ground similar to a drain field. Other configurations such as a single 400 foot pipe could be considered, but all configurations considered would have a similar area of ground disturbance within the footprint of the gallery. Maximum planned flows to the gallery are 20 gpm, although it is designed for 40 gpm. Additional water above 20 gpm would be discharged only when the additional water would not result in flows reaching bankfull discharge, not cause slope instability or rise up to the ground surface beneath the gallery^{10,11}. Routine road maintenance, to Forest Service standards, of Forest Road 3575-120 would be done between Forest Road 3575-125 and the new road accessing the lower portals to provide year-round access to the infiltration gallery. The water infiltration gallery would receive treated water from private land, the mine site, where the treatment facility would be located. The treatment facility, its operation, and resulting water quality is covered by analysis in the Washington State Department of Ecology SEIS, and permits to be issued by the State of Washington, Department of Ecology. The pipeline route would only be plowed in the winter when necessary to do so for repairs; otherwise travel would be via snow machine.

Water discharged at the infiltration gallery would be required to meet the more stringent of State or Federal standards for surface or ground water quality at the end of pipe. Limits would be set by the NPDES operating permit issued by the Washington State Department of Ecology. As the State has no water quality-based effluent limit for TSS (total suspended solids), the technology-based effluent limit would be included in the proposed permit. The criteria for turbidity would allow no more than a 5 NTU increase over background turbidity.

Solid Waste

Solid refuse, trash, and general garbage generated during road or facility construction and operation would be consolidated, contained, and transported offsite to the county landfill or other approved disposal sites, as appropriate. Portable toilet facilities would be used during road and facility construction/reconstruction. Burial of solid refuse is not approved on National Forest System lands.

Alternative B – Proposed Action

This alternative is Crown/Kinross's proposal for use of National Forest System lands to mine the minerals deposit on patented lands and transport ore to an existing mill outside of Republic, Washington. This alternative is based on the Amended Plan of Operations for the Proposed Buckhorn Mt. Project on Lands Administered by the US Forest Service (Crown Resources, 2005) submitted on March 15, 2005 and subsequent clarifications of this plan. This amendment was necessary due to changes in the land status because of the issuance of patents for the Buckhorn Mountain ore deposit. Crown Resources discovered the Buckhorn Mountain deposit in 1988.

A map of this alternative is included as Figure II-1, Alternative B.

Ore Haul Routes

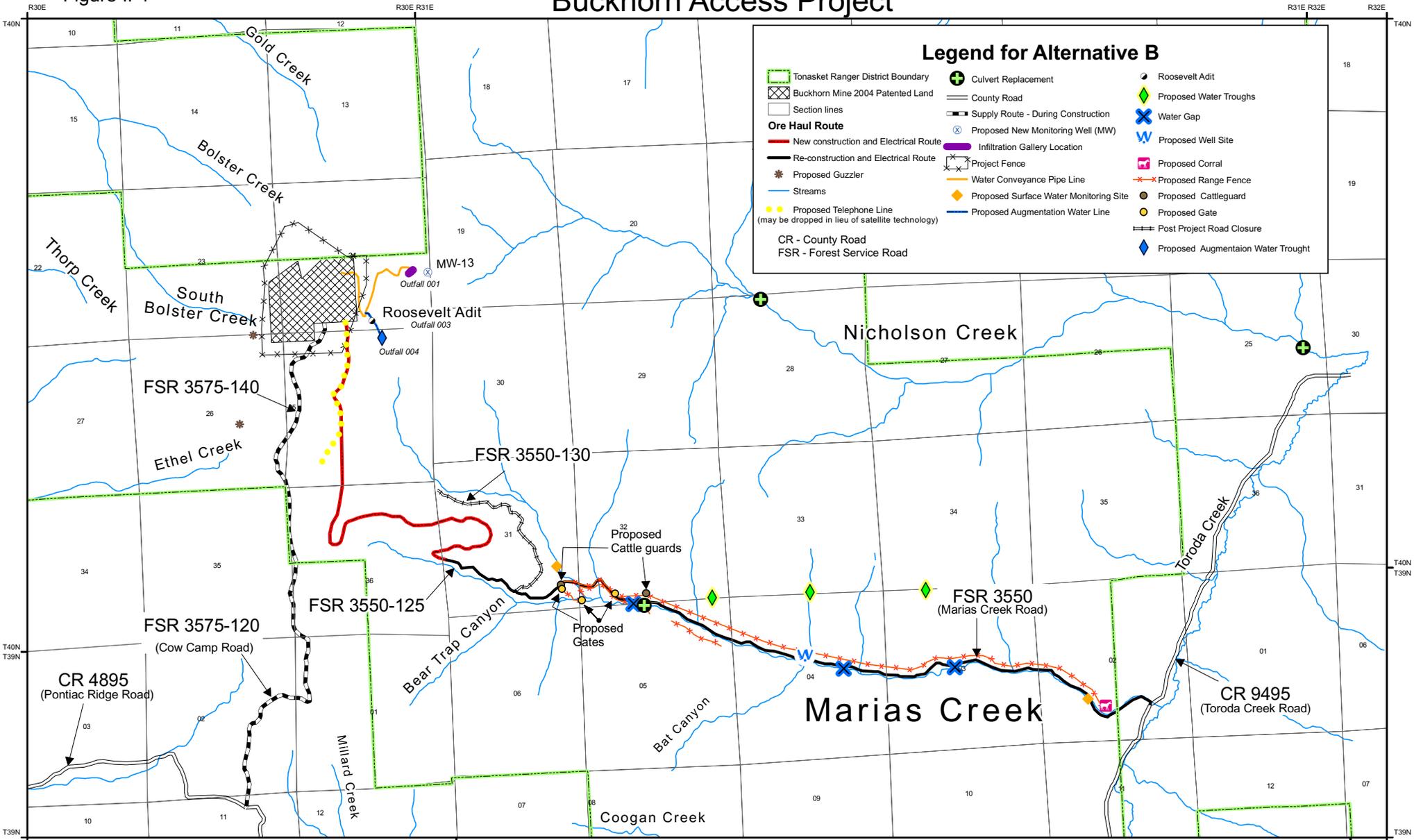
The majority of the proposed disturbance on National Forest System land and right-of-ways is for upgrade of Forest Roads (FR) 3550 and 3550-125, Marias Creek roads, and the construction of a new road to the lower portals (Figure II-1, Alternative B). Approximately 5.2 miles of existing FR

¹⁰ Draft NPDES Fact Sheet page 16

¹¹ WADOEs draft NPDES states that up to 40 gpm could be discharged at the infiltration gallery.

Figure II-1

Buckhorn Access Project



Tonasket Ranger District
Okanogan-Wenatchee National Forests
Map by JRainford



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3550 and 3550-125 would be widened to a 24-foot running surface, 31-foot total road width (24' surface, 2' shoulders each side, and 3' ditch). Approximately 8,000 feet (1.5 miles) of new road would be built across National Forest System land in Section 31, T. 40 N., R. 31 E., W.M. off the end of the 3550-125 road and in Sections 24 and 25, T. 40 N., R. 31 E., W.M., north and west of Forest Road 3575-120. The junctions of existing Forest Roads 3575-120, Cow Camp Road, and Forest Road 3550-130 with the new road would be realigned to form near perpendicular junctions for safety. Speed limits on National Forest roads would be 30 miles per hour (mph), which is 5 mph below Okanogan County standards for gravel roads. The Proponent would be responsible for on-going road maintenance and snow plowing, to Forest Service standards, necessary to maintain year-round heavy truck and passenger vehicle access.

Supply Haul Routes

During road construction/reconstruction for the ore haul route, mine access would be over Forest Roads (FR) 3575-120 and 3575-140 from Okanogan County Road 4895 (Pontiac Ridge Road). Forest Roads 3575-120 and 3575-140, across National Forest System lands and rights-of-way would continue to receive road maintenance to make them passable by trucks bringing equipment and supplies to the site. FR 3575-140, a one lane gravel road, would be used by 10 – 20 supply trucks per day, 1 – 2 supply trucks per hour, for a period of up to 10 months under an existing Road Use Permit and during ore haul route construction. The existing Road Use Permit requires maintenance of the surface of the road, plowing of snow, and dust control. During ore haul operations, the supply route would be the same as the ore haul route described under each alternative.

Operating Schedule

Transportation of the ore to the mill would be limited to 6:00 a.m. to 6:00 p.m. for loaded haul trucks (ore or backfill) on National Forest System land. Although some shift staggering may occur, mine employees would be assigned to an 8-, 10-, or 12-hour shift, depending on their responsibility. Most supplies would be delivered between 6:00 a.m. and 6:00 p.m. but some supply delivery would take place outside these hours.

Project Life

All action alternatives have proposed project lives of approximately 13 years, not including water augmentation and monitoring which would continue for a longer period of time; possibly 25 – 60 years, or longer for monitoring. Water augmentation is expected to continue until Year 16 at outfalls 003 and 004. Flows to outfall 001, the infiltration gallery, would end at the end of mining. Of that 13-year period, construction accounts for less than one year, operations are projected for approximately 7 - 8 years, and decommissioning/reclamation of most facilities on National Forest System land are anticipated for another year. Re-vegetation monitoring would last approximately another 3 years.

Employment

The estimated number of construction employees at the mine site would be approximately 100 at the peak of construction activities and average about 70 – 80 individuals. During production, approximately 120 employees would work directly at the mine site and an additional 31 employees would be employed directly or under contract for ore hauling activities. Supplementary contractors, averaging 3 to 5 people, would be hired on an as-needed basis to perform road

maintenance, mechanical repair and maintenance, engineering, special mine projects, etc. During reclamation, an average of 10 – 20 employees would be employed.

Employee Transportation

Employees would be allowed to access the mine by whatever Forest Service route they desired during snow-free months. Only the ore and supply haul road route would be plowed during the winter, so this would be the only approved access route for employees at that time. Employee start times would be mostly 6:00 – 8:00 a.m. and 6:00 – 8:00 p.m. Although some shift staggering may occur, mine employees would generally be assigned to an 8-, 10-, or 12-hour shift, depending on their responsibility. If requested by the Proponent, the Forest Service would consider allowing the 3575-120 road to be plowed open in the winter for employee access.

Utilities (power and telephone)

Electrical lines would be buried in the Marias Creek road across National Forest System land and right-of-way. One power pole would be placed adjacent to Toroda Creek road to provide the transition point from an aerial line to a buried line. Telephone service would be buried along FR 3575-120 and then the new road to the lower portal from the end of the existing line at Cow Camp to the mine property boundary. A solar power source would be installed at the well being developed adjacent to FR 3550 to provide power for the water developments above the road. During construction, generators would be used on site to provide power until commercial power service is available.

Water Monitoring

At least three surface water monitoring locations would be established in lower Marias Creek to monitor impacts of ore and supply haul on Marias Creek. The lowest monitoring point would be near the lower stream crossing by FR 3550. The second monitoring point would be on Marias Creek prior to it crossing Forest Road 3550 (near the previous SW-2 monitoring point). These two points would be used to monitor turbidity, chlorides, and magnesium. Monitoring would include both scheduled monitoring and monitoring after storm events greater than 0.25" of rainfall within a rolling 24-hour period. Other monitoring points were listed previously under Components Common to All Alternatives, Water Monitoring.

Winter access to monitoring wells and surface water monitoring stations would be either on snowplowed roads or by snow machine. Several surface water monitoring stations are located in closed areas in deer winter range in the Ethel Creek drainage and along Forest Road 3575-100.

Dust Suppression

Dust suppression programs would be required for all supply and ore haul routes on National Forest System lands and right-of-ways, including during construction. This dust suppression program would involve a chemical treatment with magnesium chloride and/or periodic watering. A mine water truck would run periodically, wetting the roads to minimize dust. Water utilized to control dust would come from water rights on private land, and not from National Forest System lands. Roads on National Forest System lands would be maintained regularly by a motor grader to remove any silt from the roadside ditch and other debris from the road surface and to maintain the road running surface. This removed material would be hauled off-site for disposal. Smooth and clean road surfaces are essential for not only minimizing dust but also for allowing efficient, safe, and economical use of the haul roads. No pavement is proposed on National Forest System

land or in National Forest right-of-ways. Truck drivers would be required to report dusty road conditions and roads needing maintenance to mine personnel.

Road Closures

During the construction of the ore haul route, Forest Roads 3550, and 3550-125 would be closed to public use for safety because the amount and type of haul traffic using these roads would not be compatible with public use and road construction. During ore haul, the 3550-125 road (including the section of new road above the 3575-120 road to the lower portal) above the junction with Forest Road 3550-130, would be closed to public use for safety. Public access above Forest Road 3575-120 is not needed except to visit the mine and there is no turnarounds on this road. The section of Forest Road 3550-125 between Forest Road 3550-130 and Forest Road 3575-120 is steep with several sharp turns and would not be compatible with public and mine use.

Other previously closed roads that have had the closure breached by the public, and NEPA was previously completed for the closure, particularly along Forest Roads 3575 and 3575-150, would be re-closed by this project. Up to 10 road closures a year could be completed under this program.

After the completion of operations, once the 3550/3550-125 road is no longer in use as the ore and supply haul route, the 3550-130 road would be closed to public use, but open for administrative use to access previously harvested units and DNR managed land. Forest Road 3575-140 would be closed, except for administrative use near the junction with FR 3575-143 since the remaining portion of road would be a short, dead end road with no place to turn around. The ore haul route between the upper and lower portals on private land would close this road where it crosses private land.

Area of Disturbance

Table II-1: Disturbance Acres for Alternative B

Facility	Size	Comments
Ore haul route	<36 acres	Assumed 82' clearing for construction, additional 30' for reconstruction.
Monitoring wells, surface water monitoring points, and piezometers	<1 acres	1 new water monitoring well, re-opening up to 300' of temporary road, new piezometers, and surface water monitoring points
Infiltration gallery & pipeline	<6 acres	4640' pipeline to dosing tank and drainage field.
Fence	<4 acres	74 acre area of National Forest System land enclosed. (assumed 1.7 miles X 20')
Mitigation Acres Well & Watering Troughs Fencing along road Water gaps Corrals Cattle guards and gates Culverts removed or replaced Guzzlers Nicholson Creek Culvert	<10 acres	
TOTAL	57 Acres¹²	

¹² The acres of impact has changed from the DEIS since clearing limit staking for the preliminary road design has been completed. Construction clearing limit width averaged about 82' instead of the 66' average estimated for the DEIS. The additional clearing for the reconstruction was assumed to average 30' instead of the 24' estimated for the DEIS based on field review of staking.

Reclamation

The goal of reclamation would be to return the site to a productive post-mining condition following closure and decommissioning. All surface disturbances on National Forest System lands or right-of-ways would be graded, sloped, top-soiled, and vegetated for long-term stability. Reclamation activities would occur as soon as practical. To the extent practicable, reclamation activities would be timed to take advantage of optimal climatic conditions.

All monitoring wells and access roads would be removed and reclaimed at the end of water monitoring. Water monitoring could continue for 25 to 60 years, or longer. The fence around the mine site, access manholes for the water augmentation pipeline, the dosing tank, and the lower sections of the pipeline to the infiltration gallery would be removed at the end of mining. The surface of the infiltration gallery would be re-vegetated.

Concurrent reclamation would occur on slopes that are at final contours, such as along access roads where no changes would be needed following construction. The access road from OCR 9495, Toroda Creek road, to Forest Road 3575-120 would remain in place following mine closure. The new section of road across National Forest System land from Cow Camp to the mine site would have the width of the running surface reduced from 24 feet to 12 feet, plus inter-visible turnouts, through grading the gravel surfacing onto the remaining road surface, ripping of the abandoned road surface, and minor regrading of the fill slopes to blend with adjacent slopes. The road along the pipeline to the infiltration gallery would be fully reclaimed by returning the contour to as near natural as possible and then re-vegetating the surface. Erosion control techniques such as application of mulch and tackifier or hydromulching and installation of diversion ditches would be used, as necessary, to minimize soil erosion and sedimentation.

Utilities would be left in the road. The telephone line would be disconnected at the pedestal in Cow Camp. The power line would be disconnected at Toroda Creek Road (OCR 9495) once all activities requiring power have ceased.

Alternative B1 – Modified Proposed Action

Modifications to the Proponent's proposal were made to respond to as many public and agency issues as possible, while still using the Marias Creek ore and supply haul route. Issues addressed with this alternative are:

- Paving and washing of the first 0.5 miles of the Marias Creek road would provide for safety by allowing track-on to occur on the Forest Service road and reduce dust.
- Paving of the first 0.5 miles of the Marias Creek road would reduce the amount of dust suppression chemicals that would need to be used potentially reducing chemical impacts to streams, wetlands, and riparian areas; most of this section of road is directly adjacent to Marias Creek.
- The speed limit would be 25 mph, as opposed to 30 mph in Alternative B, decreasing accidents with other vehicles and wildlife and dust.
- Road reclamation of the new road between the 3575-120 road and the patented land would be more extensive. Road reclamation of the portion of road across National Forest System land and right-of-ways from the end of the pavement to Forest Road 3575-120 would return this road to its present 17 – 18' usable surface at the end of the project.

- Road closures in MA 14-18 would eliminate the need to amend the Okanogan National Forest Land and Resource Management Plan road density standard in MA 14-18.
- Empty ore trucks would not be allowed to operate outside of 6:00 a.m. to 6:00 p.m. to minimize impacts to residents and wildlife.
- Access from December 1 to March 31 for water monitoring would only be permitted by snowmobile to minimize impacts to wildlife, unless on a road already plowed for other mine activities.
- Restricting supply trucks to between 6:00 a.m. and 6:00 p.m. on National Forest roads, except infrequent, unplanned supply traffic necessary to provide immediately needed supplies, would decrease impacts to tourism, aesthetic enjoyment of the area, the quality of life and solitude for residents, recreational activities, and wildlife.

The main differences between this alternative and the Proponent's proposal has to do with road reclamation of the new road between FR 3575-120 and the patented land; reclamation of Forest Roads 3550 and 3550-125 back to its present width at the end of ore haul; paving the lower 0.5 miles of the haul route from Toroda Creek Road to 150' past the first crossing of Marias Creek; ore and supply haul trucks, either loaded or unloaded, would only be allowed on Forest Roads between 6:00 a.m. and 6:00 p.m., except infrequent, unplanned supply deliveries; reducing the speed limit on Forest roads to 25 mph; and allowing only snowmobile access for water monitoring December 1 to March 31 on roads not approved for snowplowing.

A map of this alternative follows, Figure II-2, Alternative B1.

Ore Haul Routes

The ore haul route in this alternative would be the same as in Alternative B except the first 0.5 miles of the road from Toroda Creek road would be paved to improve safety, reduce dust impacts and the amount of dust suppression chemicals that would need to be used. Speed limits on National Forest roads would be 25 miles per hour.

The Proponent would be responsible for on-going road maintenance and snow plowing, to Forest Service standards, necessary to maintain year-round heavy truck and passenger vehicle access. The paved section of road would be periodically washed to remove track-out dust/dirt from the road surface.

Supply Haul Routes

Alternative B1 has the same supply routes as Alternative B.

Operating Schedule

Transportation of the ore to the mill would be limited to 6:00 a.m. to 6:00 p.m. for ore haul trucks (ore or backfill, loaded or unloaded) on National Forest System land. Supplies would be delivered between 6:00 a.m. and 6:00 p.m. except infrequent, unplanned supply deliveries outside those hours for immediately needed supplies.

Project Life

Alternative B1 has the same project life as Alternative B.

Employment

Alternative B1 has the same employment as Alternative B.

Employee Transportation

Alternative B1 has the same employee transportation as Alternative B. If requested by the Proponent, the Forest Service would consider allowing the 3575-120 road to be plowed open in the winter for employee access. This route would not be used by commercial vehicles.

Utilities (power and telephone)

Alternative B1 has the same utilities service as Alternative B.

Water Monitoring

Water monitoring for Alternative B1 would be the same as for Alternative B except access to water monitoring sites would only be allowed by snow machine December 1st to March 31st to minimize impacts to wildlife, except on roads already plowed open during mining operations; the ore haul route, the pipeline road, the roads to the infiltration gallery, and the roads to the water tower. Several surface water monitoring stations are located in closed areas in deer winter range in the Ethel Creek drainage and along Forest Road 3575-100.

Dust Suppression

To minimize dust in the vicinity of a private residence at the start of Forest Road 3550, and the track-out of dust onto the County Road, the first 0.5 miles of the road would be paved to 150' past the Marias Creek stream crossing. Magnesium chloride and water are proposed to be used for dust suppression with lignin sulfonate as a fall back if magnesium chloride use is found to be causing unacceptable environmental damage.

Road Closures

The following roads are proposed to be permanently closed, except for administrative use, to offset impacts of new road construction and winter use on wildlife.

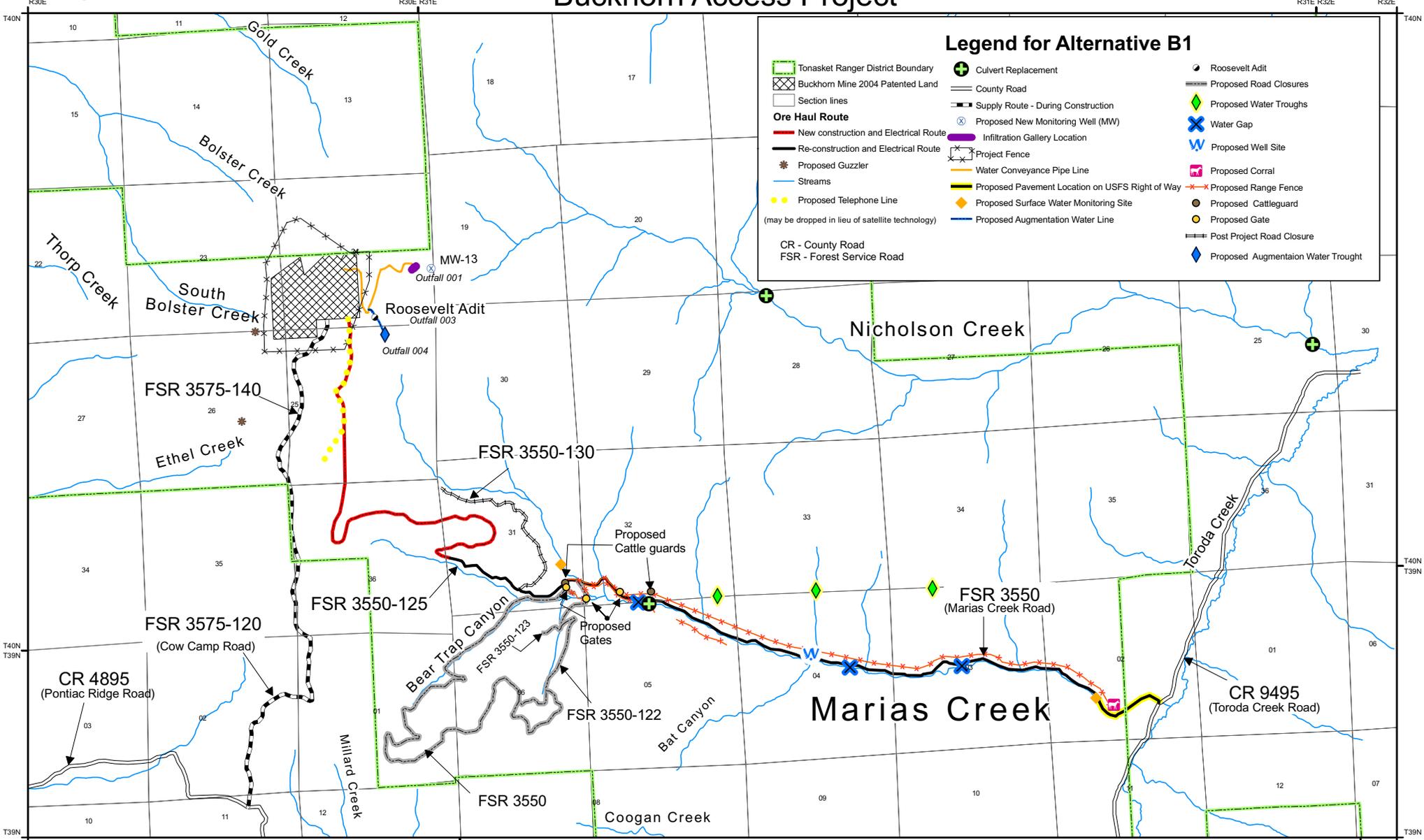
Table II-2: Road Closures for Alternative B1

Route Number	Road Miles	System/Non-System
3550-122	1.4	System
3550-123	0.2	System
3550 (MP 4.5 – 8.0)	3.5	System
3550-122-100L-1	0.1	Non-system
3550-122-1.00L-1	0.1	Non-system
3550-122-1.00L-1	0.1	Non-system
3550-125-0.04L-1	0.02	Non-system
Total Miles	5.4	

During the construction of the ore haul route, Forest Roads 3550 and 3550-125 would be closed to public use for safety because the amount and type of haul traffic using these roads would not be compatible with public use and road construction. During ore haul, the 3550-125 road (including the section of new road above the 3575-120 road to the lower portal), above the

Figure II-2

Buckhorn Access Project



junction with Forest Road 3550-130, would be closed to public use for safety. Public access above Forest Road 3575-120 is not needed except to visit the mine and there is no turnarounds on this road. The section of Forest Road 3550-125 between Forest Road 3550-130 and Forest Road 3575-120 is steep with several sharp turns, 20 mph, and would not be compatible with public and mine use.

After the completion of operations, once the 3550/3550-125 road is no longer in use as the ore and supply haul route, the 3550-130 road would be closed to public use, but open for administrative use to access previously harvested units and Department of Natural Resource managed land. Forest Road 3575-140 would be closed, except for administrative use near the junction with FR 3575-143 since the remaining portion of road would be a short, dead end road with no place to turn around. The ore haul route between the upper and lower portals on private land would close this road where it crosses private land.

Other previously closed roads that have had the closure breached by the public and NEPA was previously completed for the closure, particularly along Forest Roads 3575 and 3575-150, would be re-closed during this project by the Proponent.

Area of Disturbance

The area of disturbance would be the same area as Alternative B, 57 acres.

Reclamation

The width of the running surface on the new section of road from the private property boundary above FR 3575-120 to the mine site would be reduced from 24 feet to 12 feet, plus intervisible turnouts, through pulling back road fill and placing it against the cutbank and the re-grading of the fill slopes to blend with adjacent slopes. Forest Roads 3550 and 3550-125 would be reclaimed back to their 17-18 foot present width, plus intervisible turnouts, at the end of ore haul. The entire length of the road along the pipeline to the infiltration gallery would be fully reclaimed on National Forest System land by returning the contour to as near natural as possible and then re-vegetating the surface. Erosion control techniques such as application of mulch and tackifier or hydromulching and installation of diversion ditches would be used, as needed, to minimize soil erosion and sedimentation. Because of the differences in reclamation between Alternatives B and B1, reclamation on NFS land may take several weeks longer under Alternative B1.

Alternative C

This alternative was designed to use a different ore, supply, and employee access route than the Marias Creek route to address issues that arose relating to the Marias Creek route. Many of the same issues relating to the Marias Creek route simply transfer to the Nicholson Creek route, but a different land base and set of residents would be affected. Because of the greater number of residents living along the Forest Service right-of-ways in this alternative, additional mitigation measures were added to reduce impacts to those residents. A map of this alternative is included as Figure II-3, Alternative C.

The main differences between this alternative and the Proponent's proposal include:

- The ore and supply haul route would be the Nicholson Creek route which responds to the dust and noise issues raised by residents on the Pontiac Ridge Road and Marias Creek, and sedimentation issues associated with Marias Creek.

- Road reclamation standards for the new road between FR 3575-120 and the lower portal.
- Paving the lower portions of the haul route from Toroda Creek Road to 50' past the cattle guard after private land (2.4 miles paved) to minimize the effects of dust on residents, minimize the use of dust suppressants, and avoid track-out onto County Roads.
- 25 mph speed limit.
- Ore haul trucks, either loaded or unloaded, would only be allowed to haul between 6:00 a.m. and 6:00 p.m. on National Forest System roads, Monday – Saturday to minimize impacts to residents outside normal working hours and on Sundays.
- Supply haul trucks would be restricted to a 6:00 a.m. to 6:00 p.m. schedule, Monday – Friday, except for infrequent unplanned, unforeseen supply shortages to minimize impacts to residents outside normal working hours.
- Access from December 1 to March 31 for water monitoring would only be permitted by snowmobile to minimize impacts to wildlife, unless on a road already snow plowed for other mine activities.
- There is a lower need for land disturbing mitigation due to impacts to the Cedar grazing allotment. Where the cattle congregate in the north pasture is mostly away from the haul route, so less mitigation would be needed than Alternatives B and B1 to reduce the interaction between haul vehicles and cattle; and
- Amendments to the Okanogan Forest Plan for travel through deer winter range and road density in MA 14-18 are not needed. Forest Road 3575 is presently a designated open road through deer winter range.

Ore Haul Routes

This alternative proposes that the ore and supply route during operations would come up the Nicholson Creek route and that the Nicholson Creek roads (3575, 3575-150, 3575-100, 3575-120 would be upgraded instead of the Marias Creek route, and the new access route to the lower portals would be constructed). The above Forest Roads would be upgraded to a 24-foot running surface, 31-foot total width including ditches and shoulders, similar to what is proposed in Alternatives B and B1. Ore haul trucks, loaded or unloaded, would be restricted to a 6:00 a.m. to 6:00 p.m. schedule on National Forest roads, Monday to Saturday. There would be no ore haul permitted on Sundays. There would be a greater number of trucks during the days of haul; averaging 60 trucks versus 50 trucks/day during days of haul.

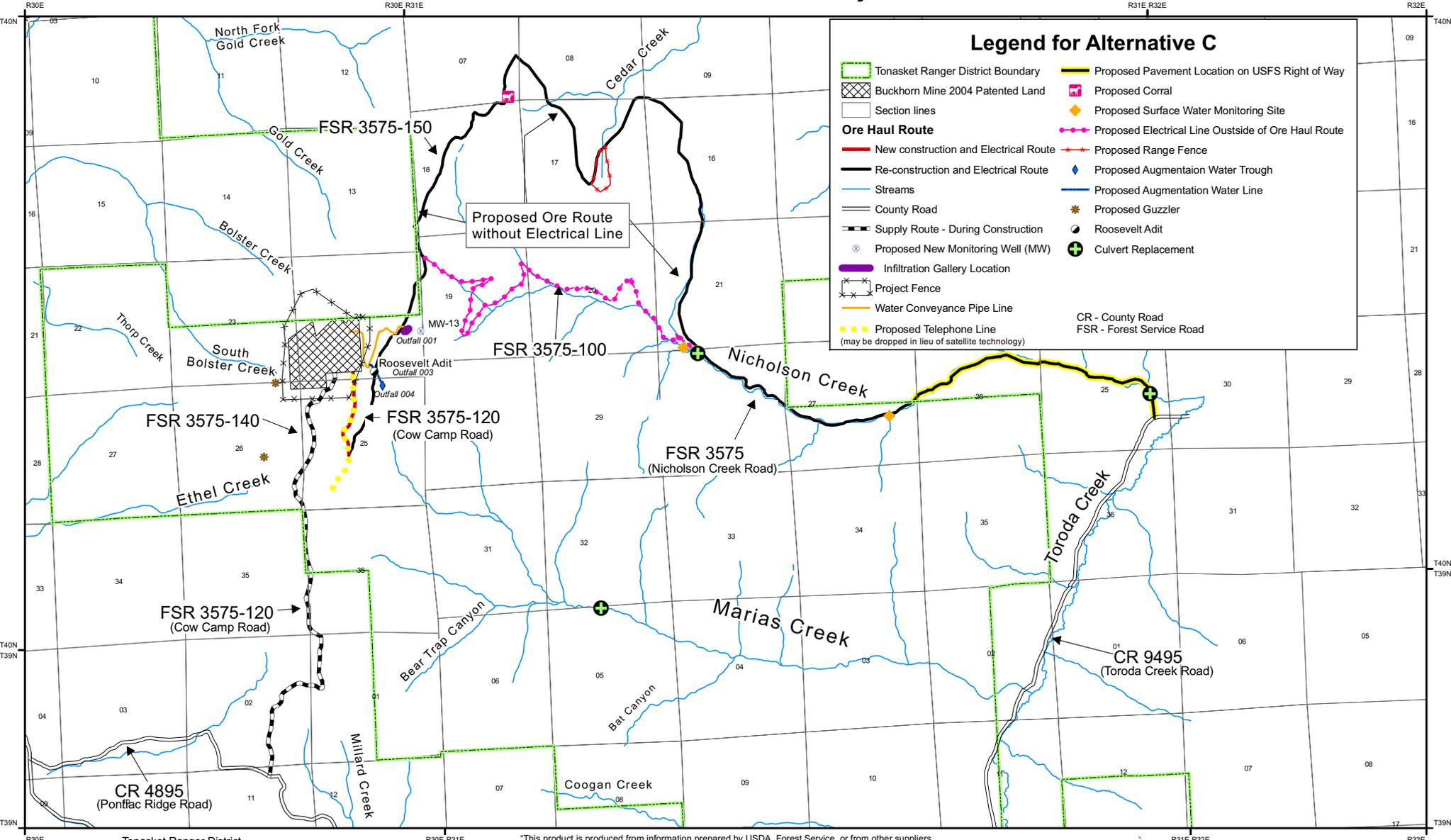
The Proponent would be responsible for on-going road maintenance and snow plowing, to Forest Service standards, necessary to maintain year-around heavy truck and passenger vehicle access.

Supply Haul Routes

During road construction/reconstruction for the ore haul route, mine construction access would be the same as Alternative B. During operations, the supply route would be the same as the ore haul route described above. Supply haul trucks would be restricted to a 6:00 a.m. to 6:00 p.m. schedule, Monday to Friday, except for infrequent unplanned, unforeseen supply shortages.

Figure II-3

Buckhorn Access Project



Legend for Alternative C

Tonasket Ranger District Boundary	Proposed Pavement Location on USFS Right of Way
Buckhorn Mine 2004 Patented Land	Proposed Corral
Section lines	Proposed Surface Water Monitoring Site
Ore Haul Route	
New construction and Electrical Route	Proposed Electrical Line Outside of Ore Haul Route
Re-construction and Electrical Route	Proposed Range Fence
Streams	Proposed Augmentation Water Trough
County Road	Proposed Augmentation Water Line
Supply Route - During Construction	Proposed Guzzler
Infiltration Gallery Location	Roosevelt Adit
Project Fence	Culvert Replacement
Proposed Telephone Line (may be dropped in lieu of satellite technology)	

CR - County Road
FSR - Forest Service Road

Tonasket Ranger District
Okanogan-Wenatchee National Forests
Map by JRainford

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1 inch equals 0.70 miles
0 0.25 0.5 1 1.5 2 Miles

Absolute Scale = 1:44,096



Operating Schedule

The mine would operate on a 24-hour basis with transportation of ore limited to 6:00 a.m. to 6:00 p.m. for loaded or unloaded haul trucks (ore, backfill) on National Forest System land, Monday to Saturday. The transportation of supplies would be limited to 6:00 a.m. to 6:00 p.m., Monday to Friday, except for infrequent unplanned, unforeseen supply shortages. Although some shift staggering may occur, mine employees would be assigned to an 8-, 10-, or a 12-hour shift, depending on their responsibility.

Project Life

The project life is similar to Alternative B, but reclamation may take several weeks longer because of the difference in reclamation of the road between Forest Road 3575-120 and patented land.

Employment

Employment would be similar to Alternative B except possibly 1 to 2 more contract employees may be needed for ore haul and road maintenance because of the longer route.

Employee Transportation

The employees would be allowed to access the mine by whatever Forest Service route they desired during snow-free months. Only the ore and supply haul route, Nicholson Creek, would be plowed during the winter, so this would be their only approved access route for employees at that time. Forest Road 3550-125 and 130 would remain closed to all motorized traffic December 1st to March 31st. If requested by the Proponent, the Forest Service would consider allowing the 3575-120 road to be plowed open in the winter for employee access. Employee start times would be same as in Alternative B. The Proponent would encourage car-pooling to decrease the amount of traffic on National Forest roads.

Utilities (power, telephone)

During construction, generators would be used on site to provide power until commercial service is available. The electrical line would follow a slightly different route than the ore and supply haul road. The electric line would come up Forest Road 3575-100 from Forest Road 3575 instead of taking the longer route around proposed as the ore haul route. Telephone service would be buried along Forest Road 3575-120 and the new access road to patented land from the end of the existing line at Cow Camp to the mine property boundary. At the end of mining, utilities would be left in the roads. Electricity would be disconnected at the end of private land on FR 3575. Telephone lines would be disconnected at the pedestal at Cow Camp.

Water Monitoring

Water monitoring would be similar to Alternative B1 except the additional surface water monitoring locations would be in lower Nicholson Creek instead of lower Marias Creek. The approximate location of the water monitoring facilities is shown on Figure II-3, Alternative C. Access to water monitoring sites would only be allowed by snow machine unless on a road already plowed open for ore haul or mine operations. Several surface water monitoring stations are located in closed areas in deer winter range in the Ethel Creek drainage and along Forest Road 3575-100.

Dust Suppression

The dust suppression program would be similar to Alternative B except that pavement is proposed on National Forest right-of-ways from Toroda Creek road to 50' past the cattleguard after private land in Section 26; about 2.4 miles of paving. The speed limit would be 25 mph.

Road Closures

During the construction of the ore haul route, portions of Forest Roads 3575, 3575-150, 3575-100, and 3575-120 would be closed to public use for safety. During the operations phase of the mine, the only sections of roads closed to public use would be the new section of road above FR 3575-120 to the lower portals and roads inside the project fence, which would be closed for public safety. After the completion of operations, the new section of road to patented land would be open for public use. Forest Road 3575-140 would be closed to public use, after the project fence is removed, at the junction with Forest Road 3575-143 since it would be a dead end road with no turnaround. The ore haul route between the upper and lower portals on private land would close this road where it crosses private land.

Other previously closed roads that have had the closure breached by the public, and NEPA was previously completed for the closure, particularly along Forest Roads 3575 and 3575-150, would be re-closed during by this project by the Proponent.

Reclamation

Reclamation of this alternative would be similar to Alternative B1, except that the reconstructed portion of the ore haul route would remain double lane.

Area of Disturbance

Table II-3: Disturbance Acres for Alternative C

Facility	Size	Comments
Ore haul route	<52 acres	Assumed 93' clearing for construction, additional 30' for reconstruction.
Monitoring wells	<1 acres	1 new water monitoring well, re-opening up to 300' of temporary road, new piezometers and surface water monitoring points
Infiltration gallery & pipeline	<6 acres	4640' pipeline to dosing tank and drainage field.
Fence	<4 acres	74 acres area of National Forest System land enclosed
Mitigation Acres Fence around Grass Lake Corrals Culvert removed Guzzlers	2 acres	
TOTAL	65 Acres¹³	

¹³ The acres of impact has changed from the DEIS since clearing limit staking for the preliminary road design for Alternatives B and B1 has been completed. Construction width clearing limits above the 3575-120 road averaged about 93' instead of the 66' average estimated for the DEIS. The additional clearing for the reconstruction was assumed to average 30' instead of the 24' estimated for the DEIS.

Alternative D

This alternative was designed to result in the least impacts to National Forest System lands, particularly relating to sedimentation, air quality, water quality, recreational impacts, wildlife, and road maintenance impacts. Because more residents live along Forest Service rights-of-way in this alternative than in Alternatives B and B1, paving of the road past most of these residences was incorporated into the alternative to reduce air quality impacts to these residents and supply and ore haul days were restricted to Monday through Friday.

The main differences between this alternative and the Proponent's proposal are:

- The ore and supply haul route would be from OCR 4895 (Pontiac Ridge Road) up FR 3575-120, minimizing disturbance on National Forest System land.
- Road reclamation of the new road between the 3575-120 road and the patented land.
- Paving the lower portion of the haul and supply route from OCR 4895 to Section 36, DNR land (1.3 miles paved).
- 25 mph speed limit.
- Ore haul trucks, either loaded or unloaded, would only be allowed to haul between 6:00 a.m. and 6:00 p.m. on National Forest roads, Monday – Friday.
- Supply haul trucks would be restricted to a 6:00 a.m. to 6:00 p.m. schedule, Monday – Friday, except for infrequent unplanned, unforeseen supply shortages.
- Access to water monitoring sites during snowbound months would only be permitted by snow machine to minimize impacts to wildlife, unless on a road already plowed open for other mine operations. Several surface water monitoring stations are located in closed areas in deer winter range in the Ethel Creek drainage and along Forest Road 3575-100.
- A lower need for range mitigation since very little of the Cedar allotment on National Forest System land would be affected by this alternative.
- Amendments to the Okanogan Forest Plan for travel through deer winter range and road density in deer winter range in Management Area 14-18 and stream fines in Marias and Nicholson Creeks are not needed.

A map of this alternative is included as Figure II-4, Alternative D.

Ore Haul Route

The ore haul route during operations would come up FR 3575-120, from Okanogan County Road 4895. FR 3575-120 would be upgraded similar to as shown on the Road Plans for the Crown Jewel Project except the lower 1.3 miles would be paved. From Cow Camp to the mine site, the ore haul route would be the same as other action alternatives. Ore haul would be restricted for loaded and unloaded trucks to 6:00 a.m. to 6:00 p.m., Monday to Friday.

The Proponent would be responsible for on-going road maintenance and snow plowing, to Forest Service standards, necessary to maintain year-around heavy truck and passenger vehicle access.

Supply Haul Routes

During road construction for the ore haul route, mine construction access would be a portion of the road being reconstructed so delays would be encountered. During operations, the supply route would be the same as the ore haul route described above. Supply haul trucks would be mostly restricted to a 6:00 a.m. to 6:00 p.m. schedule, Monday to Friday.

Project Life

The project life is the same as Alternative B.

Employment

The estimated number of construction and mine employees is similar to Alternative B with the possibility of one additional employee for ore haul, but one less employee for road watering and maintenance since more of the haul would be on roads maintained by the County.

Employee Transportation

The employees would be allowed to access the mine by whatever Forest Service route they desired during snow-free months. Only the ore and supply haul road route, Forest Road 3575-120, would be plowed during the winter, so this would be their only approved access route at that time. Forest Roads 3550-125, 3550-130, and a portion of 3575-100 would continue to be closed to all motorized traffic December 1st to March 31st except snowmobiles for water monitoring on FR 3575-100.

Operating Schedule

Transportation of ore would be limited to 6:00 a.m. to 6:00 p.m., Monday to Friday, for loaded and unloaded haul trucks (ore, backfill) on National Forest System land. Supplies would be delivered between 6:00 a.m. and 6:00 p.m., Monday to Friday, except for infrequent, unplanned supply deliveries outside those hours. Although some shift staggering may occur, mine employees would be assigned to an 8-, 10-, or a 12-hour shift, depending on their responsibility. Employee start times would be mostly 6:00 – 8:00 a.m. and 6:00 – 8:00 p.m.

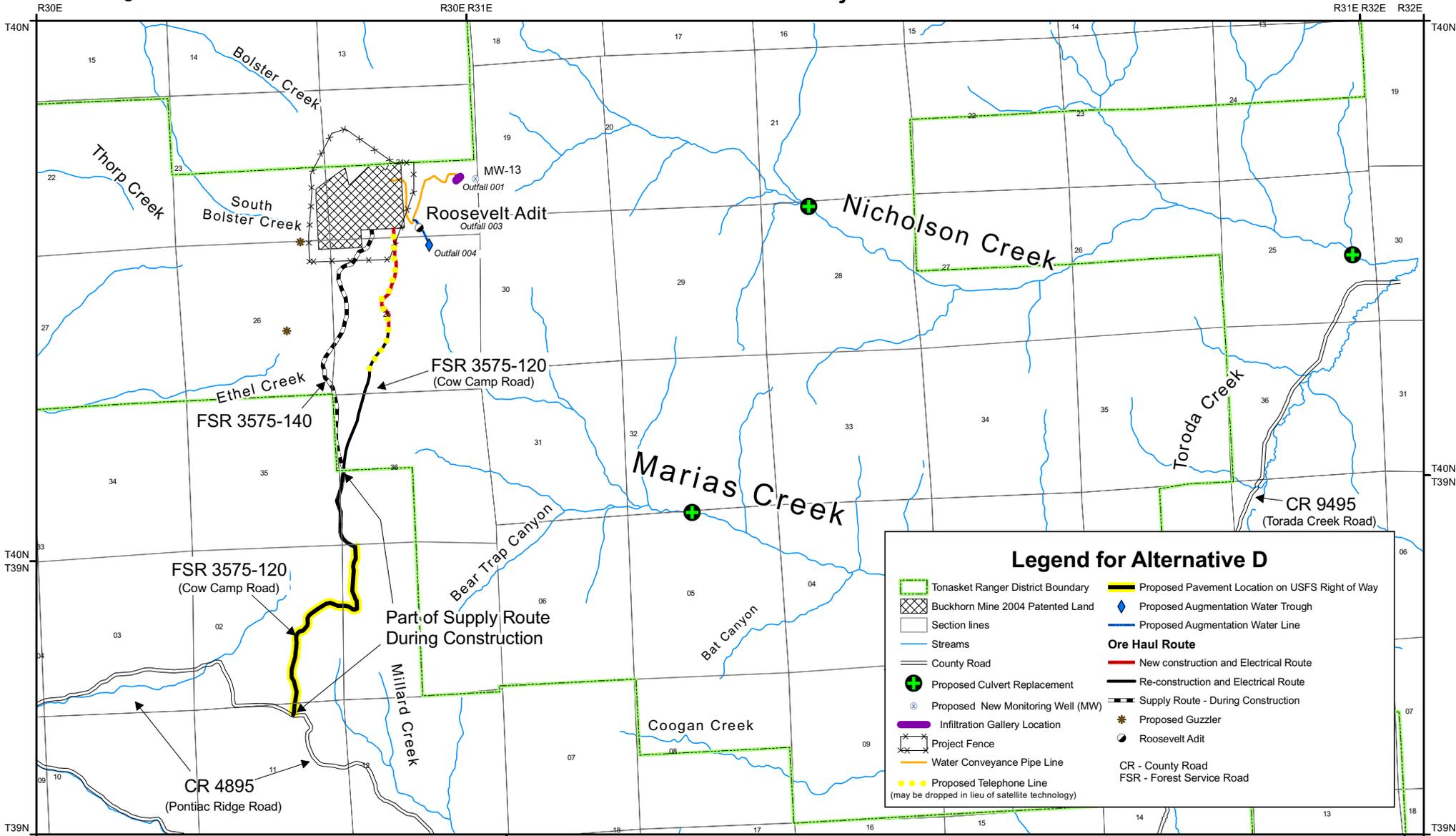
Utilities (power, telephone)

Electrical lines would be buried in Forest Road 3575-120 right-of-way from near the junction with Pontiac Ridge Road to Cow Camp and then follow the new access route to the lower portals. Telephone lines would be buried along Forest Road 3575-120 and the new road to patented land from the end of the existing line at Cow Camp to the mine property boundary. During construction, generators would be used on site to provide power until commercial service is available.

At the end of mining, utilities would be left in the road. All utilities would be disconnected at Cow Camp. This access route would provide power to a number of private residences along Forest Road 3575-120 who presently do not have power.

Figure II-4

Buckhorn Access Project



Legend for Alternative D

Tonasket Ranger District Boundary	Proposed Pavement Location on USFS Right of Way
Buckhorn Mine 2004 Patented Land	Proposed Augmentation Water Trough
Section lines	Proposed Augmentation Water Line
Streams	Ore Haul Route
County Road	New construction and Electrical Route
Proposed Culvert Replacement	Re-construction and Electrical Route
Proposed New Monitoring Well (MW)	Supply Route - During Construction
Infiltration Gallery Location	Proposed Guzzler
Project Fence	Roosevelt Adit
Water Conveyance Pipe Line	CR - County Road
Proposed Telephone Line (may be dropped in lieu of satellite technology)	FSR - Forest Service Road

Tonasket Ranger District
Okanogan-Wenatchee National Forests
Map by JRainford



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Water Monitoring

Water monitoring would be the same as Alternative B except no new surface water monitoring points on National Forest System land are proposed by the Forest Service. Additional monitoring points may be required by the Washington State Department of Ecology as part of the NPDES permit. Water monitoring during winter would be by snow machine, unless on a road already plowed open as part of ore haul or mine operations. Several surface water monitoring stations are located in closed areas in deer winter range in the Ethel Creek drainage and along Forest Road 3575-100.

Dust Suppression

Dust suppression programs would be similar to Alternative B except about 1.3 miles of Forest Road 3575-120 would be paved through private land to minimize dust. The speed limit on National Forest System roads would be 25 miles per hour.

Road Closures

During construction of the ore haul route, portions of Forest Road 3575-120 would be closed to public use for safety. During the operations phase of the mine, the only sections of roads closed to public use would be the new section of road above FR 3575-120 to the lower portals and roads inside the project fence, which would be closed for public safety. After the completion of operations, the new section of road to patented land would be open for public use. Forest Road 3575-140 would be closed to public use, after the project fence is removed, at the junction with Forest Road 3575-143 since it would be a dead end road with no turnaround.

Other previously closed roads that have had the closure breached by the public, and NEPA was previously completed for the closure, particularly along Forest Roads 3575 and 3575-150, would be re-closed during this project by the Proponent.

Reclamation

Final reclamation under this alternative is similar to Alternative B1, except the ore and supply haul route would remain double lane on Forest Road 3575-120.

Area of Disturbance

Table II-4: Disturbance Acres for Alternative D

Facility	Size	Comments
Ore haul route	<14 acres	Assumed 66' clearing for construction, additional 24' for reconstruction.
Monitoring wells	<1 acres	1 new water monitoring well, re-opening 300' of previously reclaimed road, additional piezometer locations.
Infiltration gallery & pipeline	<6acres	4640' pipeline to dosing tank and drainage field. Used figure from Table 2-1 from State's FSEIS. Maximum area of disturbance
Fence	<4 acres	74 acres area of National Forest System land enclosed, 17 miles X 20' clearing
Mitigation Acres Culvert removal & replacement Guzzlers Nicholson Creek Culvert	<1 acres	
TOTAL	26¹⁴ Acres	

Comparison of Components

Table II-5 on the next pages provides a comparison of alternatives by component.

¹⁴ The acres of impact has changed from the DEIS since clearing limit staking area for the preliminary road design has been completed. Construction clearing limits averaged about 93' above Forest Road 3575-120 instead of the 66' average estimated for the DEIS. The clearing for the reconstruction was assumed to average 30' instead of the 24' estimated for the DEIS based on clearing limits for Alternatives B and B1. There has also been another change to delete the 2 acres included previously through Washington Department of Natural Resource land since this is not Forest Service right-of-way.

Table II-5: Comparison of Components by Alternative

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Ore Haul Route	Not Applicable	Marias Creek (3550, 3550-125, new road to mine site). 8.4 miles total length (OCR to patented land) 1.5 miles construction on National Forest (N.F.) land or N. F. ROW, 5.2 miles reconstruction on N. F. System land or N.F. ROW.	Marias Creek (3550, 3550-125, new road to mine site). 8.4 miles total length (OCR to patented land) 1.5 miles construction on N.F. System land or N.F.ROW, 5.2 miles reconstruction on N.F. System land or National Forest ROW.	Nicholson Creek (3575, 3575-150, 3575-100, 3575-120, new road to mine site; 13.3 miles total length (OCR to patented land site); 0.6 miles of construction on N.F. land or ROW; 12.4 miles of reconstruction on N.F. land or ROW.	Cow Camp to Pontiac Ridge Road (3575-120), new road to mine site; 4.1 miles total length OCR to patented land site; 0.6 miles of construction on N.F. land or ROW; 2.1 miles of reconstruction on N.F. land or ROW.
Ore Trucks/Day	0	50 – 70 round trips/day, mostly Monday to Friday with possible reduced haul on Saturdays and Sundays depending on mill supply needs; About 25 additional trucks per day before and after Spring break-up on County Roads for up to 3 weeks.	50 – 70 round trips/day, mostly Monday to Friday with possible reduced haul on Saturdays and Sundays depending on mill supply needs; About 25 additional trucks per day before and after Spring break-up on County Roads for up to 3 weeks.	Averages 60 round trips/day; most haul Monday to Friday with possible reduced haul on Saturdays. No Sunday haul. About 30 additional trucks per day before and after Spring break-up on County Roads for up to 3 weeks.	Averages 70 round trips/day Monday to Friday. No haul on Saturdays and Sundays. About 35 additional trucks per day before and after Spring break-up on County Roads for up to 3 weeks.
Supply Haul Route During Ore Haul Route Construction	Not Applicable	Hwy 97 to OCR 9480 to OCR 4895 to FR 3575-120 & 3575-140. Average 10 – 20 trucks/day. Snow removal as necessary. Most haul Monday – Saturday.	Hwy 97 to OCR 9480 to OCR 4895 to FR 3575-120 & 3575-140. Average 10 – 20 trucks/day. Snow removal as necessary. Most haul Monday – Saturday.	Hwy 97 to OCR 9480 to OCR 4895 to FR 3575-120 & 3575-140. Average 10 – 20 trucks/day. Snow removal as necessary. Most haul Monday – Saturday.	Hwy 97 to OCR 9480 to OCR 4895 to FR 3575-120 & 3575-140. Average 10 – 20 trucks/day. Snow removal as necessary. Most haul Mon.– Sat.
Supply Haul Route During Operations	Not Applicable	Marias Creek (3550, 3550-125, new road to lower portal); Hwy 20 to OCR 9495 to FR 3550.	Marias Creek (3550, 3550-125, new road to lower portal); Hwy 20 to OCR 9495 to FR 3550.	Nicholson Creek (3575, 3575-150, 3575-100, 3575-120, new road to lower portal); Hwy 20 to OCR 9495 to FR 3575.	Pontiac Ridge to 3575-120, new road to lower portal; Hwy 97 to OCR 9480 to OCR 4895 to FR 3575-120.
Employee Transportation Route	Not Applicable	Any route during snow free months. Only FR 3550 route plowed in winter. If requested by the Proponent, the Forest Service would consider allowing the 3575-120 road to be plowed open in the winter for employee access.	Any route during snow free months. Only FR 3550 route plowed in winter. If requested by the Proponent, the Forest Service would consider allowing the 3575-120 road to be plowed open in the winter for employee access.	Any route during snow free months. Only ore haul route plowed in winter. FR 3550-125 & 130 closed 12-1 to 3- 31 If requested, the F.S. would consider allowing the 3575-120 road to be plowed open in the winter for employee access.	Any route during snow free months. FR 3550-125 & 130 closed December 1 to March 31 st (not to be plowed). Only ore haul route plowed in winter. Other access roads may not be plowed in winter.
Operating Schedule Ore Haul	Not Applicable	Loaded trucks 6:00 a.m. to 6:00 p.m. only, 7 days/week. Unloaded ore trucks may be traveling outside 6:00 a.m. to 6:00 p.m. schedule.	Loaded and unloaded trucks – 6:00 a.m. to 6:00 p.m. only; 7 days/week. No ore haul trucks may be on N.F. roads outside these hours.	Loaded and unloaded trucks – 6:00 a.m. to 6:00 p.m. only, 6 days/week (Mon. - Sat.). No ore haul trucks on N.F. roads outside these hours.	Loaded and unloaded trucks – 6:00 a.m. to 6:00 p.m. only; 5 days/week (Mon. – Fri.). No ore haul trucks on NFS. roads outside these hours.
Operating Schedule Supply Haul	Not Applicable	Supplies mostly 6:00 a.m. to 6:00 p.m., 7 days a week. Some trucks outside these hours.	Supplies only 6:00 a.m. to 6:00 p.m., 7 days a week. Only infrequent, unplanned supply traffic outside these hours.	Supplies 6:00 a.m. to 6:00 p.m.; Monday – Friday. Only infrequent, unplanned supply traffic outside these hours.	Supplies 6:00 a.m. to 6:00 p.m.; Monday – Friday. Only infrequent, unplanned supply traffic outside these hours.
Employee Schedule	Not Applicable	Employee start times mostly 6:00 – 8:00 a.m. /p.m.	Employee start times mostly 6:00 – 8:00 a.m. /p.m.	Employee start times mostly 6:00 – 8:00 a.m. /p.m.	Employee start times mostly 6:00 – 8:00 a.m. /p.m.
Water Supply Access Route	Not Applicable	FR 3575-120 going south from new Marias Creek access route and then 3575-140 to FR 3575-143. Route snowplowed in winter	FR 3575-120 going south from new Marias Creek access route and then 3575-140 to FR 3575-143. Route snowplowed in winter	FR 3575-120 going south from new access route and then 3575-140 to FR 3575-143. Route snowplowed in winter	FR 3575-120 and then 3575-140 to FR 3575-143. Route snowplowed in winter

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Project Fence	Not Applicable	3-strand, wildlife permeable, barbed wire fence. Enclose 74 ac. NFS, 1.7 miles long; posted "No Trespassing" signs. Gated where cross roads. No public access inside fence.	3-strand, wildlife permeable, barbed wire fence. Enclose 74 ac. NFS, 1.7 miles long; posted "No Trespassing" signs. Gated where cross roads. No public access inside fence.	3-strand, wildlife permeable, barbed wire fence. Enclose 74 ac. NFS, 1.7 miles long; posted "No Trespassing" signs. Gated where cross roads. No public access inside fence.	3-strand, wildlife permeable, barbed wire fence. Enclose 74 ac. NFS, 1.7 miles long; posted "No Trespassing" signs. Gated where cross roads. No public access inside fence.
Infiltration Area and Supply Pipeline	Not Applicable	Near junction 3575-120 and 125 roads; pipeline about 4,640' to dosing tank. Road along route.	Near junction 3575-120 and 125 roads; pipeline about 4,640' to dosing tank. Road along route.	Near junction 3575-120 and 125 roads; pipeline about 4,640' to dosing tank. Road along route.	Near junction 3575-120 and 125 roads; pipeline about 4,640' to dosing tank. Road along route.
Dust Suppression	Not Applicable	Magnesium chloride and water used.	Magnesium chloride, water; pave from OCR 9845 to 150' past first Marias Creek crossing (0.5 miles paved)	Magnesium chloride, water; pave from OCR 9845 to cattle guard past end private land (2.4 miles paved)	Magnesium chloride, water; pave from south boundary Section 36 to OCR 4895 (1.3 miles paved)
Snow Removal	Not Applicable	Blading and sand. No blading of snow below road within 100' of creeks. Snowplowing to monitoring sites possible.	Blading and sand. No blading of snow below road within 100' of creeks. No snowplowing to monitoring sites where not already snowplowed.	Blading and sand. No blading of snow below road within 100' of creeks. No snowplowing to monitoring sites where not already snowplowed.	Blading and sand. No piling of snow within 50' of creeks. No snowplowing to monitoring sites where not already snowplowed.
Utilities	Not Applicable	Electricity - buried in road prism of ore haul route. Telephone - From existing line at Cow Camp up FR 3575-120 and new road to patented land.	Electricity - buried in road prism of ore haul route. Telephone - From existing line at Cow Camp up FR 3575-120 and new road to patented land.	Electricity - buried in road prism of FR 3575, 3575-100, 3575-120, and in new road to lower portal. Not all in ore haul route. Telephone - From existing line at Cow Camp up FR 3575-120 and new road to patented land.	Electricity - buried in road prism of ore haul route. Telephone - From existing line at Cow Camp or new line buried with power line on ore haul route.
Road Closures during Construction and Operations	Not Applicable	All newly constructed roads and FR 3550-125 past the 3550-130 junction. The reconstructed road up to the 3550-130 junction and the reconstructed FR 3575-120 junction with the new road would remain open to public use. Forest Roads inside the project fence closed to the public.	All newly constructed roads and FR 3550-125 past the 3550-130 junction. The reconstructed road up to the 3550-130 junction and the reconstructed FR 3575-120 junction with the new road would remain open to public use. Forest Roads inside the project fence closed to the public	All newly constructed roads. Forest roads inside project fenced closed to public	All newly constructed roads. Forest roads inside project fenced closed to public.
Surface Water Monitoring Sites	Existing NEPA documents	Surface water monitoring sites at 12 locations on N.F. land on Buckhorn Mt. (SW-1, -2, -5, -7, -9, -10, -11, -14, GW-2, and 2 - 3 new sites in Marias Creek, Additional new sites may be determined by WADOE during permitting.	Surface water monitoring sites at 12 locations on N.F. land on Buckhorn Mt. (SW-1, -2, -5, -7, -9, -10, -11, -14, GW-2, and 2 - 3 new sites in Marias Creek, Additional new sites may be determined by WADOE during permitting.	Surface water monitoring sites at 12 locations on N.F. land on Buckhorn Mt. (SW-1, -2, -5, -7, -9, -10, -11, -14, GW-2, and 2 - 3 new sites in Nicholson Creek, Additional new sites may be determined by WADOE during permitting.	Surface water monitoring sites at 12 locations on N.F. land on Buckhorn Mt. (SW-1, -2, -5, -7, -9, -10, -11, -14, and GW-2. Additional new sites may be determined by WADOE during permitting.

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Water Monitoring Wells	Existing NEPA documents.	1 new monitoring well (MW-13) on N.F. land, 7 existing monitoring wells (MW-1, -3, -4, -7, -9-11, -12) on N.F. land. 4 new piezometers at the Infiltration Gallery on N.F. land, 3 new piezometers on N.F. land in Myers Creek basin, staff gauges at 17 seeps/springs (all but 2 on N.F. land), 5 staff gauges, and 10 mini-piezometers at Nicholson and Marias Creek headwater wetlands.	1 new monitoring well (MW-13) on N.F. land, 7 existing monitoring wells (MW-1, -3, -4, -7, -9-11, -12) on N.F. land. 4 new piezometers at the Infiltration Gallery on N.F. land, 3 new piezometers on N.F. land in Myers Creek basin, staff gauges at 17 seeps/springs (all but 2 on N.F. land), 5 staff gauges, and 10 mini-piezometers at Nicholson and Marias Creek headwater wetlands.	1 new monitoring well (MW-13) on N.F. land, 7 existing monitoring wells (MW-1, -3, -4, -7, -9-11, -12) on N.F. land. 4 new piezometers at the Infiltration Gallery on N.F. land, 3 new piezometers on N.F. land in Myers Creek basin, staff gauges at 17 seeps/springs (all but 2 on N.F. land), 5 staff gauges, and 10 mini-piezometers at Nicholson and Marias Creek headwater wetlands.	1 new monitoring well (MW-13) on N.F. land, 7 existing monitoring wells (MW-1, -3, -4, -7, -9-11, -12) on N.F. land. 4 new piezometers at the Infiltration Gallery on N.F. land, 3 new piezometers on N.F. land in Myers Creek basin, staff gauges at 17 seeps/springs (all but 2 on N.F. land), 5 staff gauges, and 10 mini-piezometers at Nicholson and Marias Creek headwater wetlands.
Site Reclamation	Existing NEPA documents	100% of infiltration and augmentation facilities, monitoring wells and remove fence, 1 lane road with turnouts to lower portal from Cow Camp (rip one lane closed), leave utilities in road but disconnected. Remove manholes and upper and lower sections of pipelines.	100% of infiltration and augmentation facilities, monitoring wells and remove fence, 1 lane road with turnouts to lower portal from Cow Camp (re-contour to one lane road), leave utilities in road but disconnected. Remove manholes and upper and lower sections of pipelines. F.R. 3550 and 3550-125 would be reclaimed back to their previous 17 – 18' width with intervisible turnouts.	100% of infiltration and augmentation facilities, monitoring wells and fence, 1 lane road with turnouts to lower portal from Cow Camp (re-contour to one lane road), leave utilities in road but disconnected after private land on 3575 road. Remove manholes and upper and lower terminus of pipelines.	100% of infiltration and augmentation facilities, monitoring wells and remove fence, 1 lane road with turnouts to lower portal from Cow Camp (re-contour to one lane road), leave utilities in road but disconnected at Cow Camp. Remove manholes and upper and lower terminus of pipelines.
Speed Limit	35 mph	30 mph	25 mph	25 mph	25 mph
Project Life	4 years (1 year reclamation, 3 years reclamation monitoring)	13 - 15 years (1 year construction, 8 years operations, 1 year reclamation, 3 - 5 years reclamation monitoring). Water monitoring may continue for up to 25 – 60 years.	13 - 15 years (1 year construction, 8 years operations, 1 year reclamation, 3 - 5 years reclamation monitoring). Water monitoring may continue for up to 25 – 60 years.	13 - 15 years (1 year construction, 8 years operations, 1 year reclamation, 3 - 5 years reclamation monitoring). Water monitoring may continue for up to 25 – 60 years.	13 - 15 years (1 year construction, 8 years operations, 1 year reclamation, 3 - 5 years reclamation monitoring). Water monitoring may continue for up to 25 – 60 years.

RECLAMATION MEASURES

The purpose of reclamation is to return the disturbed areas to a stabilized and productive condition following mining related activities and protect long-term land, water, and air resources in the area. Reclamation policies of the Forest Service are to ensure the return of disturbed lands to productive uses consistent with land management policies.

The Proponent submitted a Reclamation Plan as part of their Amended Plan of Operations for the Proposed Buckhorn Mt. Project on Lands Administered by the US Forest Service, May 15, 2005 and a Revised Reclamation Plan for the Buckhorn Mountain Project, June 2, 2006. The plan includes their proposed reclamation measures and design for the site. If an action alternative is selected, this reclamation plan would be modified, as necessary, to include any changes or additions as developed through this Environmental Impact Statement, the Plan of Operation, Road Use, Utility, and other permitting processes.

Reclamation practices and technology are changing and developing. Future modifications in the Operational Reclamation Plans are expected as techniques are refined or expanded consistent with meeting the goals of reclamation identified herein. The Proponent would take advantage of opportunities to explore new reclamation techniques and new and more effective methods for erosion control. The reclamation plan would be updated at least once every five years or as appropriate using improvements in reclamation technology.

As described in the Performance Securities section below, reclamation performance securities would be reviewed/updated on two year intervals or more frequently, as necessary, depending on changes in disturbed areas, modifications of plans, or any other alteration of or to the condition of National Forest System lands that affects the cost of reclamation.

Introduction

The reclamation program for the Buckhorn Access Project is designed to reclaim mining and ore haul related disturbances on National Forest System land, where conditions and current reclamation technology reasonably permit, in compliance with the requirements of the Forest Service. The procedures are designed to require the Proponent to reclaim affected areas to a productive post-mining land use that is similar to pre-mining land uses.

Reclamation Goals and Objectives

The current land use of much of the site is primarily for timber management, range land for cattle grazing, wildlife habitat, and dispersed recreation. The emphasis of the reclamation plan would be to re-vegetate disturbed areas by seeding native vegetation materials that quickly develop plant cover on site to prevent accelerated erosion, stream sedimentation, and/or noxious weed infestations. The secondary emphasis would be to create forested habitats similar to what existed prior to the start of project activities, and improved deer winter range, where appropriate.

The reclamation plan for any of the selected action alternatives would incorporate the following basic goals:

- Establishment of stable surface, topographic, and drainage conditions that are compatible with surrounding landscapes and that control erosion, water quality, and air quality impacts from the operation;
- Establishment of surface soil conditions that are conducive to regeneration of a stable plant community through removal, stockpiling, and reapplication of suitable topsoil and cover soil material, where possible;
- Re-vegetation of disturbed areas using species adapted to site conditions and approved by the Forest Service in order to establish a long-term productive, self sustaining, biotic community compatible with currently identified future land uses and comparable to what currently exists on the site;
- Consideration of public safety including posting warning signs, limiting public access, and stabilizing or removing of structures created as a result of the mining activities that could constitute a public hazard; and
- The post-mining land uses on National Forest System land would be managed for replacement timber, grazing, wildlife habitat, and dispersed recreation or land use emphasis developed for the area through Management Plan revisions.

Reclamation Schedule

Reclamation and closure design measures would be incorporated into the project design at the start of the Buckhorn Access Project and would be an integral part of the project permitting and operations. Reclamation activities would be initiated as soon as practical after project activities in a particular area are completed, thus minimizing erosion and sedimentation problems. This is called segmental or concurrent reclamation.

In general, reclamation activities would be timed to take advantage of optimal climatic conditions. Seedbeds would be prepared and seeding would be completed in order to take advantage of winter and spring moisture. Tree and shrub planting would occur in the spring.

During the life of Buckhorn Access Project, interim and segmental reclamation would occur to reduce erosion and the potential for water quality degradation. Interim reclamation refers to reclamation efforts on lands disturbed during the course of a project and is intended to temporarily stabilize an area prior to final reclamation. Interim re-vegetation would include re-vegetation to reduce erosion and sediment during the life of the operation. Topsoil would not be applied to interim re-vegetated areas. Hydromulching would be applied, as appropriate, following seeding. Examples of areas which would require interim reclamation includes the temporary road embankments along the water pipeline to the infiltration gallery and at the infiltration gallery.

Segmental reclamation refers to reclamation activities which can be carried on at the same time as ongoing activities. Segmental (concurrent) reclamation would be used on disturbed areas such as road outslopes and cutslopes for permanent roadways and fences since they would be little disturbed at the close of operations. Final surface contouring and re-vegetation activities would occur at the time of construction. The areas to undergo reclamation at mine closure would include portions of the water infiltration gallery pipeline, water augmentation pipeline, and portions of the newly constructed roads. Final reclamation would be implemented upon the completion of ore haul or after a period of shutdown of more than two years, unless there are circumstances that allow for longer periods under permit terms.

Temporary Cessation

Although a temporary cessation of operations is not planned, circumstances beyond the control of the Proponent may require a temporary cessation of operations. If a temporary cessation of operations occurs, the Proponent would implement the following activities:

- Seeding and associated re-vegetation practices would be implemented on areas not scheduled for additional disturbance;
- Diversion ditches and sedimentation ponds that are part of road construction would be inspected periodically to ensure that approved design criteria are met and that the systems continue to function properly after major storm events. Cleaning and repairs would be performed as necessary; and,
- Appropriate sediment management structures would be placed as necessary to minimize erosion and sediment delivery.

Under certain circumstances, and 180 days after the cessation of operations, the WADNR can declare the site abandoned and final reclamation would commence, or as otherwise defined in an approved Plan of Operations.

Permanent Cessation

In the unlikely event that operations permanently cease prior to the scheduled completion of operations, the Proponent would work with the Forest Service to develop a revised reclamation plan that specifically addresses the existing conditions at the time of closure.

General Reclamation Procedures

This section includes the general steps to be followed in reclaiming each of the disturbance areas. Where feasible, project features to be reclaimed would be designed to achieve a topography that blends into the surrounding terrain. This would not be fully accomplished since much of the proposed ore haul route would be retained as a double lane road and not returned to a narrower standard or only the running surface would be narrowed.

Vegetation Clearing and Seed Collection

Surface soils (topsoil) would be saved for reuse during reclamation. Prior to topsoil salvage, merchantable timber would be harvested and removed from the site, except where needed to meet down log or erosion control requirements. To the extent possible, remaining vegetation would be removed and be placed below the road as part of the project erosion control measures. Logs that would be used for replacement of large woody debris during segmental or final reclamation would be stockpiled during operations. Stockpiling of large woody debris would be done along the pipeline route to the infiltration gallery. Stumps would be ground and returned onto the cut and fill slopes of roads. Other woody debris including limbs, brush, etc. would be placed in a windrow below road fill slopes to provide an erosion barrier.

Seedlings and seed mixes approved by the Forest Service would be used to establish acceptable vegetation on disturbed sites. This may required the collection of tree and shrub seed from the proper seed zones and providing this seed to a private tree nursery to grow the necessary seedlings needed for reclamation.

Erosion and Sediment Control

Erosion control on roads would be accomplished by diverting existing flow to the inside of roads during construction and reconstruction, thus eliminating excessive surface runoff across disturbed areas. Sediment detention structures designed for catching and storing sediment from relief culverts would be built as part of road construction and reconstruction. Detention structures would have an adequate retention time to allow the sediment to settle out prior to discharge to surface waters. Sediment traps would be placed in ditches, depending on slope, and below unvegetated slopes to aid in erosion and sediment control. The size and spacing of structures would be based on site specific design considerations.

Best Management Practices for runoff and sediment control include the following measures:

- The disturbed area would be kept to a minimum at any given time through phased disturbance and segmental reclamation;
- Drainage structures installed as part of the construction and reconstruction access and haul roads would include channels, water-bars, relief culverts, sediment traps, and silt fencing. The silt fencing would be backed with straw bales at relief culverts except on Forest Road 3575 on NFS lands or 3575-150 where cows are present on allotments in Alternative C. Silt fencing would be placed below all fill slopes where the toe of the fill is within 100 feet of a stream;

- Rapidly developing and sod-forming plant species would be planted to promote rapid stabilization of disturbed slopes;
- Seeding and planting would occur in the first appropriate season after soil disturbance;
- Mulches, with tackifiers (as needed), would be applied for erosion control and moisture retention;
- Grasses, shrubs, and trees would be planted, where appropriate, for stabilization. Trees and shrubs would not be planted on road cut or fill slopes;
- Interim seeding would be used to stabilize inactive, disturbed areas;
- Roads and water control structures would be maintained periodically, as needed; and
- Sediment control structures would be maintained until reclamation and re-vegetation are completed and the structures are no longer needed. The structures would then be reclaimed.
- Grading during reclamation would be designed and conducted to minimize the potential for erosion.
- Fill slopes and other potential sediment sources would be visually inspected throughout the operation to allow early detection of erosion and vegetation problems. During critical runoff periods, such as spring snow melt and after thunderstorms, inspection of fills and erosive areas would occur on a more frequent basis.
- Reclaimed slopes would be inspected after spring runoff and after major storm events for a period of at least five years after the completion of reclamation grading or as determined by the Forest Service. Any rills or gullies greater than 4 inches deep that develop would be stabilized and re-vegetated.

Decommissioning of Facilities

Following permanent closure of the operation, all facilities, equipment, and tanks, not desired for the long-term management of the land, would be removed from National Forest System lands. Utilities lines would be disconnected; piping would have sections removed at the top and bottom, access ports would be removed from the infiltration and augmentation pipelines, roads would be reclaimed to their final form, and any other structures removed.

In addition, the new access road to the patented land from its junction with Forest Road 3575-120 would be reclaimed back to a one-lane road. The access road for the infiltration gallery pipeline would be obliterated and returned to its natural contour. Access roads to monitoring wells would be returned to their natural contour on National Forest System land once water monitoring is complete. Under Alternative B1, Forest Roads 3550 and 3550-125 would be returned to their present 17 – 18 foot usable surface width, with intervisible turnouts.

Road Grading and Stabilization

Construction/reconstruction slopes on the ore and supply haul route, except between the 3575-120 road and the patented lands, would be shaped for reclamation during initial material removal and placement. Road cutslopes in bedrock would be left as near vertical walls to minimize the amount of disturbed land.

Topsoil

Topsoil and cover soil suitable for re-vegetation would be salvaged and utilized, as possible, to help in re-vegetation along roads and pipelines. Areas that are compacted would be ripped to an 18" depth to loosen the plant rooting zone and create an adhesive surface for topsoil application.

Re-vegetation

The species mixture chosen for re-vegetation would be designed to provide a stable environment that is capable of supporting pre-mining land uses of timber production, livestock grazing, wildlife habitat, and dispersed recreation use. The first objective of re-vegetation would be to provide immediate soil stabilization to prevent erosion and the establishment of noxious weeds. The second objective of re-vegetation would be to establish a self-sustaining, native, biotic community comparable to what currently exists on the site.

Seeding and planting activities for grasses and forbs would be conducted April 1 to June 1 or September 1 to November 1 to take advantage of fall and spring moisture. Where necessary, planting of trees and shrubs, at the infiltration gallery and along the infiltration pipeline, would take place in the spring. If seeding or planting are unsuccessful, follow-up applications in the next appropriate season would occur until re-vegetation meets established release criteria defined in the monitoring section of this chapter.

The surface of prepared seedbeds would be left relatively rough to create sufficient micro sites to facilitate burial of seed and establishment of vegetation. Grass and forb seeds would be broadcast with a cyclone-type broadcast seeder where possible and if necessary, inaccessible areas would be hydro-seeded. It is desirable to use broadcast seeding techniques to the extent possible since it creates a more natural appearing plant community.

Tree and shrub seedlings would be planted randomly at the infiltration gallery and along the infiltration pipeline at approximately 250 larch and Douglas-fir trees and 425 shrubs (250 Kinnikinnick, 100 Snowberry, and 75 Baldhip rose, or similar species) per acre.

Noxious Weed Control

Necessary control measures utilizing various mechanical, biological, cultural, and chemical control techniques would be implemented by the Forest Service on project haul roads and facilities under existing District Noxious Weed Environmental Assessments until a new District-wide Noxious Weed Environmental Assessment can be completed under the guidelines of the Pacific Northwest Region Invasive Plant Program (USFS, 2005). The Proponent would be responsible for providing up to \$4,000 a year in funding for the Tonasket Ranger District to do this work on National Forest System lands within the project area.

Re-vegetation Success Monitoring

A re-vegetation monitoring plan is proposed to evaluate the success of re-vegetation activities. Monitoring would begin the first growing season following planting and seeding and would continue until successful re-vegetation criteria have been met. Re-vegetation would be considered successful when herbaceous cover and production values, as well as, woody plant densities and tree seedling survival rates, meet or exceed proposed success criteria. See the Reclamation Monitoring section later in this chapter.

Reclamation Performance Securities

The statutory and regulatory authority of the Forest Service would require the Proponent to execute a reclamation financial security agreement as part of the Plan of Operations approval. This agreement would assure that sufficient monies are available to properly reclaim disturbed areas in the event that the Proponent would be unable to meet its reclamation obligations.

No road or facility construction can commence, except road maintenance, without approval of the Plan of Operations and the execution of financial assurance agreements for sufficient reclamation funds for decommissioning and reclamation of the Project.

Additional information about reclamation financial assurances is set forth in the Performance Securities section below.

MITIGATION MEASURES

Mitigation practices on National Forest System land would be based on federal, state, and local laws and regulations, current technology, best management practices, and company policies. The purpose of these practices would be to reduce or avoid adverse impacts to the environment and to reclaim disturbed areas. Implementation of mitigation measures would primarily be the responsibility of the Proponent and this would mostly be done through road construction design and re-vegetation requirements. Enforcement of mitigation measures would primarily be the responsibility of the Forest Service through the issuing of permits (Road Use and Special Use) and a of the Plan of Operations, although some enforcement, like water quality, would mostly be the responsibility of other agencies such as the Washington State Department of Ecology. This section is a summary of mitigation practices that would be applied based on applicable federal and state regulations, or policy, or agreed to by the Proponent.

Mitigation measures are an integral part of each action alternative. Environmental consequences are predicted based on these measures being successfully implemented. The effects of the proposed alternatives on the environment are described in Chapter III, Affected Environment and Environmental Consequences. If the No Action Alternative (Alternative A) is selected, the mitigation outlined below would not be required. Instead, the reclamation plans already approved in other environmental documents would be implemented. If an action alternative is selected, the Proponent must acquire an approved Plan of Operation and appropriate Road Use Permits, and utility companies must acquire necessary permits and Letters of Authorization to install power and telephone lines, prior to initiating construction and operation. The mitigation listed below applies to all Alternatives unless the mitigation measure indicates otherwise.

A rating system, described below and in General Water Quality Best Management Practices (Forest Service, 1988) was used to determine the probable effectiveness in achieving the mitigation measures objectives. Effectiveness ratings are somewhat subjective and may be based on professional judgment of how effective the measure would be at mitigating and/or compensating for the impact. Goals for each mitigation measure have been established. Effectiveness is measured against how well the mitigation measure meets its stated goal.

Effectiveness:

High: Achieves the desired results more than 90% of the time and this is documented or obviously so.

Moderate: Between 75 to 90% effective, or logic dictates that it is more than 90% effective, but no documentation exists; and

Low: Effectiveness is unknown or unverified, or is estimated to be effective less than 75% of the time.

Air Quality

AQ-1: Best Available Control Technology

All applicable federal and state air quality standards must be met, which would require BACT (Best Available Control Technology) to control vehicle emissions. Regular preventative and routine maintenance of vehicles would be accomplished so that they run efficiently and completely burn fuels.

Goal: Minimize diesel exhaust.

Effectiveness: High since haul vehicles would meet federal diesel exhaust guidelines and it is planned to use low sulfur fuel in the ore haul vehicles.

Implementation Device: Plan of Operations and Road Use Permit.

AQ-2: Fugitive Dust Control

Dust suppression programs would be required for all ore and supply haul roads on National Forest System land or in National Forest right-of-ways during construction and operation. This program would involve use of an approved chemical treatment and/or periodic watering to control fugitive dust generation. A water truck would run periodically, wetting the haul roads to minimize dust. No water can be removed from National Forest System lands. Haul roads would be maintained regularly by a motor grader to remove any large rocks, silt or any other debris. Smooth and clean road surfaces are essential for not only minimizing dust but also for allowing efficient, safe and economic use of haulage equipment. Ore and supply haul truck drivers would be required to report dusty conditions or conditions requiring road maintenance. Gravel would be replaced as necessary to reduce dust and maintain the running surface. Any pavement installed would be periodically cleaned to prevent the eventual migration of tracked out dirt on to paved County roads and to minimize dust generated.

The Proponent would be required to maintain detailed records of the specific locations, amount, and source of brine applied. The Forest Service would require a certificate that states that the dust suppressant meets the chemical requirements of the Pacific Northwest Snowfighters, that a toxicity test (ASTM E-729) be submitted, and that the pH of the product be on the certificate as well.

This material would be submitted to the Forest Service prior to any application of brine on National Forest System land and right-of-ways.

Typical environmental impact minimization and avoidance techniques would be used including:

- During preparation for application of dust palliatives, gravel roads would be tight bladed or processed (cut 2" and watered, then laid back on grade and rolled) to bring fines to the surface.
- Dust palliatives, when applied, would remain on the road surface and would not go over the road edge.
- A 1-foot buffer zone on the edge of the gravel would be used if the road allows.
- The machinery used to apply palliatives would carry adequate spill protection equipment to control spills during application.
- Dust palliatives would not be applied while raining. Dust palliatives would only be applied where no precipitation is expected in the 3-day weather forecast.
- Lignin sulfonate would not be applied within 25 feet of streams; water would be used instead.

Goal: Minimize fugitive dust from roads while allowing safe and efficient utilization of the roads and minimal effects to the environment.

Effectiveness: Moderate since greater than 75% of the potential fugitive dust would be controlled.

Implementation Device: Road Use Permit.

AQ-3: Slash Burning

The majority of slash from timber removal for road and facility construction would be stockpiled on site and burned, chipped, or utilized as a part of erosion control measures. Slash burning during clearing operations would comply with WADNR and Forest Service burning requirements.

Goal: Minimize smoke impacts of slash burning on adjacent residents and Class 1 airsheds.

Effectiveness: High since the burning would comply with State air quality burning guidelines.

Implementation Device: Road Use Permit

AQ-4: Car Pooling/Van Pooling/Busing

The Proponent would encourage car/van pooling by employees and otherwise minimize traffic to the site.

Goal: Minimize traffic to the site and attendant impacts.

Effectiveness: Low since pooling/busing is not required and many people would drive individually.

Implementation Device: Plan of Operations.

Employee Training

ET-1: The Proponent would initiate a comprehensive program of training and education for employees and contractors, as needed. A major portion of this training and education would

involve the health and safety practices of the construction and operation of the haul roads for the mine. Environmental considerations would be included in this training.

Environmental lessons would generally outline major rules and regulations which dictate key aspects of the operation. Events leading to their origin, rationale, objectives, and compliance would be reviewed. Environmental training and education would explain the “hows” and the “whys” to the individuals with the most potential to positively effect the outcome – the mine and contractors’ employees.

Wildlife impact identification and mitigation measures would be a key component of environmental training and education. Items including, but not limited to the following, would be discussed in the training:

- Hunting prohibitions;
- Firearm prohibitions;
- Traffic speed limits on roads;
- Proper handling of spills;
- Measures to prevent wildlife harassment;
- Hunting and fishing regulations;
- Identification and notification procedures in the event of road kill of deer and other wildlife and aquatic species;
- Identification and reporting requirements for threatened and endangered species;
- Importance of habitat conservation and reclamation; and
- Likely wildlife and livestock concentration areas along roads.

Goal: Provide health, safety, and environmental training for employees to assure knowledge of important issues.

Effectiveness: Moderate since the training may not be completely effective at achieving the desired objectives.

Implementation Device: Plan of Operations.

Heritage Resources

HR-1: Heritage resources identified during baseline surveys and other known historic and prehistoric sites, buildings, and properties would be protected through avoidance, where possible, and data recovery where it is not possible to avoid identified sites. Mitigation measures would be developed in consultation with the property owner, the Colville Confederated Tribes, and the State Historic Preservation Officer.

A qualified archaeologist would on-site to monitor reconstruction and planting along Forest Road 3550 where it crosses the Wheaton site (Alternatives B and B1). If additional heritage resources are identified during project activities, the Plan of Operations would require protection and work stoppages until the site can be evaluated and appropriate resource protection

measures developed and implemented per the Memorandum of Agreement between the Washington State Historic Preservation Office and the Forest Service.

The Forest Supervisor may unilaterally modify or terminate permits to protect an area, object of antiquity, artifact, or similar object that is or may be entitled to protection regardless of when the area, object, or artifact is discovered or identified on National Forest System land and rights-of-way.

Road plating and placement of conduit within the plated portion of the road would be required for road work through the Wheaton site (Alternatives B and B1), and additional mitigation measures would be implemented if road work is planned through the Rol Borders Site (Alternative C only).

Goal: Insure protection of sites potentially eligible for the National Register of Historic Places or mitigate adverse impacts to such sites.

Effectiveness: High since field inventory has been completed in all areas classified as high for site probability per the Forest's site predictive model plus all areas where major ground disturbance is planned.

Implementation Device: Plan of Operations.

Land Use

LU-1: Land and Vegetation Disturbance

The Proponent would minimize disturbance by maintaining a compact operation. Vegetation would be cleared only in those areas necessary for construction of approved roads and facilities and then the minimum amount of timber necessary would be removed from National Forest System lands. Erosion and sediment control measures such as sediment collection facilities, segmental reclamation, and temporary re-vegetation would be implemented to prevent downstream sediment impacts.

Goal: Minimize land and vegetation disturbance related to clearing during construction and operations.

Effectiveness: Moderate since land and vegetation disturbance not minimized by using single lane roads or one-way traffic.

Implementation Device: Plan of Operations.

LU-2: Timber Settlement Contract

Timber on areas scheduled for disturbance such as roads, pipelines, monitoring wells, and the infiltration gallery would be transferred to the proponent and cleared in accordance with Forest Service management requirements. A settlement contract for timber removal would be entered into with the Forest Service by the Proponent. Timber to be removed would be designated by the Forest Service prior to removal.

As applicable, plans for clearing and disposal of vegetation would be submitted prior to the beginning of clearing operations. The areas to be cleared would be delineated on the ground

by the Proponent to facilitate layout. The Forest Service would review these plans and specify the measures that would be needed to ensure proper utilization of the timber, disposal of slash, and protection of the surface resources.

Volume estimation and payment would be calculated by cruising. Slash and unmerchantable timber, not stockpiled for future use, would be piled for burning in locations that would not cause damage to surrounding vegetation and/or ground/chipped for blending with topsoil. The Proponent would burn designated slash piles as directed by the Forest Service and allowed under smoke management regulations of the Department of Natural Resources. The Forest Service would designate brush and unmerchantable log piles, as needed, to be left for wildlife habitat and erosion control. Debris left from burning would be spread or buried depending on the volume of material present.

Constructed slash piles that are burned would be seeded as soon as practical following burning.

Goal: Ensure the proper utilization of the timber, disposal of slash, and protection of the surface resources. Provide for wildlife habitat and erosion control.

Effectiveness: High since method in place for timber removal and payment for value removed.

Implementation Device: Plan of Operations, Road Use Permit, and Settlement Contract.

LU-3: Noxious Weed Control

The Forest Service would be responsible for noxious weed control on National Forest System lands involved in this project. The Proponent would be responsible for funding this control on National Forest System lands. Estimated costs would be up to \$4,000 per year from the start of operations until 5 years after reclamation is complete. The Proponent would be responsible for treating noxious weeds on Crown/Kinross lands.

All existing noxious weed posts and monitoring plots would be protected. These are blue fiberglass posts, green carsonite posts, orange posts (monitoring sites), or 4" aluminum tags on trees. Posts and tags may need to be relocated prior to commencement of activities.

All gravel placed on roads or other fill brought onto National Forest lands would be free of noxious weeds and noxious weed seeds. All gravel sources would be certified noxious weed free by the Forest Service prior to transport to National Forest System land or right-of-ways.

A Vegetation Management Plan has been prepared by the Forest Service for noxious weed control and is contained in District files.

Goal: Control, contain, and eradicate new and potential invader noxious weeds.

Effectiveness: High when combined with seeding and monitoring.

Implementation Device: Plan of Operations and Collection Agreement.

LU-4: Equipment Washing

The Proponent shall ensure that prior to moving on to National Forest System land, all off-road equipment is free of soil, seeds, vegetative matter, or other debris that could contain or hold

seeds. The Proponent shall certify in writing that Off-Road equipment is free of noxious weeds and noxious weed seed. Off-road equipment includes all logging and construction equipment, except haul trucks, service vehicles, water trucks, pickup trucks, cars, and similar vehicles. A current list of noxious weeds of concern to the Forest Service would be made available to the Proponent at project commencement.

The Proponent, and its subcontractors, shall employ whatever cleaning methods are necessary to ensure off-road equipment is free of noxious weeds. Equipment shall be considered free of soil, seeds, and other such debris when a visual inspection does not disclose such material. Disassembly of equipment components or specialized inspection tools is not required.

Goal: Minimize the spread of noxious weeds on National Forest System lands from off-road equipment.

Effectiveness: High, cleaning equipment prior to entering National Forest lands would substantially reduce the likelihood of introduction of noxious weeds. Off-road equipment is often responsible for the introduction of noxious weed species into disturbed areas.

Implementation Device: Plan of Operations and Road Use Permit.

LU-5: Noxious Weed-Free Mulch and Seed

Certified noxious weed-free mulch, straw, and erosion blankets, and certified noxious weed-free seed mixtures would be used to promptly reclaim disturbed areas and control noxious weeds. Any reseeding must be done with a seed mixture approved by the Forest Service so the introduction of noxious plants can be avoided. Seed mixtures would be designed to aggressively re-vegetate slopes. The noxious weed list used for certification would be for Washington State noxious weeds.

Goal: Prevent the establishment of noxious weeds.

Effectiveness: Moderate since native species don't often compete well with invasive, non-native plant species.

Implementation Device: Plan of Operations and Road Use Agreement.

LU-6: Reclamation of Past Disturbances

All past exploration and development disturbances on National Forest System land, that are no longer needed, such as roads to monitoring wells and monitoring wells, would be reclaimed at the first available opportunity per previous NEPA decisions.

Goal: Minimize the area of disturbance.

Effectiveness: Moderate since reclamation would not return the land to the predisturbance condition.

Implementation Device: Plan of Operations.

Noise

NO-1: The Proponent would comply with all Washington State and Okanogan County health and safety requirements pertaining to noise generation. All supply and ore haul trucks would meet Motor Vehicle Noise Performance Standards, Chapter 173-62 WAC. Ore haul trucks would be equipped with “quiet” type mufflers. All compression type brakes would be muffled.

Goal: Minimize noise disturbance to wildlife and adjacent residences.

Effectiveness: Moderate since not all noise disturbances can be avoided. Noise disturbance would be above ambient conditions.

Implementation Device: Plan of Operations and Road Use Permit.

Permitting and Financial Assurances

PFA-1: Permit Acquisition

Approval of a Plan of Operations must be obtained from the Forest Service prior to beginning any surface disturbing activities except road maintenance. The Proponent would prepare and submit a comprehensive reclamation plan as part of the Plan of Operation including reclamation methods and schedule; and other details as needed including reclamation and water monitoring plans and the performance securities cost estimates. This Plan would describe, show, and elaborate on the details of measures presented in the selected alternative.

Compliance with the approved Plan of Operations would be conditioned upon compliance with the terms of the other federal and state permits, which govern the proposed actions.

Goal: Assure the Proponent operations and designs comply with applicable laws and regulations.

Effectiveness: High since compliance would be assured by monitoring by the agencies.

Implementation Device: Plan of Operations.

PFA-2: Performance Securities

The Proponent would be required to post a reclamation performance security before beginning any surface disturbing activities. The regulations of the Forest Service require that the Proponent submit a reclamation performance security to ensure that adequate reclamation and restoration of National Forest System land is achieved following activities. The reclamation performance security would provide the Forest Service with sufficient funds to reclaim, re-vegetate, and remove facilities from National Forest System land, and to monitor and correct water quality problems should the Proponent fail to do so.

Goal: To ensure that adequate reclamation, restoration, and remediation of the land are achieved following mining related activities on National Forest System land or unforeseen events related thereto.

Effectiveness: High since the performance security would be determined based on the estimated costs of reclaiming all surface disturbances and would be reviewed regularly to accommodate changes on the ground and changes in cost factors.

Implementation Device: Plan of Operations.

PFA-3: Collection Agreement

The proponent has voluntarily agreed to enter into a collection agreement with the Forest Service to pay for the costs of all Plan of Operation and permit approvals and administration, including but not limited to the costs for timber marking, settlement contract preparation, road construction inspections, water quality monitoring, fish monitoring, cultural resource monitoring, and noxious weed control.

Goal: To ensure that adequate monitoring is achieved without the agency incurring costs.

Effectiveness: High since adequate funding would be in place to cover project costs.

Implementation Device: Collection Agreement.

Range

RA-1: Livestock Water Development

During construction/reconstruction of Forest Road 3550 (Alternatives B and B1), and prior to the commencement of ore haul, a well would be installed adjacent to Forest Road (FR) 3550 to provide water to three water developments that would be reconstructed north of FR 3550 at an elevation that encourages cattle to remain on the bench above the road rather than putting pressure on the fence along the road (see the Alternative Maps for specific locations, Alternatives B and B1 only). It is anticipated that the troughs and associated equipment would be flown to the installation site by helicopter. The pipe would be buried along the road from the well to a location directly below the troughs and laid on the surface up the hillside to the troughs. The system would be designed so that approximately 2 gpm flows to each trough and less than 5,000 gallons per day would be pumped from the well. Water would be pumped during hours when the cattle typically water and the hours per day would be limited to assure the 5,000 gallons per day exemption is not exceeded. The system would only be operated when cattle are in the allotment and drained prior to winter. The power supply would be left in place, post mine operations, if the permittee agrees to become responsible for the power supply and operation of the well and watering troughs. If the permittee decides to not become responsible, the entire system would be removed off National Forest System land by the Proponent and the well capped to Forest Service standards. The Proponent would be responsible for maintenance of the system during operation of the mine.

Goal: Improve grazing management and reduce haul truck interaction with cattle during the grazing season.

Effectiveness: Moderate since incidental cattle may still wander onto the road.

Implementation Device: Plan of Operations.

RA-2: Bat Canyon Livestock Fencing

During construction/reconstruction of FR 3550 (Alternatives B and B1), in the area of the Bat Canyon and Marias Creek confluence (located in Section 5, T. 39 N., R. 31 E.), prior to the commencement of ore haul, approximately 1 mile of fence would be constructed that ties into the existing drift fence on the west end and steep topography on the east end on the south side of Marias Creek to minimize cattle migration onto the Marias Creek road. A cattle guard and gate would be installed in FR 3550-080. The fence would be located to allow cattle from Bat Canyon access to Marias Creek for water. Stream bank and bed stabilization measures would be constructed to armor the stream where the cattle would be watering (see Alternative Maps for specific locations).

Goal: Improve grazing management and minimize ore and supply haul truck interaction with cattle during the grazing season.

Effectiveness: Moderate since incidental cattle may still wander onto the haul route.

Implementation Device: Plan of Operations.

RA-3: North Side Marias Creek Livestock Fencing

During construction/reconstruction of Forest Road 3550 (Alternatives B and B1), and prior to the commencement of ore haul, the north side of the Marias Creek road, FR 3550, would be fenced from the Forest boundary to the existing drift fence near Bat Canyon. The fence would be located up-gradient of the Marias Creek road cuts to prevent cattle from migrating onto the road. Gates would be located to accommodate cattle movement by the permittee. Northwest of the existing drift fence at Bat Canyon both sides of the road would be fenced to the intersection of Forest Roads 3550-125 and 3550-130. To the southeast of this intersection, a cattle guard would be installed in the Marias Creek road. Gates would be constructed at the cattle guard and roads intersecting the Marias Creek road. Gates at road intersections would be swing type gates (see Alternative Maps for specific locations). Approximately 4 total miles of fence would be installed. During the life of mining operations, the company would maintain these fences and gates. Post operations, the fence and gate maintenance would be taken over by the permittee, or the fence and gates would be removed by the company.

Goal: Improve grazing management and minimize ore and supply haul truck interaction with cattle during the grazing season.

Effectiveness: Moderate since incidental cattle may still wander onto the haul route.

Implementation Device: Plan of Operations.

RA-4: Water Gaps

During construction/reconstruction of Forest Road 3550, and prior to the commencement of ore haul, two water gap crossings in the lower Marias Creek drainage would be developed by constructing gates in the brush berms or approximately ½ mile of fence with a gate and appropriate modifications to the brush berms to allow access to or across Marias Creek road. Stream bank and bed stabilization measures would be constructed to armor the stream where the cattle would be crossing (see the Alternative Maps for specific locations).

Goal: Improve grazing management and minimize haul truck interaction with cattle during turn out and gathering times.

Effectiveness: Moderate since incidental cattle may still wander onto the road.

Implementation Device: Plan of Operations.

RA-5: Corral

During construction/reconstruction of Forest Road 3550 (Alternatives B and B1), and prior to the commencement of ore haul, a corral would be constructed in the lower Marias Creek drainage. During construction/reconstruction of Forest Road 3575-150 (Alternative C), a corral would be constructed in the flat below Forest Road 3575-150 in Nicholson Salvage One, Unit 11. The corrals would be of post and pole construction with Powder River gates, or equivalent. The corrals would have three pens, and an alley to accommodate loading of cattle into a trailer. The corral in Marias Creek would have water access. The two pens in the Marias Creek corral with water access would be sized to hold cattle overnight and the smaller pen would be located between the larger pens and the loading alley such that cattle can be separated prior to loading. The corral in Nicholson Salvage One, Unit 11, in Alternative C, would be constructed similarly but would not have water access.

Goal: Minimize cattle, haul truck interaction during turn out and gathering times.

Effectiveness: Moderate since incidental cattle may still wander onto the ore and supply haul route.

Implementation Device: Plan of Operations.

RA-6: Cattle Drives

Spring and fall cattle drives would be completed on weekends and coordinated by the permittee with the Proponent to accommodate cattle being moved on days when ore and supplies are not being hauled. The allotment permittee would notify the Proponent at least one week prior to all cattle drives. Cattle drives would be communicated to the ore and supply drivers by the allotment permittee through CB radio communications. A CB radio would be provided to the permittee by the Proponent, if needed.

Goal: Minimize cattle, haul and supply truck interaction, during turn out and gathering times.

Effectiveness: High since cattle movements coordinated between the permittee and the Proponent.

Implementation Device: Plan of Operations.

RA-7: Water Improvement Avoidance

Avoid the #2 and #10 spring water sources during road design for Alternative C. This mitigation only applies to Alternative C.

Goal: Minimize cattle, haul, and supply truck interaction while retaining important water sources for cattle in the north pasture of the Cedar Allotment.

Effectiveness: Moderate since incidental cattle may still wander onto the ore and supply haul route. The water sources may not be able to be completely unaffected by road construction.

Implementation Device: Approval of Road Design.

Recreation

RE-1: Traffic Restrictions

Refer to each individual alternative description since traffic restrictions for ore haul, supply transport and snow plowing vary by alternative.

No unauthorized vehicles, personnel, or firearms would be permitted within the fenced area surrounding the mine. Plans would be implemented to control public access within the fenced area such as posting to prohibit unauthorized entry. However, these plans would provide for administrative traffic, as well as access for Forest permittees, contractors, or operators. Public and administrative access within the fenced area would be re-established, as directed, immediately after closure of the mine. All gates in the fence on National Forest System roads, except the haul route, will be kept locked at all times.

Goal: Minimize unauthorized vehicles and personnel within the fenced area.

Effectiveness: Moderate for people since the project fence would only be 3 strands of barbed wire posted with no trespassing signs. High for vehicles since all gates, except the haul route, would be kept locked.

Implementation Device: Plan of Operations and Road Use Permit.

RE-2: Hunting Restrictions

There would be no hunting during mine operations within the fenced boundary surrounding the mine site. The possession of firearms, the discharging of firearms, and hunting would be prohibited within the fenced areas around the mine area and facilities on National Forest System lands.

Goal: Control hunting for the security of the mine and safety of employees and the public.

Effectiveness: Moderate for people since the project fence would only be 3 strands of barbed wire posted with no trespassing signs. High for vehicles since all gates, except the haul route, would be kept locked.

Implementation Device: Plan of Operations.

Soils

SO-1: As appropriate, suitable soils from roads and other disturbances would be windrowed, stabilized, and utilized as part of reclamation for these disturbances. Some such soil, as along the haul route, may be utilized almost immediately. Some such soil as along the pipeline to the infiltration gallery may be utilized as part of the reclamation at the time of mine closure.

Goal: Recover disturbed area to a productive land use post mining.

Effectiveness: Moderate since not all soils can be windrowed and returned to the surface, particularly along roads on steep sideslopes where reclamation is planned at the end of the project.

Implementation Device: Plan of Operations.

Spill Prevention, Hazardous Materials, Fire Prevention, and First Aid

The goal of these measures are intended to prevent spills or accidental release of hazardous materials; and if a release occurs, the goal would be to minimize the impact with quick responses, trained personnel, and appropriate accessible clean-up equipment. Hazardous materials and flammable liquids would only be stored on National Forest System land during construction.

The Proponent would maintain detailed plans for spill prevention and control of hazardous materials. These plans would become part of the Plan of Operations prior to beginning any transport or storage of fuels, flammable liquids, explosives, and hazardous or toxic substances, on or across National Forest System land. These plans would also describe the toxic or hazardous materials to be utilized, how they are transported, stored, and used along with the methods of disposal. The Proponent would describe the emergency procedures, equipment, and personnel that would be used to respond to an accidental spill on the site. It would describe the spill response training of appropriate Proponent employees as well as subcontractors and their employees and of haulers.

These plans would describe the monitoring procedures to ensure the following:

- Storage and containment facilities meet the prescribed standards;
- Emergency first aid and spill response materials are available and stored in the proper place; and
- Communications equipment is in working order.

Spot inspections of these procedures and equipment would be completed throughout the year by Forest Service personnel.

SP-1: Fuel Storage and Other Hazardous Substances

Fuel and other petroleum products stored on National Forest System land during construction activities would be stored in approved tanks and outside of Riparian Habitat Conservation Areas (refer to INFISH Standards and Guideline RA-4). The Proponent shall take appropriate preventative measures to ensure that any spill of oil, oil products, or other hazardous substances does not enter any stream or other waters of the United States or Washington State.

All construction equipment, such as trucks, would be fueled at least 200 feet outside of the Riparian Habitat Conservation Area (RHCA) along Marias and Nicholson Creeks. This would generally mean that fueling would take place at least 500 feet from the creek. Non-mobile equipment, equipment which can not be moved outside the RHCA in under 10 minutes, would have absorbent pads placed below the machine prior to fueling to catch any drips or spills.

Refueling sites within the RHCA must be approved by the Forest Service prior to use, and there must be an approved spill containment plan.

If the total oil or oil products storage exceeds 1,320 gallons in containers of 55 gallons or greater, on National Forest land or right-of-ways, the Proponent shall prepare a Spill Prevention Control and Countermeasure Plan. Such Plan shall meet applicable requirements (40 CFR 112), including certification by a registered professional engineer.

The Proponent shall notify appropriate agencies, including the Forest Service, of all reportable (40 CFR 110) spills of oil, oil products, or other hazardous substances by the Proponent or contractors, directly or indirectly, because of the Proponent's operations. The Proponent would take whatever initial action that may be safely accomplished to contain all spills.

The Proponent shall notify the National Response Center and the Forest Service of all releases of reportable quantities of hazardous substances on National Forest System lands and right-of-ways that are caused directly or indirectly as a result of the Proponent's operations, in accordance with 40 CFR 302.

All equipment that operates on National Forest System land shall be maintained, operated in good repair, and free of abnormal leakage of lubricants, fuel, coolants, and hydraulic fluid. The Proponent and its sub-contractors shall not service tractors, trucks, or other equipment on National Forest System lands where servicing is likely to result in pollution to soil or water. The Proponent shall furnish oil-absorbing mats for use under stationary equipment or equipment that is being serviced, to prevent leaking or spilling of petroleum based products from contaminating soil and water resources. The Proponent shall remove from National Forest System lands all contaminated soil, vegetation, debris, vehicle oil filters, batteries, oily rags, and waste oil resulting from use, servicing, repair, or abandonment of equipment.

No explosives would be stored on National Forest System land.

Goal: Safe handling and transport of petroleum products, oil, oil products, or other hazardous substances and to minimize the potential of resource damage from a spill.

Effectiveness: High since best available control technology being required.

Implementation Device: Plan of Operations and Road Use Permit.

SP-2: Transportation Spill Response Plan

A Transportation Spill Response Plan would be required by the Forest Service for transport of hazardous materials across National Forest System roads and right-of-way. It would be incorporated into the Road Use Permit or Plan of Operations for the Project. Under the terms of this plan, suppliers of hazardous materials would be required to submit spill response plans to the Proponent which describe the procedures, equipment, and personnel which would be used in case of a spill during transport on National Forest System roads. Suppliers of hazardous materials or petroleum products would be required to comply with the Transportation Spill Response Plan insofar as it affects any part of their activities.

Goal: The goal of this measure is to prevent spills/accidental releases; and if a release occurs, minimize the impact with quick responses, trained personnel, and appropriate, readily accessible clean up equipment.

Effectiveness: High since spill response plans and trained people would be in place prior to transport.

Implementation Device: Plan of Operations and Road Use Permit.

SP-3: Fire Protection and Suppression Plan

A Fire Protection and Suppression Plan would be required for the National Forest portion of the Project. The fire codes and standards of the WADNR would apply. The Proponent would comply with Forest Service and DNR procedures for protecting against starting wildfires and assuring suppression of accidental wildfires. All equipment, vehicles, and operations on National Forest System land and roads would meet fire preparedness requirements during the proclaimed fire season. This Plan would be included as part of the Forest Service Plan of Operations.

Goal: Prevent fires; and if a fire occurs, minimize the impact with quick response, trained personnel, and appropriate accessible equipment.

Effectiveness: High since plans, equipment, and trained persons would be in place for suppression of accidental fires.

Implementation Device: Plan of Operations.

SP-4: External Spill Response and Materials Handling Training

The Proponent would ensure that appropriate spill response and materials handling training be provided to the local sheriffs departments, fire departments, and appropriate administering agencies.

The Proponent would meet with the appropriate local authorities to discuss coordinated responses to Project related vehicle accidents or other emergencies on Forest roads.

Goal: Provide local agencies with training in handling petroleum products and hazardous substances.

Effectiveness: High since appropriate training would be provided to local responders.

Implementation Device: Plan of Operations.

Scenic Resources

SR-1: General Scenic Mitigation Measures

The following general scenic resource mitigation measures would be utilized:

- Retain vegetation and trees to screen facilities and maintained a forested appearance to the extent practical;
- To the extent practical, locate facilities where they can be screened;
- Plant native species to screen facilities and re-vegetate disturbed areas;

- Design cuts, fills, and clearings to blend in with the surround topography; and
- All structures would use non-reflective earth-tone paints.

Goal: Meet maximum modification visual quality objective on National Forest System land.

Effectiveness: High since visual quality objectives met.

Implementation Device: Plan of Operations.

SR-2: Exterior Fixed Lights

Fixed exterior lighting at the infiltration gallery would be kept to the minimum required for safety and security purposes. Lights would be directed down. Permanently mounted lights should be sodium or a type of equal spectrum and intensity.

Goal: Minimize lighting impacts from surrounding viewpoints.

Effectiveness: High since lighting at the infiltration gallery would not be seen from any viewpoints. Lights at the mine and headlights on portions of the ore and supply haul route would be visible at times in all alternatives.

Implementation Device: Plan of Operations.

Solid and Sanitary Waste (Garbage) Management

SW-1: During construction and operation on National Forest System land, solid waste would be contained and hauled off-site as appropriate. Facilities such as portable toilets would be used to handle sanitary waste. Spills of oil, fuel, grease, and other materials would be cleaned up immediately.

Open burning of solid waste and refuse would be prohibited on National Forest System land. All solid waste would be hauled to state-approved sanitary landfills. Any garbage stored on National Forest System land and right-of-ways would be contained in bear-proof containers.

Portable toilets would be used for sanitary waste during road construction and toilets would be serviced and moved as necessary as part of the construction activities. Toilets would be located on the far side of the road from the creek and in areas with no connection to the creek if spilled (relief culverts, ditches, water bars, etc.). Since portable toilets are self-contained, temporary in nature and would not remain on National Forest System lands after the completion of road construction, this would be consistent with INFISH standard and guideline MM-3.

Goal: To meet existing local, state, and federal laws and regulations and reduce the potential for acclimation of wildlife to human waste.

Effectiveness: High since this should be the normal way that contractors operate and administration of the project should identify any lapses.

Implementation Device: Plan of Operations and Road Use Permit.

Transportation

TR-1: Winter Road Maintenance and Haul

Road designs should provide sufficient storage for snow removal adjacent to roadways. Snow would be removed or plowed regularly by the Proponent to minimize snow packing and interference with day-to-day activities. Road sanding would avoid the use of salt to the extent practical. The road use permit would detail when roads are open to use and which roads, or portions of roads, can be snow plowed. In general, only the ore and supply haul route, a route to the water tower, and a route to the infiltration gallery can be snowplowed December 1st to March 31st except Alternative B, which would allow snowplowing to water monitoring locations. If requested by the Proponent, the Forest Service would consider allowing plowing of Forest Road 3575-120 in the winter for employee access under Alternatives B, B1, and C.

When within 100' of fish bearing streams, snow would not be plowed off the downhill side of the road. These areas would be marked on the ground with posts or other suitable methods. Any snow, within 100' of streams that cannot be plowed onto the uphill side of roads would be removed from the RHCA.

Road sand would not be stockpiled for use on National Forest System lands or right-of-ways.

Turnarounds would be plowed at all road junctions along the ore and supply haul route.

Haul, including winter haul and haul during spring breakup, would cease when normal, routine road maintenance can not be kept up with the surfacing standard as substantially free of chuckholes, wheel ruts, or washboard corrugations.

Goal: Maintain safe road passage while reducing damage to streams and roadside vegetation due to winter road maintenance.

Effectiveness: Moderate since snow plowing may have some affect on roadside streams and vegetation.

Implementation Device: Plan of Operations and Road Use Permit.

TR-2: Remote Office

The Proponent would maintain an office away from the mine site for most personnel hiring and most purchasing requirements.

Goal: Reduce the number of visits to the mine site by vendors and supplier representatives and individuals looking for work.

Effectiveness: Moderate since some vendors, supplier representatives, and individuals looking for work can be expected to go to the mine site.

Implementation Device: Plan of Operations.

TR-3: Supply Deliveries

Supply deliveries to the mine site would be limited to 6:00 a.m. to 6:00 p.m., Monday – Friday, except for infrequent, unplanned supply shortages under Alternatives C, and D. Under Alternative B1, supply deliveries to the mine site would be limited to 6:00 a.m. to 6:00 p.m., 7 days a week, except for infrequent, unplanned supply shortages. Under Alternative B, most deliveries would take place between 6:00 a.m. and 6:00 p.m., 7 days a week but some supplies would be delivered outside of those hours.

Goal: Decrease disturbance of wildlife and residents living along the supply haul routes.

Effectiveness: Alternatives C and D = Moderate since most supply deliveries would be limited to 5 days a week, 12 hours a day.

Alternative B1 = Moderate – Low since more disturbance to wildlife and residents would be expected along the supply route due to 7 days a week deliveries, with infrequent deliveries outside of 6:00 a.m. to 6:00 p.m.

Alternative B = Low since deliveries could potentially occur 24 hours a day, 7 days a week causing the greatest amount of disturbance.

Implementation Device: Plan of Operations and Road Use Permit.

TR-4: Road Use Permit

The Proponent's Operating Plan/Road Use Permit would include the following provisions:

- Any improvements on Forest Roads would meet Forest Service Standards (FSH 7709.56 Road Preconstruction Handbook) specifications for road width, grade, alignment, drainage, quality control, gross vehicle weights, and signing. Exceptions to these standards may be used only with Forest Service approval¹⁵.
- Unpaved roads would be surfaced with adequate gravel. This would minimize surface soil erosion occurring from the road while still creating a permeable surface.
- The road route in the Marias Creek drainage, if selected, would avoid the population of *Hedwigia ciliata*, a sensitive plant. This may require moving the road route slightly up the hill from its present proposed location.
- The Proponent would encourage car/van pooling to the site during construction and operations to reduce traffic on and disturbance from project roads.
- Contractors would comply with Forest Service rules for oversized and overweight loads.
- Location and design changes for access roads on National Forest System land or right-of-ways must receive approval from the Forest Service before any ground-disturbing activities take place.

¹⁵ The road engineering design shows about 1300 feet of road being reconstructed towards Marias Creek. The proponent has verbally told the Forest Service all road would be reconstruction on the uphill side from Marias Creek, however the Forest Service has not yet received a new engineering design reflecting this change.

- The Proponent would be responsible for deferred (non-routine) road maintenance such as surface rock or culvert replacement. The Proponent would be responsible for all recurrent road maintenance (grading, cleaning culverts, etc) as specified in the Forest Service Road Use Permit or the Plan of Operations. This would apply to the supply haul route during construction and operations, the ore haul route, the infiltration pipeline road, access roads to the water tower, access roads to monitoring wells and surface water monitoring locations, and the access road to the infiltration gallery.

Goal: To ensure that the road system is safe and conforms to the natural resource management objectives for the area, and that financial liabilities created by the Proponents use of roads are borne by the Proponent.

Effectiveness: High since contractors for the Proponent would maintain the road to a higher standard than is presently achieved.

Implementation Device: Road Use Permit.

TR-5: Road Closure

If the Marias Creek haul route is selected, the portion of FR 3550-125 above the FR 3550-130 junction would be closed to public access. The new road from the junction with FR 3575-120 to the mine site would be closed to public access during project operations under all alternatives. These roads would re-open to the public once mine ore haul is complete. After the completion of operations, the new section of road to patented land would be open for public use. Forest Road 3575-140 would be closed to public use, after the project fence is removed, at the junction with Forest Road 3575-143 since it would be a dead end road with no turnaround.

Other previously closed roads that have had the closure breached by the public, and NEPA was previously completed for the closure, particularly along Forest Roads 3575 and 3575-150, would be re-closed by this project.

Goal: Maintain public safety.

Effectiveness: Moderate since some individuals would not pay attention to road closed signs, particularly when the closed route is the better maintained route.

Implementation Device: Road Use Permit.

TR-6: Road Junction Improvement

The junction of the new road to the mine site with FR 3575-120 would be improved to increase safety. This could take several forms depending on the ore and supply haul route selected. Under Alternatives B and B1, a near perpendicular junction with stop signs would be created. Under Alternatives B and B1, the junction of the new road with FR 3550-130 on DNR land would be improved to increase safety by creating a near perpendicular junction with stop signs.

Goal: Increased safety on the transportation route.

Effectiveness: High since visibility would be good and stop signs would be in place.

Implementation Device: Road design approval.

Wildlife and Fish

A series of wildlife and fish mitigation and management practices are required to minimize disturbance and adverse impacts. Where possible the goals of mitigation are:

- Avoid impacts to wildlife and fish and their sensitive habitats;
- Minimize impacts when impacts can not be avoided;
- Compensate for unavoidable impacts to habitat from the project;
- Maintain viable fish and wildlife habitats in the vicinity of the project;
- Protect and enhance, both during and after the project, the diversity, abundance, and distribution of fish and wildlife and their habitats; and
- Re-establish and improve habitats impacted by the Project to conditions nearly the same as those that existed before the project.

These goals would be approached through mitigation on public lands that strive to replace habitat functions and values and provide a mix of habitats similar to that impacted by the Project. This would include reclaiming of disturbed areas and enhancing lands near the project. Reclamation measures are described in the Reclamation Measures section above, and elsewhere. Habitat conditions similar to those that existed prior to the project should become re-established within 50 to 100 years with the exception of the late, mature structure associated with portions of the new road above Forest Road 3575-120 to the lower portals. In the interim, the reclaimed lands may provide habitat for wildlife species that favor or use early and mid successional forest habitats.

WF-1: Wildlife Road Closures

Existing "Special Order" and "Travel Plan" closed roads (mostly in the Ethel Creek area and Forest Road 3575-125 on the ridge between Nicholson and Marias Creek) would remain in that condition during the life of the project.

Forest Road 3550, past the junction with Forest Road 3550-125, would be closed to all motorized vehicles except administrative traffic. Forest Road 3550-122 would be closed after Marias Creek to all motorized vehicles except administrative traffic (Alternative B1 only; see Alternative B1 Map for locations).

Existing winter range road closures would be maintained except as part of the ore and supply haul route. Forest Roads 3575-140 and 3575-143, in deer winter range, would be closed to the public from December 1 to March 31st, but plowing for administrative and mine related traffic would be allowed to access the water tower and radio installations on Buckhorn Mountain (All Action Alternatives)

Goal: Provide wildlife security habitat to offset disturbance associated with project activities and reduce road densities in Management Areas 14, 25, and 26.

Effectiveness: Moderate since winter wildlife security habitat would be lost due to ore and supply haul and the use of FR 3575-140 by mine and administrative traffic during December 1st to March 31st.

Implementation Device: Plan of Operations.

WF-2: Fencing for Deer Movement

All fences would be designed to keep cattle from passing while allowing for deer passage in either direction. Special modifications would be used at obvious deer crossing sites including slight fence realignment or constructing pole fences for short distances. The fence would generally be 3 strands of barbed wire spaced so that it would only be a minor obstacle to wildlife such as deer.

Goal: Facilitate movement of deer and other wildlife species while directing cattle movement.

Effectiveness: Moderate – High since incidental cattle can be expected to get past the fence and the fence may be a small deterrent to wildlife movement.

Implementation Device: Plan of Operations.

WF-3: Dogs

Employee owned dogs would not be allowed to run loose on National Forest System land.

Goal: Minimize disturbance of wildlife from roaming dogs.

Effectiveness: Low since enforcement would be impractical.

Implementation Device: Plan of Operations.

WF-4: Snags

Snags would be created in riparian habitat conservation areas other than those areas along the ore and supply haul route and generally more than 200' from open roads, by topping. This would be done to compensate for snags lost during project construction and operations and for disturbance impacts of operations. The number of snags created would be 3.5 times the number of acres of National Forest System land cleared. At least 50% of the replacement snags would be 21" in diameter at dbh (or greater). All snags created would be greater than 16" in diameter. The location of the snags to be created would be agreed upon between the Forest Service and the Project Proponent.

Goal: Replace snag habitat lost or impaired during the project.

Effectiveness: High since snags would be created. Topping has been found to be effective at creating snags.

Implementation Device: Plan of Operations.

WF-5: Wildlife Run-outs

Wildlife run-outs would be created, at least, every 1,000 feet, on both sides of plowed project roads when snow banks along the roads become greater than 2 feet high so animals that use project roads can escape.

Goal: To minimize potential wildlife mortality and harassment of wildlife on project area roads.

Effectiveness: Moderate since wildlife tends to follow the easiest route possible, which would be the plowed road and run-outs would only be available every 1000 feet.

Implementation Device: Road Use Permit.

WF-6: Woody Material Replacement

Down woody material would be replaced on the reclaimed infiltration pipeline and infiltration gallery at a rate of seven tons per acre. Less than 10% of this weight would be from stumps. Large diameter logs would be preferred.

Goal: To replace large woody debris lost from project disturbances.

Effectiveness: High since large woody debris would be available for this use and replacement would be required by the reclamation part of the Plan of Operations.

Implementation Device: Plan of Operations.

WF-7: Fish Kills

If fish kills are detected, an investigation based on American Fishery Society (AFS) standards would be conducted to determine the reason for the deaths. Based on the results of the investigation, a restoration plan to restore habitat or populations for fish or other aquatic species would be developed based on the Field Manual for the Investigation of Fish Kills by USDI (USFWS Resource Publication #177). This provides investigation guidelines and direction for monetary compensation in the event of a fish kill. Use of magnesium chloride for dust abatement would be stopped until it is determined that the fish kills are not the result of this dust suppressant. Water or lignin sulfonate would be temporarily used so haul could continue.

If a fish kill occurs attributable to the infiltration gallery, or other water augmentation sites, a fish kill investigation would be done as described in the above field manual, or its successor. Water releases from the infiltration gallery and augmentation sites would not continue, except as necessary to complete the investigation.

Goal: To evaluate the magnitude of potential fish and aquatic organism mortalities from the effects of Project related water quality problems. To restore fish populations and other aquatic organisms affected by water quality problems. Protect the viability and productivity of stream systems.

Effectiveness: Moderate since determining the reason for fish and aquatic organism mortalities may be difficult.

Implementation Device: Plan of Operations.

WF-8: Project Speed Limits

Speed limits on project haul and supply roads would be 25 mph, except 30 mph under Alternative B. The Proponent would post the haul and supply road. Drivers would be required

to follow these speed limits. All ore haul trucks would be required to have large, visible identifying numbers, at least 12" high, on the doors or hoods of the trucks.

Goal: To maximize safety between project traffic and other vehicles, wildlife, and cattle.

Effectiveness: Moderate since enforcement of this measure would be intermittent.

Implementation Device: Road Use Permit.

WF-9: Fish Passage Improvement

Replace the lower most culvert on Nicholson Creek Road, Forest Road 3575; the Marias Creek culvert on Forest Road 3550-080 and the culvert on a non-system road near the junction of the 3575, 3575-100 roads with fish-friendly, aquatic life passable culverts that would allow native rainbow trout to move upstream into more habitat area and back. The design of this structure on the Nicholson Creek road would include rock vanes as catch points for upstream down-cutting of the channel and measures to protect the road from erosion. All three structures would be designed to accommodate a 100-year flood, including associated bedload and debris using the stream simulation method.

Goal: Allow native rainbow trout to move upstream into more habitat area and back to Toroda Creek.

Effectiveness: High for Nicholson Creek because the design would use the stream simulation method to ensure proper design. Moderate on Marias Creek; although the stream simulation method would be used, this creek goes subterranean during low flows just before it reaches Toroda Creek.

Implementation Device: Plan of Operations.

WF-11: Amphibian Kills

If amphibians are found dead within the vicinity of project roads, riparian areas, the infiltration gallery, or other water augmentation sites, an investigation would be conducted to determine the reason for the deaths. Based on the results of the investigation, a restoration plan to restore habitat or populations would be developed. Use of magnesium chloride for dust abatement would be stopped until it is determined that the amphibian deaths are not the result of this dust suppressant. Water or lignin sulfonate would be temporarily used so haul could continue. If the deaths are the result of dust abatement, another method of dust control or a different chemical would be utilized. This might include utilizing additional water or utilizing a different chemical such as lignin sulfonate.

Goal: To evaluate the magnitude of potential amphibian mortalities from the effects of Project related activities. To restore amphibian populations and protect their viability.

Effectiveness: Moderate since determining the reason for amphibian mortalities may be difficult.

Implementation Device: Plan of Operations.

WF-12: Notification Procedures in the Event of Wildlife Road Kill

In the event of road kill of a threatened or endangered species, such as a bald eagle, Canada lynx, gray wolf, or a grizzly bear, immediate notification of the Forest Service and U.S. Fish and Wildlife Service is required.

In the event of road kill of other wildlife and aquatic species, a quarterly report would be prepared for the Forest Service.

If monitoring shows a substantial road kill, the Forest Service would consult with the Washington Department of Fish and Wildlife to determine a strategy to reduce road kills. Some strategies that might be considered include signing of wildlife congregation areas, modifications of existing fencing to discourage wildlife use of an area, and lowering speed limits through an area.

Goal: To evaluate the magnitude of potential wildlife mortalities from the effects of Project related traffic.

Effectiveness: Moderate since road kills of small animals may not be reported.

Implementation Device: Plan of Operations.

WF-13: Disposal of Killed Ungulates

The carcass of any ungulates, such as deer and cattle, killed by traffic along the ore haul, supply, or employee access routes across National Forest System lands and right-of-ways would be promptly removed by the Proponent. Removal of these carcasses would be done in accordance with appropriate County, State, or Federal regulations, whichever is the most restrictive. This would reduce the likelihood of effects on carnivores that may be attracted close to the roads because of the carcasses.

Goal: Reduce effects on carnivores that may be attracted to the roads because of the carcasses.

Effectiveness: Moderate since prompt removal and disposal of a carcass may not happen or the ungulate may wander off to die, thus the carcass may not be removed.

Implementation Device: Plan of Operations.

Water Quality

WQ-1: Erosion and Sedimentation

The Forest Service would require “best management practices” for erosion and sediment control (Forest Service, 1988). Maintenance of diversion structures and sediment traps would be conducted by the Proponent to ensure short- and long-term effectiveness of the erosion and sediment control facilities.

The following techniques would be used to minimize erosion and sedimentation:

- Vegetation would only be removed from those areas to be directly affected by project activities. Other areas would not be cleared.

- Cut and fill slopes for roads would be designed to prevent soil erosion. Drainage ditches with relief culverts would be constructed where necessary (see table below for frequency of relief culverts). Cutslopes would be laid back to a less steep angle where rock content of the cutslope is less than 50%, so ditches do not fill with soil ravel.

Table II-6: Road Relief Culvert Spacing#:

Road Grade %	Culvert Spacing (meters)*
2	103
4	86
6	71
8	57
10	44
12	33
14	25

Johansen, et al. (1997)

* The above guidelines should be adjusted according to the following (Packer and Christenson 1964)

1. Reduce the spacing by 5 m. if the road is located in the middle one-third of a slope
2. Reduce the spacing by 11 m. if the road is located in the bottom one-third of a slope.
3. Reduce the spacing by 3 m. if the road is on an east or west exposure.
4. Reduce the spacing by 6 m. if the road is on a south slope
5. If the resulting spacing after items 1 – 4 falls below 17 m., use relief culverts at 17-m. spacing and apply aggregate surfacing and erosion protection measures such as vegetative seeding to ditches, road surface, fills, shoulders, and embankments.

- Ditch relief culverts would be placed on slope grade so water from the relief culverts does not drain onto fill slopes
- Cutbanks would be stabilized after road construction/reconstruction and road widening. Hydromulching would be initially applied. The area would be seeded with an approved certified noxious weed free, appropriate seed mix. Hydromulching would be applied in two steps. Initially the seed would be applied, followed by the mulch. Tackifiers would also be applied on harsh slopes and long cutslopes, as needed. The catatonic form of PAM would not be used in hydromulch as a tackifier.
- Disturbed slopes would be re-vegetated, mulched, or otherwise stabilized, to minimize erosion as soon as practicable following construction. Road embankment slopes would be re-vegetated, as practicable, except in unsuitable areas, including grasses and forbs to prevent erosion.
- Runoff from roads, buildings, and other facilities would be handled through best management practices, including sediment traps, check dams, dispersion terraces, riprap aprons, settling ponds, berms, filter fences, adequate relief culverts, etc. The design of these features would be based upon an analysis of local hydrologic conditions for at least the 20-year, 2-, 3-, and 24- hour storm events.
- Road ditches would be adequately re-vegetated during road construction, or other methods would be utilized to prevent soil movement such as noxious weed/seed-free wattles. Streambank wheatgrass would work well as ditch vegetation.
- Wattles, or straw bales, would be placed in the ditch with spacing of at least one between each pair of relief culverts, but no more than 150' from a culvert or each other the initial year, post road construction, to trap sediment until vegetation in the ditches becomes established.
- During blading of roads, vegetation in ditches would not be disturbed. Road maintenance would only remove large debris from ditches and would be done to avoid disturbance of

vegetation in ditches. If monitoring shows that sites with wattles and/or vegetation are insufficient in checking sediment delivery, then, in addition to wattles and/or vegetation, these sites would be lined with rock or other erosion prevention measures would be installed.

- Physical structures such as gabions, large boulders, etc. would be constructed at the toe slopes of cutbanks at site-specific locations where soil erosion concerns are present. This would be designed to prevent sediment from reaching ditches, roads, and eventually the stream. The Forest Soil Scientist would identify these specific locations.
- Off-road vehicle travel would be avoided.
- The number of stream crossings would be kept to a minimum. All stream crossings would be designed to accommodate at least a 100-year, 24-hour event. All relief culverts would meet the spacing specifications described in Relief Culverts by Johansen, et al. (1997) [see table above].
- Reclamation and re-vegetation of bare soil would be implemented as soon as practicable for long-term stability.
- Diversion ditches and sediment traps would be maintained as necessary during the life of the operation. As appropriate, sediment would be removed from sediment traps.
- Where a stream is within one hundred (100) feet of the toe of the road fill, silt fencing, at least three feet tall, would be placed between the road edge and the stream to intercept sediment before it could be delivered to the stream. An estimated 13,000 feet of silt fencing would be needed on Alternatives B, B1, and C. Silt fencing would be installed prior to the placement of road fill. Erosion control structures and other measures would be implemented, as the road is constructed/reconstructed. The proponent would be required to install these structures as each segment of road is constructed/ reconstructed before moving on to the next segment. Damaged silt fencing would be replaced or repaired. The silt fence would be supported by metal or thick wood posts (not lath), that would be expected to stay in place and upright, supporting the silt fence even with a heavy load of sediment, loose soils, and/or rock against it. Straw bales would be placed below the silt fencing, below all relief culverts in RHCAs along the Marias Creek road route, above Cow Camp on the new road, and in sections 25 and 26 of the Nicholson Creek road route. Damaged straw bales would be replaced in the above locations except if damage is caused by cows in the area above Cow Camp.
- Windrows of slash with good ground contact would be placed in-between the road edge and the silt fence to provide an intermediate opportunity for sediment to be entrained, not reach the creek, and reduce the sediment load that would be intercepted by the silt fence. The silt fencing and windrow(s) of slash would be regularly maintained through the life of the project.
- Silt fencing and straw bales below relief culverts would be installed immediately following the installation of each relief culvert;
- Silt fencing, including straw bales where present, would be repaired within 24 hours of when a break or damage is reported by truck drivers, the range permittees, the Forest Service, or a regulatory agency or Proponent inspections.
- Road maintenance would occur in a manner where toe slopes of cutbanks would not be refreshed by grading and ditch cleaning equipment. This would be designed to prevent renewed soil erosion occurrences from cutbanks.

If substantial sedimentation occurs, construction and operational activities responsible for the sedimentation would be suspended or modified, and additional actions would be implemented to reduce sediment delivery.

Goal: Control surface water flow to minimize erosion and downstream sedimentation and implement corrective actions quickly to minimize impacts to streams.

Effectiveness: High since greater than 90% of the road related sediment would not reach streams. Best Management Practices are being utilized to control sediment delivery to streams.

Implementation Device: Plan of Operations, Road Use Permit, and road design approval.

WQ-2: Water Quality

Effluent limits for all wastewater parameters (water discharged at the infiltration gallery or water augmentation sites) are established as equal to the comparison of the most restrictive of relevant surface water or ground water criteria as set by the NPDES permit issued by the Washington State Department of Ecology. As the State has no water quality-based effluent limit for TSS (total suspended solids), the technology-based effluent limit would be included in the proposed permit, as modified, if necessary, by background conditions. The criteria for turbidity would allow no more than a 5 NTU increase over background turbidity. As a result, 22 NTU is the calculated effluent limit.

Goal: Protect ground and surface water quality.

Effectiveness: High since water quality standards would have to be met as part of the NPDES permit.

Implementation Device: Plan of Operations and State NPDES permit.

WQ-3 Water Infiltration and Augmentation

Any additional discharges in streams or to the infiltration gallery above flows needed to replace lost flows due to mine dewatering would be made so that resulting stream flows remain below bank full conditions.

Goal: Minimize potential for changes in channel morphology

Effectiveness: High for minimizing changes in channel morphology.

Implementation Device: Plan of Operations.

Wetlands and Streams

Existing wetlands and riparian areas on National Forest System land or in National Forest right-of-ways would be affected if any of the action alternatives are implemented. After avoidance of wetlands has been fully considered and implemented, where feasible and reasonable, the overall goal of mitigation would be to offset the Project's unavoidable adverse impacts to aquatic resources. The determination of appropriate mitigation is based on the functions and values of the aquatic resources that would be impacted, with a goal of no net loss of wetland function or acreage.

Impacts to wetlands, streams, and riparian areas on National Forest System land are guided by the Inland Native Fish Strategy (USFS, 1995). This strategy is intended to provide interim direction to protect habitat and populations of resident native fish. This direction is in the form of riparian management objectives, standards and guidelines, and monitoring requirements.

WS-1: Culverts in Live Streams

Construct new, and improve existing culverts, bridges, and other stream crossings on the proposed ore haul route to accommodate a 100-year, 24-hour event, including associated bedload and debris. Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams using the stream simulation method. Construct small wetlands above culverts on live streams to compensate for wetlands lost from culvert replacement.

Goal: Do not slow the rate of recovery below the near natural rate of recovery if no additional human caused disturbance was placed on the system.

Effectiveness: High since stream culverts on the haul routes would be better at meeting objectives than the present culverts.

Implementation Device: Road Use Permit and road design approval.

WS-2: Sensitive Plants

Avoid sensitive plant populations during installation of piezometers and staff gauges.

Goal: Retain sensitive plant populations.

Effectiveness: High because populations can be easily avoided during installation.

Implementation Device: Plan of Operations.

MONITORING MEASURES

Environmental monitoring programs would be implemented as part of any action alternative. Some of this monitoring, such as water quality and quantity, may be required in conjunction with other agencies permits. Portions of the monitoring program that would be done by the Proponent would be included in the Plan of Operations. Monitoring programs would be designed to quantify any measurable environmental impacts accompanying construction, operation, reclamation, and post-reclamation closure conditions with reference to pre-operational data obtained during baseline monitoring. Impacts that result in violations of regulatory stipulations, such as water quality permits, would require alterations of project operations or additional mitigation actions. Any exceedences of monitoring criteria would be brought to the attention of the Forest Service within seven days of discovery unless other timeframes are required by permit, law, or the Plan of Operation. Monitoring plans would be part of the Plan of Operations.

Periodic review of monitoring data would be required to assess the possible presence of short- or long-term impacts resulting from the project. The Proponent would prepare an annual summary report for monitoring studies. Individual monitoring plans may require more frequent reporting and this would be indicated in the individual monitoring plans. The Proponent would submit the annual report to the Forest Service by March 15th. During the first quarter of each calendar year,

a coordinating meeting would be held at the Buckhorn Mt. Project site to present a summary of the previous year's monitoring results and to discuss the adequacy of the monitoring plan. The annual reports would be submitted at least two weeks prior to the annual meeting. All water quality and quantity data provided to WADOE, for the Buckhorn Mountain area, in compliance with State permits, or a summary of that data, would be provided to the Forest Service.

Water Resources Monitoring

A ground water and surface water monitoring program would be established to assess:

- Compliance with state and federal permits;
- Operational performance;
- Long-term changes in water quality and quantity;
- Closure and reclamation success; and
- Magnitude and extent of unanticipated releases of regulated substances.

The monitoring program would include water quality, quantity, and levels of regulated substances. The water quality monitoring program would involve collection and analysis of key parameters necessary to assess each phase of the project. Water monitoring samples would be collected at many locations, including existing and proposed monitoring wells, and existing and new surface water monitoring points including at least two directly adjacent to the Marias Creek or Nicholson Creek haul routes. Turbidity levels would be monitored before, during and for at least three years after road construction/ reconstruction along the ore haul route and in Toroda Creek above and below Marias or Nicholson Creek depending on ore haul route if access to private land for Toroda Creek monitoring is obtained. Water monitoring for chlorides would be required after storm events greater than 0.25 inches of precipitation in a rolling 24-hour period. Sample monitoring plans for Alternatives B and B1 are included in the appendix to this EIS.

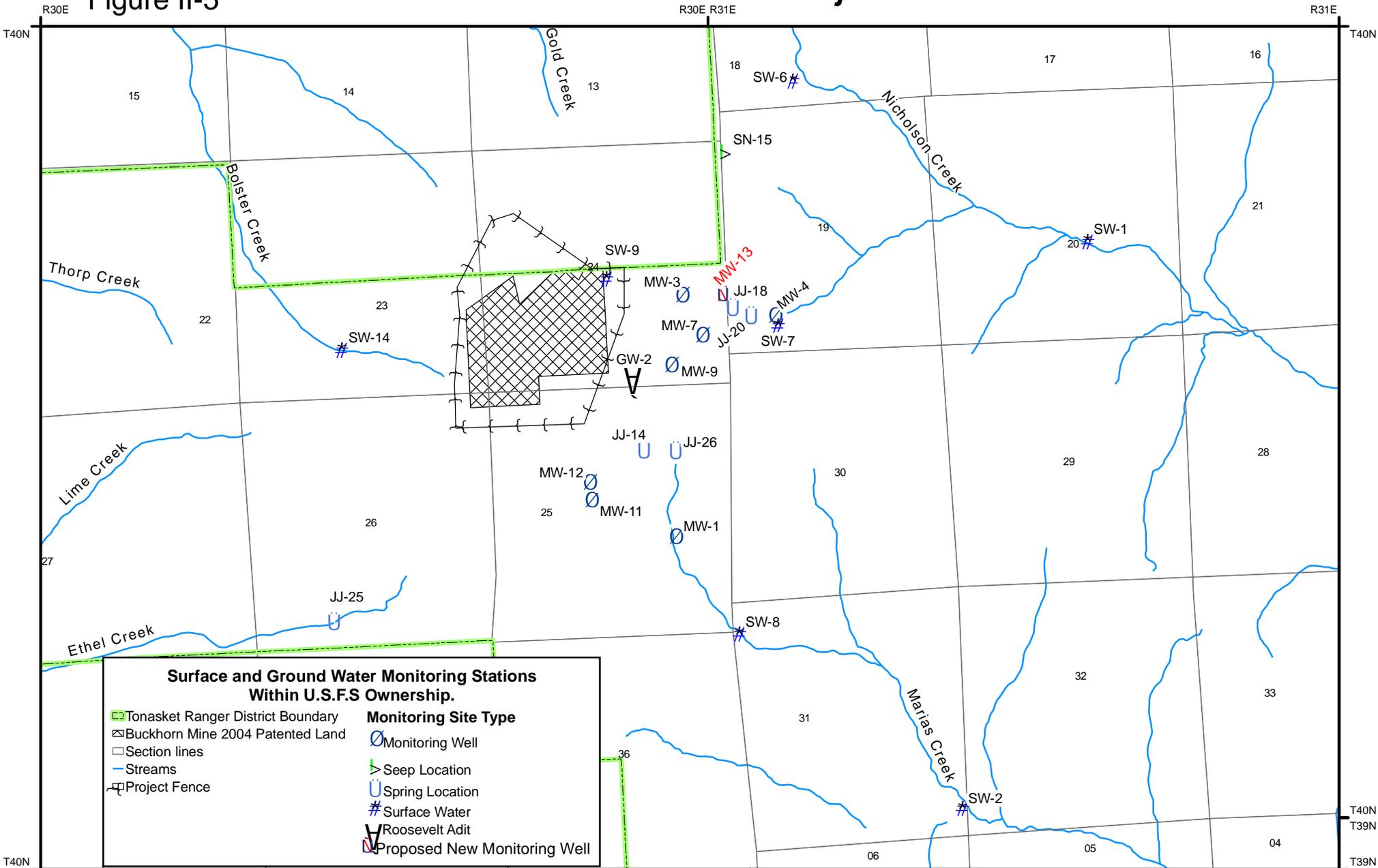
Some examples of key surface water parameters that would be monitored in Marias or Nicholson Creek, depending on ore haul route, for at least five years would include flow, pH, chloride, and magnesium. Sampling monitoring plans for Alternatives B or B1 are included in Appendix C of this EIS. An automatic sampling device to track temperature would be installed in Marias or Nicholson Creeks, depending on haul route, to track changes.

Surface water quality and quantity monitoring stations would be established in streams, springs, and seeps that have the potential to be impacted by ore haul, water infiltration, or mining operations. Water at these stations would be sampled and analyzed for physical and chemical parameters. The existing baseline monitoring network would be preserved to the extent possible and necessary. The location of water monitoring wells can be found on the Figure II-5 on the next page. The exact locations, parameters, and frequencies would be established in State Permits in consultation with the Forest Service. Additional piezometers (small diameter pipes, usually one inch or less in diameter, sunk into the ground to measure the "surface" of the groundwater) and staff gauges would be used to monitor effects on seeps, springs, and wetlands.

Ground water monitoring wells would be located as close to the potential source of contamination as physically or reasonably possible. The list of ground water monitoring parameters would be similar to parameters developed for the surface water monitoring program and would be listed in the State's NPDES permit. The existing baseline monitoring network would be preserved to the extent possible. The exact locations, parameters, and frequencies would be established in State Permits in consultation with the Forest Service.

Buckhorn Access Project

Figure II-5



Surface and Ground Water Monitoring Stations Within U.S.F.S Ownership.

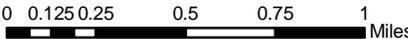
Tonasket Ranger District Boundary	Monitoring Site Type
Buckhorn Mine 2004 Patented Land	Monitoring Well
Section lines	Seep Location
Streams	Spring Location
Project Fence	Surface Water
	Roosevelt Adit
	Proposed New Monitoring Well

Tonasket Ranger District
Okanogan-Wenatchee National Forests
Map by JRainford

1 inch equals 0.53 miles



Absolute Scale = 1:33,790



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The Proponent would be required to install, maintain, and record measurements from devices for measuring precipitation, temperature, wind speed/direction, and the depth and water content of the snow pack at the infiltration site or another suitable location.

The focus of this monitoring would be to track long-term water quality effects of the project. The frequency would be adequate to document changes in water quality and quantity. Post closure monitoring below the mine site would continue until several years after most of the mine has filled with water.

Snow plowing to access water monitoring wells and surface water monitoring points would not be approved under Alternatives B1, C, or D.

Implementation Device: Plan of Operations and State NPDES permit.

Range Allotment Monitoring Measures

Range allotment mitigation measures would be reviewed annually by the Proponent, the permittee, and the Forest Service to evaluate the effectiveness of the mitigation, identify areas that need improvement, and make appropriate adjustments. Ongoing improvements to the mitigation would be completed by the Proponent to reduce the potential for truck and cattle interaction. Additional measures that may be implemented include additional fencing, additional water troughs, additional water gaps, and changes in turn-on and turn-off procedures. Additional NEPA may be required to implement some of these changes. The Range Permittee and Project Proponent would have the primary responsibility for identifying problem areas. The Proponent would be responsible for monitoring and maintaining improvements such as livestock fencing, gates, cattle guards, and water developments during mine operations. All improvements would be inspected annually and in working order two weeks before cattle turn-on in the spring. Incidental monitoring of improvements would be done by the Forest Service during administration of the Cedar Grazing Allotment.

Implementation Device: Plan of Operations.

Wildlife Road Closures

Road closures proposed for wildlife mitigation in Bear Trap Canyon would be checked on a monthly basis by the Proponent to assure that they are intact. Closures that have been breached would be repaired by the Proponent (Alternative B1 only) within one week of discovery.

Other previously closed roads that have had the closure breached by the public, and NEPA was previously completed for the closure, particularly along Forest Roads 3575 and 3575-150, would be reclosed by this project. The Proponent would monitor these closures twice yearly, once in the spring and once in the fall prior to the general rifle season and close up to 12 breaches per year.

Implementation Device: Plan of Operations.

Fish Populations

Fish populations along the ore and supply haul route would be monitored years 1 through 5, 8, and 10 for the entire fish bearing length of Marias and Nicholson Creeks. If fish populations experience a major drop in population numbers or change in species diversity that can be

attributed to the Project activities, additional mitigation measures would be considered to reverse this decline. Additional NEPA may be required to implement some of these changes. The Proponent would do the surveys and report of findings. This monitoring measure does not apply to Alternative D. The entire fish bearing length of Marias or Nicholson Creek on National Forest, Department of Natural Resource, and/or Crown/Kinross lands, as appropriate, would be monitored.

Implementation Device: Plan of Operations.

Timber Monitoring

Clearing, removal, and slash disposal would be monitored by the Forest Service to ensure compliance with the Timber Settlement Contract and the Plan of Operations. Monitoring by the Forest Service of the Settlement Contract would generally be at least once weekly during tree removal. The boundary would be tagged, flagged, and painted and each tree would have a spot of paint on it about breast height.

Implementation Device: Timber Settlement Contract.

Noxious Weed Monitoring

Because noxious weeds occur in the area, it is possible that weed infestations could occur on disturbed and newly reclaimed land. The Forest Service would monitor twice during the growing season all disturbed and reclaimed sites on National Forest System land for noxious weeds and, as necessary, would implement weed control measures to eliminate noxious weeds under existing or future NEPA decisions. The Proponent has voluntarily agreed to pay for this monitoring and would commence at the start of soil disturbing activities and would last for a period of 5 years after reclamation; estimated 13 years total. Monitoring would include all disturbed areas and would occur two times each year during the growing season. Funding would be provided by the proponent totaling up to \$4,000 per year. The Proponent would be responsible for treating noxious weeds on Crown/Kinross lands.

Implementation Device: Plan of Operations.

Transportation Monitoring

The Forest Service would meet with the Proponent annually to review transportation and related safety issues. A daily inspection schedule including visual inspection and field monitoring for all construction and reconstruction of all mine access and operational roads would be developed by the Proponent. The Forest Service would generally complete a visual review of all road construction/reconstruction work every second or third day of construction. All identified problems would be corrected before moving on to the construction of the next section of road. Roads on National Forest System land must be constructed and maintained according to Forest Service standards. In addition, the Forest Service would require the Proponent to inspect all access roads on National Forest System land used by the Proponent during and after spring runoff, and prior to winter operations. The purpose of these inspections would be to certify that drainage structures are functioning as designed, and/or to identify needed improvements or changes.

Speed on project supply and ore haul roads would be monitored by the Proponent, the Forest Service, and Okanogan County law enforcement who would deal appropriately with violations.

Mileage markers would be placed along the haul route every ½ mile. A sign plan, including speed limit signs, would be developed for project roads.

Implementation Device: Plan of Operations and Road Use Permit.

Reclamation Monitoring

The Proponent would monitor reclamation success according to the Plan of Operations approved by the Forest Service. Areas to be monitored would include road cut and fill slopes, and other reclaimed areas such as temporary access roads, the boundary fence, and the infiltration gallery and pipeline.

The vegetation cover, species composition, and tree planting success would be evaluated by the Proponent during the first, third, and fifth year following seeding or planting. Permanent road cuts and fills would not require planting of trees and shrubs. Permanent road cuts and fills would be reseeded to grasses and forbs. A suggested seed mix and seeding amounts would be provided by the Forest Service and would be agreed to in the Plan of Operations and/or Road Use Permit.

Tree planting (only on facilities associated with the water infiltration pipeline and gallery) success criteria would be measured against the following standards/objectives:

- First year, > 90% of trees alive and well distributed;
- Third year, >75% trees alive, well distributed, and in fair or better condition; and
- Fifth year, at least 200 trees per acre, 134 well-distributed crop trees.

Shrub planting (only on facilities associated with the water infiltration pipeline and gallery) success would be measured against the following standards/objectives:

- First year, > 200 shrubs/acre; and
- Third and fifth years, > 140 shrubs per acre.

There would be a minimum of at least three shrub species present, each representing at least 10% of the total population or a minimum of five species present, each representing at least 8% of the total population.

Grass and forb seeding success would be measured against the following standards/objectives:

- First year, >30% ground cover; and
- Third year, >60% ground cover.

In areas where these standards/objectives are not met, replanting would take place until they are met. These criteria and specifics would be further defined in the Plan of Operations.

Implementation Device: Plan of Operations (Reclamation Plan).

Cut and Fill Slope Monitoring

Monitoring of soil erosion and displacement of cut and fill slopes would occur by the Proponent once road construction is complete. If cut or fill slopes continue to erode, additional soil

stabilizing methods would occur if initial methods fail to stabilize the cut or fill slopes. Options may include additional seeding, tackifiers, erosion mats, and/or placement of boulders or other debris in contact with the ground.

The Proponent would be required to visually survey and record in a notebook damage to cut and fill slopes along the length of the haul route weekly during April and May, monthly June through September and quarterly (i.e. November and February) the remainder of the year. In addition, the Proponent would be required to survey within 24 hours following any period of rainfall of more than 0.25 inches in 24 hours measured at the Buckhorn weather station. This is a rolling 24-hour period for rainfall events. Any rills greater than 4 inches in depth would be stabilized and re-vegetated within the week. The Forest Service would be notified quarterly of the results of those inspections.

Implementation Device: Plan of Operations and Road Use Permit.

Monitoring of Silt Fences and Straw Bales

Field surveys would be made visually and a written record would be kept of all findings. Collected information would be sent to the Forest Service quarterly. On the Marias Creek haul route, Alternatives B and B1, and on the section of road above Cow Camp for all alternatives, silt fencing and straw bales would be monitored monthly May through September and quarterly (i.e. November and February) the remainder of the year.

On the Nicholson Creek haul route, except as noted above, silt fencing and straw bales would be monitored monthly except when cattle are present on the allotment and then they would be monitored weekly.

The Proponent would be required to survey sediment control structures along the length of the haul route within 24 hours following any period of rainfall of more than 0.25 inches in 24 hours measured at the Buckhorn weather station. This is a rolling 24-hour period for rainfall events. The Forest Service would be notified quarterly of the results of those inspections.

If the structures and measures are not functioning, require maintenance, or are not in the proper location, the project Proponent would take action to repair, move, or supplement the sediment reduction measures within 48 hours of the survey or of when a break or damage is reported.

Implementation Device: Plan of Operations and Road Use Permit.

PERFORMANCE SECURITIES

The statutory and regulatory authority of the Forest Service requires the Proponent to execute financial assurance agreements as part of any Plan or Permit approvals. These financial assurances would be in the form of a reclamation performance security to ensure that sufficient funds would be available to properly reclaim the areas disturbed on National Forest System lands and right-of-ways by the Project in the event that the Proponent would be unable or unwilling to meet reclamation and post-closure obligations under the terms of the Plan of Operations or Permit approvals.

No construction activities on National Forest System land or right-of-ways can commence without approval of the Plan of Operations and appropriate permits required by the Forest Service and the execution of financial assurance agreements for sufficient reclamation funds.

The amount of the reclamation performance security must be sufficient to assure completion of the reclamation if such work had to be performed by the Forest Service in the event of forfeiture by the Proponent. The calculation of a reclamation cost estimate for Project reclamation would include labor, equipment, and material costs for items such as earthwork including recontouring, site stabilization, re-vegetation, facility decommissioning, structure demolition, and monitoring during closure and reclamation. These costs would be based on an independent contractor completing site reclamation in the event that the Proponent is unable or unwilling to fulfill reclamation requirements. As such, the reclamation cost estimate would include estimates for contractor equipment mobilization and de-mobilization, agency management and overhead, contractor profit and overhead, and a contingency. The Plan of Operations would include a cost calculation for these activities. It would not be approved without an acceptable security.

The reclamation performance security would be reviewed at least every two years, although a change or alteration in Project operations or substantial inflation (or deflation) would result in a more frequent review.

Upon successful completion of reclamation of a portion or the entire project, the Proponent may apply for the release of a part or all of the reclamation performance security. Reclamation success would be addressed by Proponent compliance with the standards and performance criteria specified in the Plan of Operations.

A synopsis of reclamation objectives and procedures applicable to the project is set forth in the Reclamation Measures section. The success of the reclamation and the eventual release of all or a portion of the reclamation performance security would be measured and evaluated by the post-closure monitoring programs outlined in the Monitoring Measures section above.

The specific amount of the reclamation performance security for the Project would be determined for the selected alternative and its detailed Plan of Operations. As such, this amount would be determined as part of the permit and plan approval processes.

The Proponent currently maintains reclamation securities totaling over \$93,000 with the Forest Service for their past exploration and development activities.

IDENTIFICATION OF THE PREFERRED ALTERNATIVE

The Forest Service has identified Alternative B1 as the preferred alternative with the following modifications: decreased paving and a 30-mile per hour speed limit. Because the analysis shows that storm related sedimentation may actually increase from road paving because of the shorter time for the water to reach the roadside ditches, paving would only be done on approximately the first 800 feet of Forest Road 3550 (Marias Creek Road) to allow for any mud/dust track-off from the gravel road to occur on the Forest Service road prior to the more heavily used County Road 9495 (Toroda Creek Road) to address public safety concerns. Locating the transition from gravel to pavement at about 800 feet from the Toroda/Marias road junction would allow this track-off to occur at a point that is furthest away from Marias Creek to ensure adequate distance for vegetation to intercept sediment. Additionally, the road construction/reconstruction design speed for the Forest Road 3550 is 30 miles per hour, except on a few corners where it is 20 miles per hour, and the difference in effects to wildlife does not justify a 25 miles per hour speed limit for the whole length. 35 miles per hour is the Okanogan County speed limit on most gravel roads. These modifications are within the range of alternatives fully analyzed.

COMPARISON OF ALTERNATIVES

This section summarizes the impacts of the alternatives. Environmental consequences of each alternative are described in detail in Chapter III, Affected Environment and Environmental Consequences. The following table, Comparison of Alternatives with Mitigation in Place, compares alternatives to the key issues and other factors important to assess by alternative. Effects are with mitigation in place. Issues are identified in Chapter I, Purpose of and Need for Action.

When reviewing specific alternative actions in acres and volumes, please note there may be some minor differences. These differences are due to rounding and are not important to the descriptions of the actions or their effects. Noted that the effects described below are for National Forest System lands and right-of-ways unless otherwise noted.

Table II-7: Comparison of Alternatives with Mitigation in Place

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Acres National Forest System (NFS) land not available to public	None	74 acres	74 acres	74 acres	74 acres
Acres disturbed on NFS land and right-of-ways (ROW)	None	57 acres	57 acres	65 acres	26 acres
Timber removed from NFS land and right-of-ways (mbf)	None	370 mbf	370 mbf	265 mbf	225 mbf
Miles of boundary fence on NFS lands	None	1.7 miles	1.7 miles	1.7 miles	1.7 miles
Impact of boundary fence on wildlife	None	Short disturbance during construction, loss of small amount of habitat, and minor movement barrier to wildlife species.	Same as B	Same as B	Same as B
Impact of boundary fence on recreationists	None	74-acre area would not be available for use; most use is related to deer, bear, and bird hunting.	Same as B	Same as B	Same as B
Impact of boundary fence on grazing permittee. Estimated annual AUMs of grazing lost	None	74-acre area not available for use, AUM's lost very slight, no change in permit numbers	Same as B	Same as B	Same as B
Potential for cows to get inside project boundary fence and potential for increased permittee expense	None	Slight, infrequent due to coordination between permittee and company; company to maintain fence and communicate with permittee	Same as B	Same as B	Same as B
Miles of road fenced from cattle access	None	Approximately 4 miles	Approximately 4 miles	No roads fenced to keep cattle away from roads.	No roads fenced to keep cattle away from roads
Miles of cattle fence construction	None	Approximately 5 miles	Approximately 5 miles	Approximately 0.8 miles around Grass Lake	No fencing proposed
Estimated number of cows killed or injured annually	None	Slight, 0 - 4 each year depending upon accidental breach of a fence	Same as B	≥ B since roadway is not fenced and travel distance is longer. Roadway not fenced since cows do not tend to hang out on ore haul route. >D because D route is shorter with less potential for livestock to be in the area of roadway.	Less than B, B1, & D because less road is not fenced and less time of cattle scheduled in area of D route.

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Impact on Tribal members from boundary fence	None	No fish and likely no cultural plants in 74-acre area. Fence passable by deer and other game species. Tribal members would not be able to hunt in 74-acre area, but can access areas directly adjacent.	Same as B	Same as B	Same as B
Miles of construction within riparian habitat conservation areas on NFS lands	None	4.0 miles	4.0 miles	2.6 miles	None
Acres of construction in riparian habitat on NFS or right-of-ways.	None	0.1 acres	0.1 acres	0.2 acres	0 acres
Acres of construction in wetlands on NFS lands or right-of-way.	None	0.1 acres	0.1 acres	0.2 acres	0 acres
Predicted changes in stream temperature in Marias Creek	None	None	None	None	None
Predicted changes in stream temperature in Nicholson Creek	None	None	None	None	None
Potential for toxic materials added to the road surface to enter streams, riparian areas, and wetlands on NFS lands and ROW and impact aquatic life	None	High potential for salts to enter streams, riparian areas & wetlands, but low predicted impacts from chlorides and magnesium. Low potential for spills.	Same as B.	High potential for salts to enter streams, riparian areas and wetlands, but low predicted impacts from chlorides and magnesium. Low potential for spills.	Very low, 1 stream crossing on National Forest System lands and right-of-ways. Low potential for spills.
Number of T.E.S. plants lost	None	Estimated 21 plants lost from effects of chlorides.	Same as Alternative B	Estimated 5 plants loss from effects of chlorides.	Estimated 5 plants loss from effects of chlorides.
Annual tons of TSP produced during ore and supply haul and employee access on NFS land	None	678 tons	523 tons	945 tons	211 tons
Annual tons of PM10 produced during ore and supply haul and employee access on NFS land	None	181 tons	139 tons	251 tons	56 tons
Number of potential viewpoints where dust is likely to be seen from activities on NFS land	None	3 locations totaling ¾ mile on Ferry County Road 502; 1 location at junction of FR 3550 and OCR 9845	3 locations totaling ¾ mile on Ferry County Road 502;	3 locations totaling ¾ mile on Ferry County Road (FCR) 502;	3 locations totaling ¾ mile on Ferry County Road 502;

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Effects of dust on vegetation	None	Less than Alternative C, but more than Alternatives B1 or D. Vegetation along roads is susceptible to chronic decreases in photosynthesis, growth, and plant nutrition.	< Alt.B & C because of paving; however > Alt.D. Vegetation along roads is susceptible to chronic decreases in photosynthesis, growth, and plant nutrition.	Because of the longer road route, this alt. would have the most impact. Vegetation along roads is susceptible to chronic decreases in photosynthesis, growth, and plant nutrition.	Since this alt. has the least amount of road mileage, it would have the least impact from dust. Vegetation along roads is susceptible to chronic decreases in photosynthesis, growth, and plant nutrition.
Number of residences along potential haul route on Forest Service roads and ROW (within 500')	None	1 residence	1 residence	9 residences	7 residences
Cumulative number of residences along haul route to junction FR 3575 and OCR 9495 (within 500')	None	11 residences	11 residences	9 residences	24 residences
Impact of construction/reconstruction on residential quality of life, health, safety, and solitude	None	Construction/reconstruction would cause very serious noise impacts on 2 residences for approximately 3 months.	Same as B	Construction/reconstruction would cause very serious noise impacts on 9 residences for approximately 4 months.	Construction/reconstruction would cause very serious noise impacts on 7 residences for approximately 2 months.
Disturbance impact of ore and supply haul on residential quality of life, health, safety, and solitude	None	2 slight impacts (one residence generally not occupied in winter); Little effect on safety of residents since access to residences generally not on haul route.	Same as B	2 very serious impacts since houses within 90' of road; 3 substantial impacts; 4 slight impacts (one residence generally not occupied in winter); Access road to residences would likely be safer due to double lane road and snowplowing in winter.	2 substantial impacts 5 slight impacts (one residence generally not occupied in winter); Access road to residences would likely be safer due to double lane road and snowplowing in winter
Number of dispersed recreation sites along potential hauls routes	None	1 destroyed; 1 moderate disturbance (>125'); and 3 severe disturbance (<125')	Same as B	17 sites impacted; 16 severe disturbance (<125'); and 1 moderate disturbance (>125')	0 sites impacted
Potential noise effects on Coogan and Nicholson-Marias Ridge unroaded areas	None	Slight effect Coogan and Nicholson-Marias Ridge outside construction period. Noise near ambient 1000' from road.	Similar to B	No effect Coogan, slight effect Nicholson-Marias Ridge outside construction period. Noise near ambient 1000' from road.	None

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D	
Impact of employee traffic on residential quality of life, health, safety, and solitude (impacts by residences)	None	2 residences would be slightly impacted. Little effect on safety of residents since access to residences generally not on haul route.	Same as B	2 residences would be substantially impacted, 7 residences would be slightly impacted. Access road to residences would likely be safer due to double lane road and snowplowing in winter.	1 residence would be substantially impacted, 6 residences would be slightly impacted. Access road would likely be safer due to double lane road and snowplowing in winter.	
Impact on recreation	None	Substantial since most of the recreating public would avoid Marias Creek drainage for the duration of construction and operations.	Same as B	Substantial since most of the recreating public would avoid the ore and supply haul route during construction and operations.	Very slight since small amount of recreation use on National Forest lands along the ore and supply haul route. Most of route off NFS lands.	
Changes in visibility in Class 1 airsheds	None	Very slight	Very slight	Very slight	Very slight	
Total miles of road from patented mine boundary to County roads	N/A	8.4 miles	8.4 miles	13.3 miles	4.1 miles	
Miles of total road on NFS lands and ROWs	N/A	6.7 miles	6.7 miles	13.0 miles	2.7 miles	
Miles of unpaved haul road on NFS lands and ROWs	N/A	6.7 miles	6.2 miles	10.6 miles	1.4 miles	
Miles of proposed road pavement on ore haul route	N/A	0 miles	0.5 miles	2.4 miles	1.3 miles	
Summertime noise levels (LEQ) along ore and supply haul route	50' 100' 200' 500'	No change	60 decibels 56 51 45	Same as B	Same as B	Same as B
Acres with noticeable noise effects within Jackson Creek inventoried roadless area (w/i 500' of road)	0	0	0	91 acres	0	
Gray wolf and wolverine assessment model security habitat	47,730 acres (23%) of security habitat in Myers and Toroda W.S.	35 acres of security habitat lost; no change in percent of total acres affected	240 ac. security habitat created; no change in percent of total acres affected	20 acres of security habitat lost; no change in percent of total acres affected	20 acres of security habitat lost; no change in percent of total acres affected	
Mule deer winter habitat disturbance index of acres impacted by roads.	1,238 out of 13,199 acres (9%) of deer winter range within Buckhorn block currently impacted	2,870 additional acres impacted (4,108 acres, 31% of total) affected	1,860 additional acres (3,098 acres, 23% of total) affected. The area affected is less than Alt. B due to road closures	1,119 additional acres impacted (2,357 acres, 18% of total) affected	550 additional acres impacted (1,788 acres, 14% of total) affected	

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Late Successional Forest, Non-winter Habitat affected by roads and trails	3,066 acres out of 32,575 total acres (9%) currently affected by roads	14 additional acres affected; no change in percent of total acres affected	21 less acres affected due to road closures; no change in percent of total acres affected	10 additional acres affected; no change in percent of total acres affected	10 additional acres affected; no change in percent of total acres affected
Late Successional Forest Non-winter Security Habitat impacted by roads and trails	10,823 acres out of 32,757 total acres (33%) currently impacted	9 additional acres affected; no percent change in total acres affected	99 less acres affected due to road closures; no percent change in total acres affected	3 additional acres affected; no percent change in total acres affected	3 additional acres affected; no percent change in total acres affected
Late Successional Forest Winter Security Habitat impacted by roads and winter trails	9,430 acres out of 32,757 total acres (29%)	19 additional acres affected; no change in percent of total acres affected	16 less acres affected; no change in percent of total acres affected	12 additional acres affected; no change in percent of total acres affected	12 additional acres affected; no change in percent of total acres affected
Riparian Non-winter Habitat Influence Index; acres affected by roads and trails	6,050 acres out of 18,197 acres total (33%) currently impacted	2 additional acres affected; no change in percent of total acres affected	64 less acres affected; no change in percent of total acres affected	No additional acres affected; no change in percent of total acres affected	No additional acres affected; no change in percent of total acres affected
Road density by MA area (Forest Plan Standard) during project (miles per square mile) ¹⁶ :					Same as C
MA 14-17 (2.0)	1.0	1.0	1.0	1.0	1.0
MA 14-18 (2.0)	3.8	4.2	1.5	3.8	3.8
MA 14-19 (2.0)	1.7	1.7	1.7	1.7	1.7
MA 25-18 (3.0)	1.8	1.9	1.8	1.9	1.9
MA 26-16 (1.0)	1.4	1.4	1.1	1.4	1.4
Miles of road in deer winter range (Road density [miles/ square mile (m/m ²)])	14.3 (1.5)	15.0(1.6)	12.8 (1.4)	13.0 (1.4)	13.0 (1.4)
Miles of road in deer summer range (Road density [m/m ²])	58.5 (1.8)	58.9 (1.8)	58.9 (1.8)	57.6 (1.7)	57.6 (1.7)
Impacts from creation of semi-permeable barrier along haul routes	None	Limits movement of wildlife, creates disturbance, and direct mortality. Effects greater than B1 & D.	Effects less than Alt. B and C, but greater than Alt. A & D.	Longest haul route, so greatest impact to wildlife.	Greater impact than Alt. A, but less than Alt. B, B1, & C. Shortest haul route, so least impacts.
Acres of soil disturbance	None	57 acres	57 acres	65 acres	26 acres
Acres of existing noxious weeds along haul routes	None	> 82 acres	> 82 acres	> 117 acres	8 acres
Potential for weed spread onto NFS lands across NFS lands and from NFS lands to private lands	No change	57 acres of disturbance, slight chance	Same as B	65 acres of disturbance; Greater chance from more weed acres	26 acres of disturbance; Least weed spread - fewer acres of weeds

¹⁶ The estimates were based on “open” travel routes, and the substantial increase in the traffic volume along the ore haul route where the road currently exists was not part of the model. Therefore the intensity of impacts along the ore haul route would be substantially greater than under the existing conditions, but this substantial difference in intensity was not captured in the model.

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Potential for use of herbicides under existing decisions, and cumulative effects analysis of effect on non-target species	Known noxious weed sites included in the District Integrated Weed Mgmt Program. Effects on non-target plants minimal.	Same as A, but increased potential for need for herbicide treatment from haul	Same as A, but increased potential for need for herbicide treatment from haul	Same as A, but increased potential for need for herbicide treatment from haul	Same as A, but increased potential for need for herbicide treatment from haul
Potential for introduction of noxious weeds from borrow site	No potential	Low potential; gravel required to be noxious weed seed free	Same as B	Same as B	Same as B
Sediment increases in year one (WEPP model) from road construction/reconstruction	None	49 tons first year in Marias, but reduced by 99% to less than 3 tons including winter sand	51 tons per year in Marias, but reduced by 99% to less than 3 tons including winter sand	42 tons first year in Nicholson, but reduced by 95% to 14-54 tons including sand	0
Potential for chemicals to reach streams, wetlands, RHCAs and riparian habitat	No potential	High if spill occurs	High if spill occurs	High if spill occurs	Low if spill occurs
Effects of magnesium chloride on vegetation	None	Less than Alternative C, but more than Alternative B1 or D	< Alternative C, and less than Alternative B because of paving work. > Alternative D	Greatest potential impacts from more roading	Since this alt. has the least amount of roads, it would have the least potential impact
Predicted increases of chlorides in streams ¹⁷	N/A	147 ppm Marias Creek, 27 ppm direct/indirect and 41-61 ppm cumulative in Nicholson Creek	123 ppm Marias Cr., 27 ppm direct/indirect and 41-61 cumulative in Nicholson Creek	64 ppm direct/indirect Nicholson Cr., 77-91 cumulative; 9 ppm in Marias Cr.	No increase Up. Myers or Millard Creeks, 27 ppm direct/indirect, 41-61 cumulative in Nicholson Cr.; 9 ppm Marias Cr.
Impacts of increases in chlorides in streams on aquatic species	No increases in chlorides. Baseline is 3 ppm. State criteria is 230 ppm	See above; meets state chronic criteria of 230 ppm so no impacts on aquatic species.	See above, meets state chronic criteria of 230 ppm so no impacts on aquatic species.	See above, meets state chronic criteria of 230 ppm so no impacts on aquatics species.	No impact on Millard Creek. Meets State chronic criteria of 230 ppm.
Impacts on Toroda Creek stream flows from water use for dust abatement	None	1 – 5% increase in flows during mining and reclamation during May – Sept.; 0.1 – 1.1% decrease during Oct. – April based on actual use.	Same as B	Same as B	Not as much water needed for dust abatement so less impacts than B
Number of cultural resource properties present and affected	0	5	5	5	5
Number of eligible historic properties affected	0	1	1	1	0

¹⁷ Using flows in WADOEs FSEIS; see Hydrology section in Chapter 3 for calculations using Golder 2006a or draft NPDES permit.

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Potential to impact cultural plants	None	Less than Alternative C, but more than Alternative D	Same as Alternative B	Since this alt has the most road widening it would have the greatest potential	Since this alt. has the least amount of roads, it would have the least potential
Number of Indian Allotments within 2 miles of access route	N/A	1 Allotment	1 Allotment	1 Allotment	1 Allotment
Big game expected to be lost due to project activities on NFS land	No big game expected to be lost.	Greater than in Alt. A, B1, and D	Less than Alternative B and C, but greater than Alts. A & D.	Greater than Alts. A, B, B1 and D due to longest haul route.	Less than Alts. B, B1, & C due to shorter haul route
Fish expected to be lost due to project activities on NFS land	None	Some, but with culvert replacements may just retreat to Toroda Creek	Same as B	Same as B	None
Lineal feet of stream channel within INFISH RHCAs potentially affected	None	20,856' (4.0 miles)	20,856' (4.0 miles)	13,622' (2.6 miles)	None
Effects on seeps, springs, ponds, and wetlands cumulative activities	None	Flows in seeps, springs, ponds, and wetlands in Myers Creek and above infiltration and augmentation sites reduced from mine dewatering but no cumulative effect from Buckhorn Access Project. Flows to seeps, springs, ponds, and wetlands below augmentation and infiltration sites may have slightly reduced or increased flows depending on the site and time of year. Augmentation and infiltration designed to mostly offset flow reductions due to mine dewatering on private lands.			
Hours of expected truck traffic outside 6:00 a.m. to 6:00 p.m.	None	No restrictions on truck traffic except full ore haul trucks 6:00 a.m. to 6:00 p.m.	Ore and supply haul trucks, full or empty, 6:00 a.m. to 6:00 p.m., except infrequent, unplanned supply traffic	Ore and supply haul trucks, full or empty, 6:00 a.m. to 6:00 p.m., except infrequent, unplanned supply traffic.	Ore and supply haul trucks, full or empty, 6:00 a.m. to 6:00 p.m., except infrequent, unplanned supply traffic.
Hours of operation along haul, employee and supply routes	None	Vehicles operating 24 – 7. Most impacts 5:00 a.m. to 9:00 p.m.	Employee vehicles operating 24-7. Most trucks 6:00 a.m. – 6:00 p.m., except infrequent, unplanned supply traffic, 7 days a week. Most impacts 5:00 a.m. to 9:00 p.m.	Employee vehicles operating 24-7. Trucks 6:00 a.m. – 6:00 p.m., except infrequent, unplanned supply traffic. Supply haul Monday to Friday, ore haul Monday to Sat. No trucks on Sunday. Most impacts 5:00 a.m. to 9:00 p.m.	Employee vehicles operating 24-7. Most trucks 6:00 a.m. – 6:00 p.m., except infrequent, unplanned supply traffic, Mon. - Fri. No trucks on Saturdays and Sundays. Most impacts 5:00 a.m. to 9:00 p.m.
Number of vehicle trips expected to operate outside 6:00 a.m. to 6:00 p.m.	None	Up to 110 passenger type vehicles and 18 trucks	Up to 110 passenger type vehicles and 1 truck.	Up to 110 passenger type vehicles and 1 truck.	Up to 110 passenger type vehicles and 1 truck.
Passage rate by residences from ore haul before/during/ after spring breakup (minutes)	0	3.6/0/3.6	3/6/0/3/6	3.1/0/3.1	2.2/0/2.2
Acres of disturbance from water infiltration gallery and pipeline	None	6	6	6	6

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Number of daily trips (one way) by alt. during operations (snow free months) ¹⁸ FR 3550 Monday-Friday Saturday Sunday FR 3575 Monday-Friday Saturday Sunday FR 3575-120 Monday-Friday Saturday Sunday	Decrease of 3 to 6 trips per day	277 (108ht ¹⁹ +169pv ²⁰) 277 (108ht+169pv) 277 (108ht+169pv) few (pv) few (pv) few (pv) 51 (pv) 51 (pv) 51 (pv)	Same as B	few (pv) few (pv) few (pv) 296 (127ht+169pv) 288 (119ht+169pv) 169 (pv) 51 (pv) 51 (pv) 51 (pv)	few (pv) few (pv) few (pv) 45 (pv) 45 (pv) 45 (pv) 326(151ht+175pv) 175 (pv) 175 (pv)
Increased # of daily trips by alt. before and after spring breakup, assuming 3 weeks of shut down	None	Potentially 25 additional ore trucks per day	Same as B	Potentially 30 additional ore trucks per day	Potentially 35 additional ore trucks per day
Qualitative discussion of noise impacts to homeowners along routes during spring breakup.	None	2 residences have slight increase in noise since they are both located more than 300 feet from the haul route.	Same as B	2 residences have very serious impacts; 4 residences have substantial impacts; 3 residences have slight impacts.	2 residences have very serious impacts; 5 residences have slight impacts due to noise from additional trucks.
Acres of springs, seeps, ponds, and wetlands lost from project activities	None	0.1 acres (Marias Creek Watershed)	0.1 acres (Marias Creek Watershed)	0.2 acres (Nicholson Creek Watershed)	0
Annual road maintenance costs	\$79,281	\$141,508	\$108,162	\$184,183	\$121,395
Approximate mileage from mine site to the mill at Republic.	N/A	47 miles	47 miles	49 miles	Via Curlew – 54 miles Via Wauconda Pass – 50 miles
Potential for impacts on aquifers, residential wells and creeks from water infiltration on NFS lands	No impacts on aquifers, residential wells, and creeks	No adverse impacts. Infiltration would raise groundwater levels near infiltration site slightly during mining resulting in enhanced seep & spring areas in Nicholson Creek. Water would meet state water quality requirements set in NPDES permit	Same as B	Same as B	Same as B

¹⁸ Total employee count is less than 240 one-way trips because of variable employee daily work schedules

¹⁹ Heavy truck

²⁰ Passenger vehicle

	Alternative A	Alternative B	Alternative B1	Alternative C	Alternative D
Decreases in stream flows from activities on NFS land					
Marias Creek	None	None	None	None	None
Nicholson Creek	None	None	None	None	None
Bolster Creek	None	None	None	None	None
Ethel Creek	None	None	None	None	None
Gold Creek	None	None	None	None	None
Estimated annual tons/ gallons of supplies hauled over NFS roads					
• Cement/lime/fly ash	None	12,000 tons	Same as B	Same as B	Same as B
• Diesel fuel	None	500,000 gallons			
• Antifreeze	None	1,800 gallons			
• Gasoline	None	4,000 gallons			
• Explosives	None	730 tons			
• Propane	None	130,000 gallons			
• Motor oil	None	20,000 gallons			
• Hydraulic fluid	None	15,000 gallons			
• Magnesium chloride	None	72,000 gallons			
• Resins	None	161 cu. ft.			
• Salts	None	38,000 pounds			
• Shotcrete additives	None	24,000 gallons			
• Oxidizers	None	420 gallons			
• Acids	None	4,300 gallons			
• Bases	None	9,900 gallons			
Predicted changes to average annual baseflow at individual stream stations (Fig. II-5). Positive values indicate an increase in baseflow from the "No-Action" case.					
<u>Stream</u> ²¹ <u>Station</u>		No-Action (gpm) ²²	During Mining (Yr 7)(gpm) ²³	Post Closure (gpm) ²⁴	
Nicholson SW-9	None	14	-13.5	+6.6	Same as Alternative B
Nicholson SW-7		69	+9.7	+4.9	
Nicholson SW-1		230	+9.8	+4.9	
Marias SW-8		31	0	-0.1	
Marias SW-2		110	-0.1	-0.3	
Roosevelt GW-2		31	-4.7	-1.6	
Gold SW-10		6	--	<1	
Gold SW-4		36	-0.1	-0.3	
Bolster, N SW-11		4	--	<1	
Bolster, N SW-12		26	-0.3	-0.6	
Bolster SW-14		16	--	-2	
Bolster SW-13		47	-3.2	-2.5	
Ethel SW-5		100	-0.3	-0.8	

²¹ Stations for each stream are listed from highest to lowest elevation

²² Predicted "No- Action" modeled baseflow (Ecology FSEIS, 2006)

²³ Includes augmentation flows at outfalls 001 and 002. From Aquatic Resources Mitigation Plan (Golder, 2006a)

²⁴ Without augmentation flows. From Ecology FSEIS (2006) and Golder Aquatic Resources Mitigation (2006a)

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