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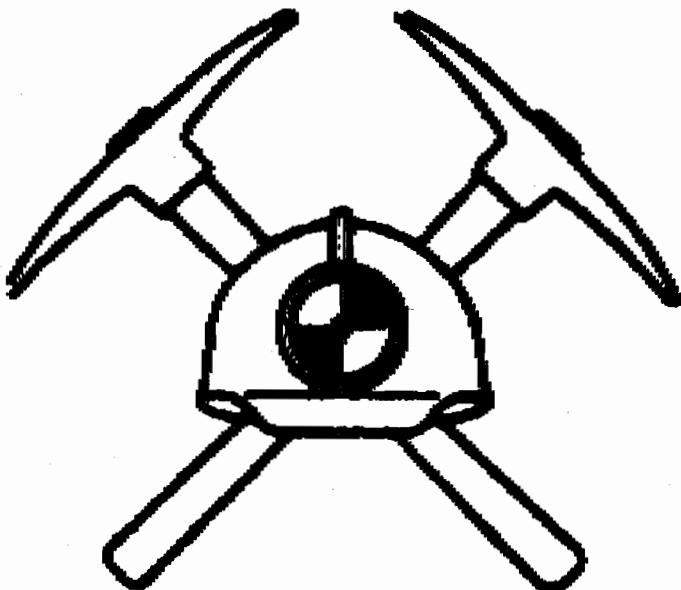
Pacific Northwest

Region

1999



NICORE MINING PLAN OF OPERATIONS



***FINAL
ENVIRONMENTAL
IMPACT STATEMENT***

NICORE MINING PLAN OF OPERATIONS

Final Environmental Impact Statement

Siskiyou National Forest, Josephine County, Oregon

July 1999

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Cooperating Agency:	U.S. Department of Interior Bureau of Land Management	
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Abstract

The Forest Service and Bureau of Land Management have prepared this Final Environmental Impact Statement. It discusses the environmental impacts of implementing the Nicore Plan of Operations. The Proposed Action would approve preparation of a Plan of Operations to mine four sites, for a total of 35 acres. The Plan includes road construction and reconstruction, and hauling and stockpiling of ore. The Final Environmental Impact Statement considers the Proposed Action, the No Action Alternative, and six additional alternatives (Alternatives 6, 7, 8, 9, 10 and 11). **Alternative 9** is the Preferred Alternative.

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NICORE PLAN OF OPERATIONS

ENVIRONMENTAL IMPACT STATEMENT

SUMMARY

INTRODUCTION

A mine claimant has submitted Plan of Operations to the Forest Service (FS) and Bureau of Land Management (BLM). The Plan of Operations include about 0.5 miles of road construction and 7.5 miles of reconstruction; the development of 35 acres of nickel laterite mine pits (4 sites); mining about 3.5 acres per year for 10 years; and use of a 14-mile haul route entirely on public lands. Most of the access route and all of the pits are on Siskiyou National Forest (FS) lands. A five to ten acre ore drying and stockpile site is proposed on Bureau of Land Management (BLM) lands. The Nicore EIS is a cooperative effort between the FS and BLM.

A Draft Environmental Impact Statement (DEIS) analyzing the project was published in January 1998. A comment period was established with about 3,800 people commenting on the project. Most of the commenters expressed disapproval of mining within the Rough and Ready Creek Watershed. Several people also signed petitions opposing the project. In August of 1998, a Notice of Intent to prepare a Supplemental DEIS was published in the Federal Register. The Siskiyou National Forest Supervisor decided to prepare a supplement (SDEIS) because of economic uncertainty related to the project; the closure of the only nickel smelter in the United States; a plant - *Arabis macdonaldiana* - was listed as endangered under the Endangered Species Act; and a perceived need for a greater range of alternatives than were analyzed in the DEIS. The SDEIS was published in November of 1998. About 500 people commented on the SDEIS during a comment period that ran until January 1999.

Many laws, regulations, policies and plans direct the agencies to support and facilitate mineral extraction while protecting surface resources:

- The 1872 General Mining Laws
- The Organic Administration Act of 1897
- The Mining and Minerals Policy Act of 1970
- The FS Surface Use Regulations 36CFR 288 Subpart A
- The BLM Surface Use Regulations 43 CFR 3809
- The Federal Land Policy and Management Act of 1976
- The National Environmental Policy Act
- The Wild and Scenic Rivers Act
- The Clean Water Act
- The Endangered Species Act

Specific guidelines exist for the analysis area. These are contained in the Siskiyou National Forest Plan, Medford BLM District Resource Management Plan and the 1994 Northwest Forest Plan.

The Purpose and Need for Action is driven by these regulations, policies and plans. The purpose is to determine reasonable measures to protect federal surface resources. The need for action is to respond to the miner's Plan of Operations. The decision makers are the Forest Supervisor for the Siskiyou National Forest, and the Medford BLM District Manager.

THE ANALYSIS AREA

The analysis area is 36 square miles located in parts of Township 40 South, Ranges 8 and 9 West. It is wholly within the West Fork Illinois River watershed, mostly within the Rough and Ready Creek watershed (see Vicinity Map shown in Figure 1). About two-thirds of the is within the South Kalmiopsis Inventoried Roadless Area. The area is widely known for its botanical diversity and high numbers of rare plant species. The BLM Rough and Ready Area of Critical Environmental Concern (ACEC) and Forest Service Botanical Area (MA-4) were established to emphasize protection of botanical resources. The Oregon State Parks also manages the Rough and Ready Botanical Wayside within the project area. Currently, development of an interpretive trail within the wayside and ACEC is in progress.

Recreation within the analysis area includes swimming, botanical exploration, hiking and horseback riding. Most use occurs in the lower reaches of Rough and Ready Creek that are accessible to motorized vehicles. Many mining roads were built within the project area. These roads have segments that are currently impassable, even with high clearance vehicles.

The main stem and North Fork of Rough and Ready Creek were found eligible for inclusion into the National Wild and Scenic River system in 1993. The creek provides habitat for many fish species including chinook and coho salmon; steelhead; and cutthroat and rainbow trout. These species are either listed or proposed for listing under the Endangered Species Act, or considered sensitive within FS Region Six (R6). About 7,500 acres within the analysis area are privately owned. Land uses include residential, agricultural and industrial.

ISSUES

Scoping was initiated on this EIS in April 1997 (scoping also occurred in 1993 for the Plan of Operations submitted at that time). Scoping has been accomplished through multiple public meetings, formal hearings, informal discussions, newspaper and periodical articles and several mailings. Some issues were added or broadened in scope to respond to the comments.

These are the issues analyzed in the FEIS:

- ❖ Soil Productivity
- ❖ Slope Stability and Erosion
- ❖ Stream Crossings
- ❖ Stream Flow and Water Temperature
- ❖ Nickel Concentrations in the Water
- ❖ Risk of Hazardous Material Spills
- ❖ Proposed, Endangered, Threatened and Sensitive (PETS) Fish Species
- ❖ Port-Orford-cedar Root Disease
- ❖ Noxious Weeds
- ❖ Botanical Diversity/Sensitive and Endangered Plants
- ❖ Aquatic Conservation Strategy and Riparian Reserve Standards and Guidelines
- ❖ Wild and Scenic River Eligibility - Outstandingly Remarkable Values
- ❖ Costs of Operations
- ❖ Economic Viability
- ❖ Effects on Residents
- ❖ Visual Quality, Recreation and Interpretive Development
- ❖ Roadless Character

ALTERNATIVES

This FEIS includes several alternatives to the Proposed Action:

Alternative 6 would use the existing Rough and Ready Creek road (private road). It would require approximately 3.8 miles of new road construction and 6.1 miles reconstruction. The entire haul route (15.5 miles) would be designed to accommodate street legal haul vehicles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 6. It would approve the alternative stockpile site.

Alternative 7 would require approximately 4.2 miles new road construction and 5.5 miles reconstruction. Total haul route is about 15.4 miles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 7. It would approve the alternative stockpile site.

Alternative 8 would require approximately 4.2 miles new road construction and 4.9 miles reconstruction. Total haul route is about 13.3 miles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 8. It would approve the alternative stockpile site.

Alternative 9 is the *Preferred Alternative*. It would allow the miner to sample and process some ore to resolve the economic and operational uncertainties associated with the project, without incurring the environmental degradation associated with road development and use. Nicore would be given five years to sample and stockpile the ore (the alternative stockpile site would be used, but would be enlarged to 10 acres). Once the miner completed the sampling, he could submit a refined Plan of Operations. That plan would be subject to appropriate environmental analysis.

Alternative 10 would require approximately 1.4 miles new road construction and 8.8 miles reconstruction. Total haul route is about 14.3 miles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 10. It would approve the alternative stockpile site.

Alternative 11 would require approximately 1.25 miles new road construction and 6.0 miles reconstruction. Total haul route is about 9.6 miles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 11. It would approve the alternative stockpile site.

No Action would not approve any Plan of Operations for the Nicore project.

ALTERNATIVES COMPARED

The following chart compares components of the Proposed Action and its Alternatives.

	ALTERNATIVES							
	PA	NA	6	7	8	9	10	11
Mine Site A Access	Alberg Route	Existing Alberg Route currently impassable ¹	Ridge Route	same as Alt. 6	same as Alt. 6	Helicopter	no	no
Mine Site B Access	0.25 miles construction up 445 Road	Existing routes are currently impassable in spots	same as PA	same as PA	same as PA	Tracked vehicles only, via Rock Creek Route	Rock Creek Route	same as PA
Mine Site C Access	Existing 438 Road	Existing route currently inaccessible due to impassable fords.	same as PA	same as PA	same as PA	Helicopter	same as PA	same as PA
Mine Site D Access	Existing 442 Road	Existing 442 road currently inaccessible due to impassable fords.	same as PA	same as PA	no	Helicopter	1 mi. new road to cable landing	same as Alt. 10

¹Routes considered "currently impassable" have places that currently cannot be crossed with pickup trucks.

	ALTERNATIVES							
	PA	NA	6	7	8	9	10	11
Bench Road Construction	no	no	no	yes	yes	no	yes	no
Utilizes Rough and Ready Cr. Private Road	no	private route	yes	no	no	no	no	yes
Utilizes Wimer Road/ Rock Creek Route	no	Rock Creek route currently impassable	no	no	no	limited trips, very minor road work	yes	no
Crossing 1	ford	no	no	seasonal bridge	seasonal bridge	no	seasonal bridge	no
Crossings 2, 3, 4	ford	no	no	no	no	no	no	no
Crossing 5	ford	existing ford currently impassable	seasonal bridge	seasonal bridge	seasonal bridge	no	no	permanent bridge
Crossing 6, 7	ford	existing fords currently impassable	seasonal bridge	seasonal bridge	no	no	no	no
Total Miles of Road Construction	0.55	0	3.8	4.2	4.2	0	1.4	1.25
Total Miles of Road Reconstruction	7.70	0	6.1	5.5	4.9	Minor repair Rock Cr Route	8.8	6.0
Stockpile Site	on powerline near Hwy 199	no	on powerline Near FS Boundary	same as Alt. 6	same as Alt. 6	same as Alt 6, but enlarged to 10 acres	same as Alt. 6	same as Alt. 6
Miles Haul Route	14.3	0	15.5	15.4	13.3	0	14.3	9.6

Chapter Four describes the impacts of the alternatives on the issues. Chapter Two also includes a summary of these impacts.

CHAPTER ONE - PURPOSE AND NEED FOR ACTION

A mine claimant has submitted a Plan of Operations to the Forest Service and Bureau of Land Management. The Plan includes about 0.5 miles of road construction and 7.5 miles of reconstruction; the development of 35 acres (4 sites) of nickel laterite mine pits; mining approximately 3.5 acres per year for ten years; and use of a 14-mile haul route entirely across public lands. Most of the access route and all of the pits are located on Forest Service (FS) administered lands. A 5+ acre ore drying and stockpile site would be located on Bureau of Land Management (BLM). This Final Environmental Impact Statement (FEIS) is a joint effort between the Siskiyou National Forest and the Medford District of the Bureau of Land Management. The Responsible Official is the Siskiyou National Forest Supervisor, who, along with the BLM Medford District Manager, would ultimately approve the final Plan of Operations. Many laws, regulations, policies and plans guide the analysis and eventual approval of a Plan of Operations and provide the basis for the Purpose and Need for Action.

LAWS, REGULATIONS, POLICIES and PLANS

Many laws, regulations, policies, and plans direct the FS and BLM to support and facilitate mineral extraction while protecting surface resources to the extent possible. The **1872 Mining Law**² states that all valuable mineral deposits in lands belonging to the United States are to be free and open to exploration. The **Organic Administration Act of 1897** grants authority to the Forest Service to regulate surface resources of National Forest System lands. The **Mining and Minerals Policy Act of 1970** directs the Federal Government to foster and encourage private enterprise in the orderly and economic development of domestic mineral resources.

The **Forest Service Surface Use Regulations** (36 CFR 228, Subpart A - also known as the 228 Regulations) sets forth rules and procedures for use of the surface of National Forest System Lands in connection with mineral operations. These regulations direct the Forest Service to prepare the appropriate level of National Environmental Policy Act (NEPA) analysis and documentation when proposed operations may significantly affect surface resources. These regulations do not allow the Forest Service to deny entry or preempt the miners statutory right granted under the 1872 Mining Law. The 228 Regulations state that an operator is entitled to access in connection with the operation, and that access must be approved in writing before use can begin. The regulations also require the FS to develop mitigation measures to minimize adverse impacts on National Forest resources. The 228 Regulations include requirements for reclamation. The **Forest Service Manual (FSM) 2800** also discusses specific responsibilities and considerations for dealing with a Plan of Operations. It states that the Forest Service should minimize or prevent adverse impacts related or incidental to mining by imposing reasonable conditions that do not materially interfere with operations. It also requires the Forest Service to evaluate proposals for road construction and reconstruction and consider alternatives that may be less damaging to surface resources (see FSM 2817.25).

²Under the mining law, a mine locator "shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes, and ledges throughout their entire depth."

The **Federal Land Policy and Management Act of 1976** (FLPMA) states that public lands will be managed recognizing the need for domestic sources of minerals. In addition, FLPMA established the concept of "Areas of Critical Environmental Concern (ACEC)". The **BLM Surface Management Regulations** (43 CFR 3809) were developed to prevent unnecessary or undue degradation of public lands related to mining, as directed by FLPMA.

The **Siskiyou Land and Resource Management Plan (Siskiyou Forest Plan)** includes several Minerals Standards and Guidelines (page IV-55). These guidelines discuss the need to facilitate the orderly development of mineral commodities and provide for timely, reasonable, effective and economically feasible environmental protections. The Siskiyou Forest Plan was amended by the **1994 Northwest Forest Plan**.³ The Northwest Forest Plan provides additional guidance for minimizing impact to surface resources, especially in relationship to the **Aquatic Conservation Strategy**. The **Medford District Resource Management Plan (BLM Management Plan)** includes mineral administration direction and also incorporates the Northwest Forest Plan Standards and Guidelines.

The BLM has released a Management Plan for the Rough and Ready Area of Critical Environmental Concern (ACEC - further discussion about the ACEC occurs throughout this EIS).

In 1993, the Siskiyou National Forest completed a study to determine whether Rough and Ready Creek and/or its tributaries were eligible for Wild and Scenic River designation. The main stem and North Fork of Rough and Ready Creek were found eligible. Outstandingly Remarkable Values - ORV's⁴ include Botanical/Ecological, Hydrological/Geological, and Wildlife. **Chapter 8 of the Forest Service Planning Handbook** expresses the policy of protecting eligibility status pending further determination of the river's suitability for inclusion into the **National Wild and Scenic River System**.

Other laws relevant to this project include (but are not limited to) the **National Environmental Policy Act (NEPA)**, the **Clean Water Act** and the **Endangered Species Act**.

The Nicore Environmental Impact Statement (EIS) tiers to the plans and analysis documents discussed in this chapter.

PURPOSE AND NEED

The purpose of this analysis is to determine reasonable measures to protect resources on BLM and National Forest System lands, within the context of the laws cited above. The need for action is to respond to the claimant's Plan of Operations.

³Northwest Forest Plan is embodied in the Federal Ecosystem Management Analysis Team documents, particularly the Record of Decision for the Amendments to Forest Service and Bureau of Land Management Documents within the Range of the Northern Spotted Owl and the Standards and Guidelines.

⁴Outstandingly Remarkable Values are described in the 1993 Eligibility Study.

DECISIONS TO BE MADE

The Siskiyou National Forest Supervisor, as the FS Responsible Official for this EIS, will decide whether to accept the Plan of Operations as submitted by the miner, or to require a revised Plan of Operations that includes mitigating measures. Aspects of the mining operation that may be affected include (but are not limited to): haul routes, road design and maintenance criteria, operating season, reclamation objectives, and monitoring and reporting requirements. The Forest Supervisor may also decide that insufficient information exists to approve full scale mining at this stage of the operation.

The Medford District Manager, as the BLM Responsible Official, will decide what stockpile site is environmentally preferred and what mitigating measures would reduce environmental effects. Mitigating measures may also be applied to the haul route on BLM lands in Section 18.

The policies and regulations described previously differ between BLM and FS. The Responsible Officials will base their decisions on agency-specific guidance. For both agencies, the decision-makers have limited discretion over the mining operation.

THE ANALYSIS AREA

The analysis area is shown in Figure 1, Vicinity Map. It is a 36-square mile area (about 23,000 acres) encompassing parts of Township 40 South, Range 9 West and Township 40 South, Range 8 West. The actual mine sites comprise about 35 acres of the analysis area. The haul route includes about 14 miles of roads. The area lies within the West Fork Illinois River Watershed, mostly in the Rough and Ready Creek area. Nearly two-thirds of the area is within the South Kalmiopsis Inventoried Roadless Area (see Appendix C of the Siskiyou National Forest Plan FEIS).

The West Fork Illinois River Watershed (see Watershed Analysis) is widely recognized for its botanical diversity. The FS Rough and Ready Creek Botanical Area comprises about 1500 acres of the analysis area. Some of the area is also within the Oregon Mountain Botanical Area (about 800 acres). The BLM Rough and Ready Area of Critical Environmental Concern comprises about 1200 acres. Oregon State Parks also manages a small portion of the area, including the 11-acre Rough and Ready Botanical Wayside. Additional FS land allocations include Matrix, Administrative Study Area, and Riparian Reserve. The remainder of the analysis area is privately owned (about 7,500 acres).

Most of the proposed route has been previously developed and disturbed. During the 1940's, a Swedish miner, Fred Alberg, hand built a road several miles into the North Fork Rough and Ready Creek, where he developed a small gold mine. Limited chromite and nickel exploration began during World War II and continued into the 1950's.

More extensive nickel laterite sampling occurred during the 1970's and 1980's. Most of the existing low-standard roads were built using heavy equipment during that time⁵. Limited mineral exploration accessed by these roads has continued to the present.

⁵Most roads in the analysis are shown on the No Action map in Chapter Two. Some existing roads have not been mapped by the Forest Service and are not shown. The unmapped roads can be generally characterized as jeep trails.

In July and August of 1994, lightning fires resulted in 8,000 burned-over acres mostly in the Josephine Creek Watershed to the north. Mining roads in the project area were used to move dozers to the fire line. Several miles of hand and bulldozer fireline was built to suppress the fire. Botanists, wildlife biologists, archeologists and soil scientists were involved in the placement and rehabilitation of the firelines and burned area. The area is in a natural recovery mode, and the firelines have remained free of motorized traffic. Mining access alternatives contemplated in this EIS utilize part of the bulldozed fire line (referred to as "The Mendenhall Fireline.")

PROJECT HISTORY

A Proposed Plan of Operations (POO) for the Nicore project was originally submitted to the FS in December, 1992.⁶ The proposed POO included 5,000 tons of bulk sampling at Mine Site B. Development of a road system that crossed Rough and Ready Creek four times was included in the proposal. The District Ranger determined that an Environmental Impact Statement (EIS) would be necessary because of potential significant impacts to the environment (generally related to the stream crossings and road development). The mining claimant appealed this finding, but it was upheld by the Regional Forester. In November of 1993, the claimant revised the Plan of Operations and proposed additional mine and road development (5,000 ton sample from four mining sites in phase 1, and mining 40,000 ton per year for ten years in phase 2). Funding to complete an EIS was requested, and was forthcoming in 1996.

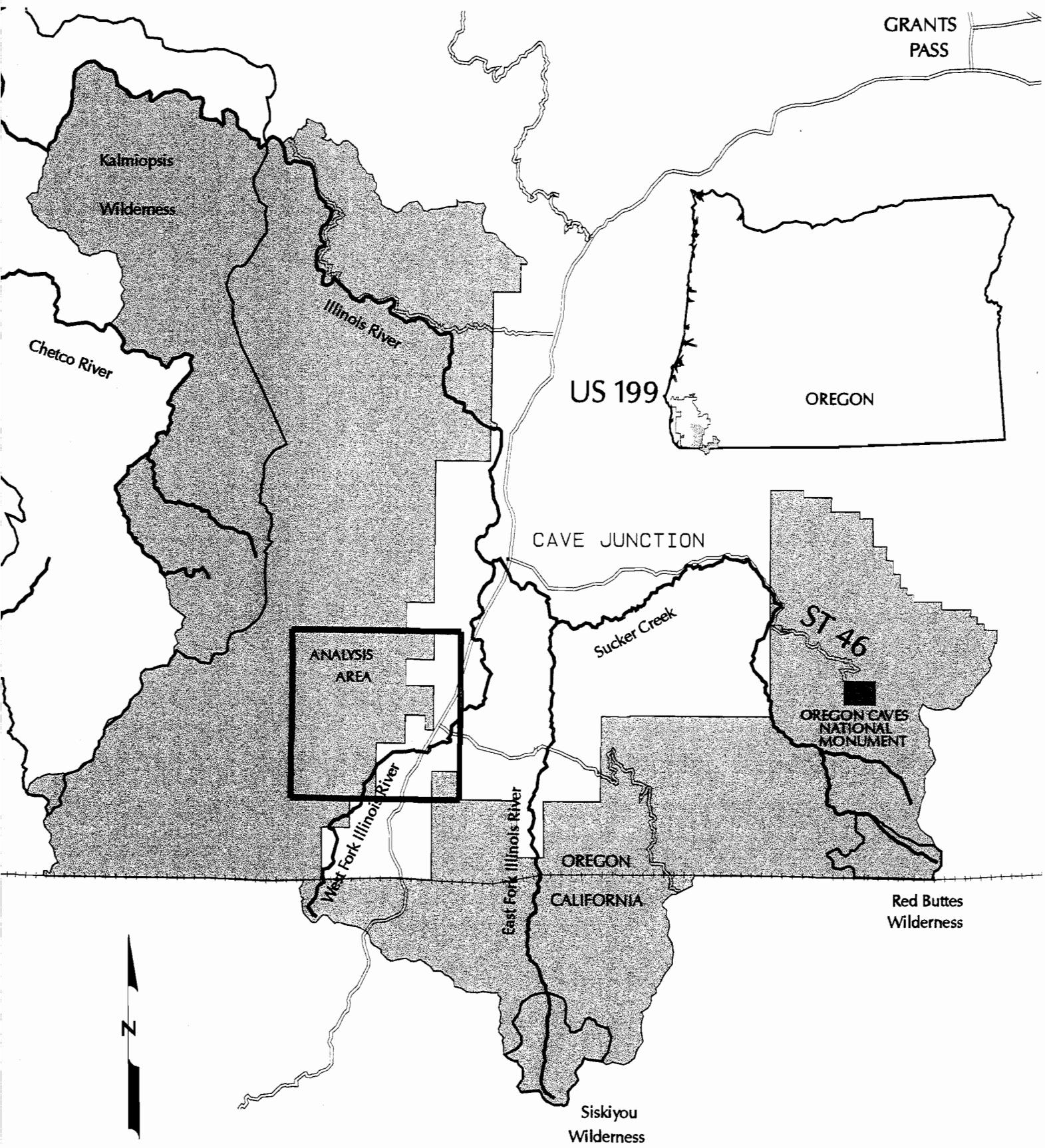
Concurrently, Forest Service Minerals Staff prepared a Surface Use Determination (SUD - see Appendix C for full text of the SUD). The Surface Use Determination considered available information related to the Plan of Operations and concluded that "removing a bulk sample of nickel bearing laterite for use in developing an off site pilot-prototype smelting facility is reasonable for this stage of operations [phase 1]," and that "...large-scale production [phase 2] is unreasonable for this stage of the operation."

The mine claimant disputed the findings of the SUD and continues to suggest that "the need for Phase 1 to precede Phase 2 no longer exists," and "Full scale mining is not contingent on the results of the sample [phase 1]." See Selected Correspondence between the Agencies and the Miner (Appendix D). The Forest Service developed Alternative 9 to represent the SUD findings and it remains the Preferred Alternative.

⁶The Plan of Operations was proposed on claims that had been extensively sampled by Inspiration Mining in the 1970's.

ILLINOIS VALLEY RANGER DISTRICT

Figure 1 Vicinity Map



Also in 1993, the mine claimant applied for patent on more than 4,000 acres of claims within the Rough and Ready Creek watershed. This patent application has not been processed by the Department of Interior, because of a moratorium imposed by the United States Congress. Mineral examination would be required as part of the patenting process.

Many people have expressed confusion over the relationship between the patent process and the process of analyzing and approving a Plan of Operation, documented by this EIS. There is little relationship between the two processes: approval of a Plan of Operations does not pass title to a mine claimant (the potential outcome of patenting), nor are mineral examinations required to approve a Plan of Operations. The patent process is independent of the approval of any Plan of Operations, regardless of selected alternative. The existing moratorium on processing patent applications has no effect on the Agencies' responsibility to analyze a Plan of Operations.

A Draft Environmental Impact Statement was released January 1998. A comment period was established and extended to May 15, 1998. The Siskiyou National Forest received about 3,800 letters during the comment period; the majority of these were form letters generated by environmental groups. Hundreds of people also signed petitions. Nearly all the letters expressed strong opposition to any mining within the South Kalmiopsis Roadless Area or the Rough and Ready Creek Watershed. Many people contacted the Chief of the Forest Service, President Bill Clinton, and their Senators and Representatives to voice their concerns. The Forest Service Chief also received a letter signed by one Senator and four Congresspeople, expressing their concerns about the project (see Appendix B, Public Comments and Responses, which includes a copy of the letter).

In August, 1998, a Notice of Intent to prepare a Supplemental Draft EIS was published within the Federal Register. The Siskiyou National Forest Supervisor decided to prepare a Supplemental Draft EIS due to the following considerations:

- uncertainty related to the economic viability of the Nicore POO
- the only nickel smelter operational within the United States of America closed
- Arabis macdonaldiana* (Red Mountain rockcress) was listed as endangered under the federal Endangered Species Act
- the Forest Supervisor desired a greater range of alternatives to be analyzed, including an alternative that would approve bulk sampling (phase 1).

In January of 1998, a Supplemental DEIS (SDEIS) was published. About 500 people commented on the SDEIS. About 1600 people also reportedly contacted the World Wildlife Fund (WWF) to support WWF's concerns about project. Appendix B responds to all the public comment received on both the DEIS and SDEIS.

FEIS ISSUES

Scoping was initiated for this EIS in April 1997 (Scoping also occurred in 1993 for the original Plan of Operations). Scoping has been accomplished through multiple public meetings, formal hearings, informal discussions, newspaper and periodical articles, and mailings. The issues described below are the basis for alternative development and analysis; the discussions in Chapters Two and Three and Alternatives Compared section of Chapter Two are organized according to these issues. *A new issue appears in this section: Nickel Concentrations in the Water.* This issue was discussed in the previous EIS'; additional information about the concentrations of nickel is now available.

Soil Productivity

Road development and use, pit development, and ore storage would disturb ultramafic soils and lead to loss of productivity. The more road development and acreage mined, the greater the risk of loss of productivity.

Slope Stability and Erosion

The public has raised numerous concerns about whether the mining pits will be stable or whether they will cause erosion. Mine Site D is on a steeper slope, associated with a higher risk of failure. Road construction is associated with risk of erosion and sediment delivery to streams. The alternatives include measures to maintain slope stability and minimize erosion risk.

Stream Crossings

The Proposed Plan of Operations would utilize seven major stream crossings (six on the mainstem Rough and Ready Creek and one on the South Fork). Each year washed rock would be placed in low water fords of the creek at these locations to accommodate ore haul. The rock would wash out with annual winter flows. Measurable increases in turbidity could occur and exceed water quality standards.⁷ The cumulative effects of years of fill added to the crossings could result in noticeable changes in channel form and slope. The alternatives to the Proposed Action minimize stream crossings and use bridges rather than low water fords. Mitigation associated with the alternatives may effectively resolve this issue.

The Proposed Action haul route is associated with 9 smaller tributary crossings. The Alberg route itself includes 4 crossings. The alternatives are designed to minimize tributary stream crossings.

Stream Flow and Water Temperature

Rough and Ready Creek has inherently low summer flows and high water temperatures. Summer flows are often critically low, and temperatures exceed state water quality standards. Use of water for dust abatement could remove thousands of gallons of water per day from the creek, leading to lower flows and higher temperatures.⁸ Low water fords (fill) in the mainstem or South Fork Rough and Ready Creek could pond water and result in higher temperatures behind the crossings. Cold springs entering Rough and Ready Creek near Crossing #3 could be affected by road development and use in that area.

⁷Turbidity standards are discussed further in Chapter Four. State standards are from OAR 340-42-365. Exceptions to these standards may be granted by the Division of State Lands under OAR 141-85-100. The operator is responsible for meeting water quality standards set and permitted by the state.

⁸A water right would be required.

Nickel Concentrations in the Water

Currently, the concentration of nickel in the surface waters of Rough and Ready Creek and nearby springs exceeds Oregon State *ambient* water quality standards⁹. The standard is set at 13.4 parts per billion, and most of the samples were measured as 15 to 40 parts per billion. Even though these levels are above the ambient water quality standards, they are considered safe for drinking. Mining and associated activities may increase the concentration of nickel in Rough and Ready Creek. Residents drink water from springs in the Analysis Area. Others drink water directly from Rough and Ready Creek or from shallow wells on the alluvial fan.

Risk of Hazardous Material Spills

The Proposed Action is associated with increased risk of fuel or other hazardous substances accidentally reaching Rough and Ready Creek, especially in the vicinity of the multiple stream crossings. People living within the analysis area have expressed concern that their drinking water could be fouled by an accidental spill. The risk of a serious spill is low, however the consequences could be significant.

Proposed, Endangered, Threatened and Sensitive (PETS) Fish Species

Rough and Ready Creek provides habitat for several PETS fish species (coho salmon are listed as threatened, steelhead trout are FS Region Six sensitive and proposed for federal listing, chinook salmon and cutthroat trout are Region Six sensitive). The Proposed Action may adversely affect fish and their habitat by blocking fish passage at mainstem and South Fork crossings and degrading other habitat features.

Port-Orford-cedar Root Disease

The Proposed Action increases the risk of importing Port-Orford-cedar (POC) root disease into the Rough and Ready Creek Watershed. The action alternatives include strategies to prevent or slow the spread of the disease. The alternatives are compared based on the relative risk of introducing the disease into currently uninfested areas.

Noxious Weeds

The Proposed Action may lead to the spread of noxious weeds that can out-compete rare and native vegetation. All of the action alternatives include some mitigation to reduce the risk of spread of noxious weeds. The alternatives are compared based on the relative risk of spreading noxious weeds.

⁹No other elements are in concentrations that exceed any standard, nor are any other standards expected to be exceeded in any mining alternative.

Botanical Diversity/Sensitive and Endangered Plants

The proposed haul route and mine site traverses the Rough and Ready Botanical Area and Area of Critical Environmental Concern (ACEC). An alternative haul route traverses the Oregon Mountain Botanical Area. Many different sensitive plant species and one listed under the federal Endangered Species Act may be affected. Botanical Area Standards and Guidelines require the FS to make "every effort" to protect these species.

Aquatic Conservation Strategy and Riparian Reserve Standards and Guidelines

The Aquatic Conservation Strategy from the Northwest Forest Plan sets objectives to maintain and restore ecosystem health. It provides an integrated approach to riparian management. Many standards and guidelines apply specifically to riparian areas. Proposed mining and access may retard attainment of the Aquatic Conservation Strategy and not fully meet Riparian Reserve Guidelines.

Wild and Scenic River Eligibility - Outstandingly Remarkable Values

The main stem and North Fork of Rough and Ready Creek was found eligible for Wild and Scenic River status. Botanical, Wildlife, and Geological/Hydrological values were found to be Outstandingly Remarkable (see Eligibility Study in the Analysis Files). Policy requires the Forest Service to protect these Outstandingly Remarkable Values (ORVs) and the potential classification (Wild, Scenic, Recreational) of eligible streams. The Proposed Action and action alternatives may have adverse effects on these ORVs.

Costs of Operations

The various components of the access route have different direct costs. Road construction and reconstruction costs, crossing structures, dust abatement and haul costs are considered.

Economic Viability

Substantial uncertainty exists relative to the economic viability of the project. Nickel prices have fallen world-wide and are predicted to remain depressed for the long term. The Proposed Action is associated with negative Present Net Values.

Effects on Residents

The Proposed Action and its alternatives have adverse impacts particular to people living near the haul route. These effects relate to increased dust and noise, decreased solitude, and increased safety hazards. Effects on water quality could also have impacts specific to local residents. Mitigation included in all action alternatives are intended to minimize adverse effects, but some impacts cannot be avoided.

Visual Quality, Recreation and Interpretive Development

The Proposed Action may degrade scenic quality of the analysis area by developing roads and a stockpile site within direct view of Highway 199, the Rough and Ready Botanical Wayside and the BLM Area of Critical Environmental Concern. The Proposed Action may reduce the area's value as an interpretive site. Improvement and use of low standard roads may affect people who use them as hiking trails or increase the number of people using the area.

Roadless Character

The Proposed Action includes some road development within an inventoried roadless area. Much of the Rough and Ready watershed is isolated from human intrusion. Some people value the isolated character of the area. Roads can bring in unwanted traffic and lead to adverse environmental impacts (most of which are also addressed within other issues).

OTHER ISSUES

Many other issues were brought up during scoping. These issues either did not lead to potential significant effects or could not be analyzed within the scope of this EIS. Brief discussions about these other issues are included in Chapter Four.

CHAPTER TWO

ALTERNATIVES INCLUDING THE PROPOSED ACTION

ALTERNATIVE DEVELOPMENT PROCESS

The Proposed Action represents the Plan of Operations submitted by Nicore. The alternatives were developed to resolve the social and environmental issues associated with the proposal, while still meeting the Purpose and Need. Chapter Two describes the Proposed Action, No Action, and Alternatives 6, 7, 8, 9, 10 and 11, including maps. Alternative 9 is the Preferred Alternative. Chapter Two also discusses alternatives that were considered but not fully analyzed. Mitigation and monitoring requirements common to all action alternatives are discussed. Finally, Chapter Two contains a comparison of the alternatives in terms of the key indicators for the issues described in Chapter One.

PROPOSED ACTION (Plan of Operations as Proposed by the Mine Claimant)

The Proposed Action would approve the Plan of Operations as submitted by the claimant. Road access would be approved to Sites A, B, C and D. The operation would extract nickel laterite from four deposits located in Section 22, Section 8, Section 11, and Section 16 of T.40 N., R.9 W., Willamette Meridian. The areas to be mined total about 35 acres. Specific elements of the Proposed Action include:

Mining Operation

1. Each excavation site would be cleared of all organic material and topsoil (about 12 inches of soil and organic material would be set aside and stored at the mine site for use in reclamation).
2. The highest grade laterite would be excavated, screened, and loaded on trucks. Oversize material (rocks larger than 1 inch that do not pass the screen) would be returned to the bottom of the pit. Typically the oversize material would range between 40% and 60% of the volume. The average depth of the laterite is about 12 feet.
3. About 3.1 acres per year would be mined over a 10 year period.
4. The primary equipment on site would be a 2 cu. yd. excavator, mobile screening unit, dozer, and a 5 cu. yd. front end loader. Support equipment would include personnel transport and other service trucks and maintenance equipment. A fuel storage, transportation, and spill plan would be part of the final Plan of Operations.
5. The operating period would be confined to daylight hours during the dry time of year, generally between June 15 and Oct. 15.

Haul Route

1. The haul route is shown in the *Proposed Action Map (Figure 2)*. The map is accompanied by a legend that applies to maps for the Proposed Action and all alternatives. The total haul route would include 14.3 miles. About 7.7 miles of road would be reconstructed (widened and surfaced) and about 0.55 miles of road (0.25 miles to Mine Site B and 0.3 miles between Crossing 3 and 4) would be constructed. The existing road up "Alberg Cr."¹⁰ would be reconstructed, along with portions of all other access roads. Road design criteria are summarized here; detailed road specifications are in the Road Access Documentation Memo in the Analysis files.

*Road grades would not exceed 25% except a few short pitches (200 feet or less) that may be up to 30%.

*Where feasible, water bars and/or cross ditches would be "built in" for grades greater than 10%. Some annual stormproofing would also be required.

*Road surfaces would be outsloped except on flats or on the route to Site B. The 4400-445 road to Site B would be insloped and would require drainage control structures.

*Borrow material would be required to fill and widen some sections of the access route (roads would be designed with a 12 foot running surface). The source of this material has not been determined, but could be waste material from crushing rock surfacing (more discussion on rock surfacing is in 2. below).

*J-holes (small turnouts) would be constructed to allow safe passage of traffic.

2. Maintenance work such as water bars, spot rockling, minor cutbank sloughs, and minor washout repair throughout the haul route would be accomplished by the miner. Rock used for road surfacing would be free of Port-Orford-cedar root disease and noxious weeds. The rock is likely to come from a source on public land within the analysis area. Any rock source, whether within or outside the analysis area, would have to be approved by the FS and BLM, and may require additional analysis before final approval.

3. The ore haul route would cross the main stem Rough and Ready Creek 6 times and would involve 10 perennial tributary crossings. All crossings would utilize washed rock fords. The rock would be carried away during high flow each winter, and new rock would be added after June 15 the next year. A year-round culvert would be placed in the "Wing and Farren" ditch.

4. The haul trucks would be 25 ton off-highway articulated dump trucks with "rough terrain" capability and a tight turning radius suitable for use on low standard roads.

5. The estimated production rate would result in approximately 3,390 round trips annually.

¹⁰"Alberg Cr." refers to the unnamed tributary that Road 437 follows.

Ore Stockpiling

The screened laterite material would be hauled to a 5 to 10 acre area on Bureau of Land Management (BLM) lands in Section 18. The ore would be stockpiled at this site (the site would be designed to accommodate between 25,000 and 40,000 tons of ore, based on two figures provided by the proponent). The ore would be dried and eventually transported to a smelter. Highway vehicles would be used to transport the ore.

Reclamation

Under the Proposed Action, about 12 inches of topsoil and organic material would be spread back over the oversized rock in the pits. The average final grade of the reclaimed pits would be about 6 feet lower than the original grade. To keep the disturbed but un-reclaimed area to a minimum, site reclamation would be kept current with the operation so no more than five acres would be open at any one time. Reclamation work would be accomplished annually prior to the winter wet season.

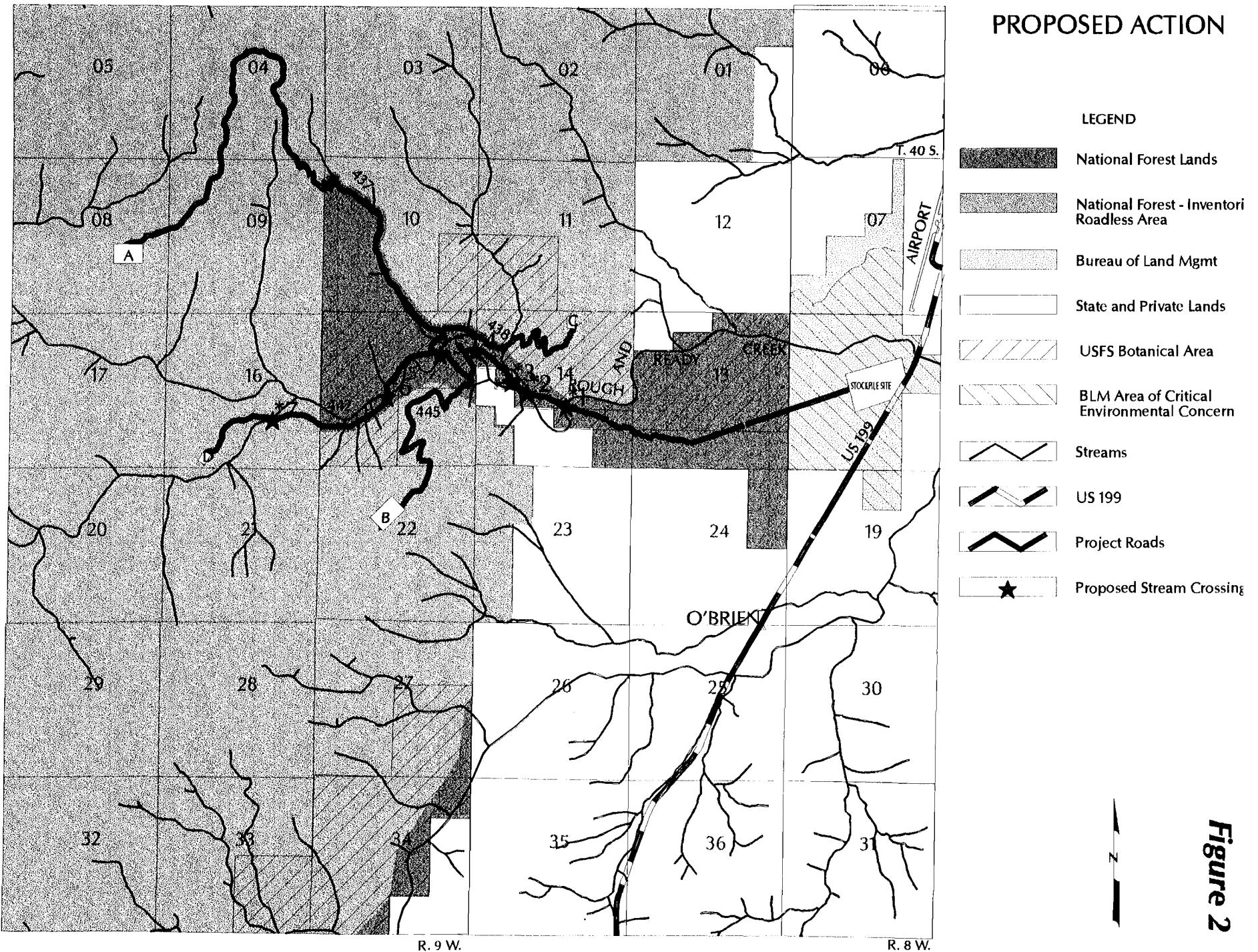


Figure 2

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Several alternatives considered during this analysis were subsequently dropped from detailed study.

Alternatives 1-5 from the Draft Environmental Impact Statement (DEIS)

Several alternatives considered in the DEIS were eliminated from detailed study, and replaced with the Alternatives Considered herein. Some components of Alternatives 1, 3, 4 and 5 were undesirable or did not effectively resolve issues:

Use of Alberg Route: DEIS Alternatives 1 and 5 utilized the Alberg route to access site A. This route would result in significant impacts to the Alberg Creek Riparian Reserve. These Alternatives would have rebuilt some of the road, and placed it away from the creek, but would still require several stream crossings and would traverse a talus slope. The ridge route better meets Standards and Guidelines and is now included in Alternatives to the Proposed Action that develop Site A.

Use of Culverts and Fill at Rough and Ready Crossings: DEIS Alternatives 1, 3, and 4 utilized culverts at Crossings #1-#7. This crossing design would have facilitated fish passage but would have resulted in greater risks to Sediment Delivery, Hazardous Fluid Spills, and PETS Fish than seasonal bridges. Culverts at Crossings #1-#7 are not proposed in any SDEIS alternative.¹¹ Other elements of DEIS Alternatives 1-5 were carried forward.

An Alternative that would withdraw the some or all of Rough and Ready Creek watershed from mineral entry.

Several commenters have suggested/demanded mineral withdrawal of some or all the South Kalmiopsis Roadless Area. This action is being considered by the FS and BLM. Federal agencies may apply for administrative withdrawals given a wide range of “public purposes”¹². The FS and/or BLM could recommend withdrawal based on the area’s environmental sensitivity. However, such a recommendation would not meet the Purpose and Need for Action¹³ as stated in Chapter One, and would be outside the scope of project level analysis. A withdrawal would not affect valid, existing claims. A mining claim is assumed valid until otherwise proven. Therefore, analysis of the proposed Plan of Operation would still be required in the near term. Details about the withdrawal and validity examination process are in the analysis files.

¹¹Culverts are proposed for other tributary crossings in Alternatives 6-11.

¹²See BLM manual supplement 2310 and FS manual 2700-90-1. The BLM is responsible for processing all withdrawal requests.

¹³Purpose - to determine reasonable mitigation, Need - to respond to a claimant’s Plan of Operations.

An Alternative that would recommend that the Rough and Ready Watershed be made into a National Conservation Area, a Designated Special Research Area, a Port-Orford-cedar Sanctuary or the Redrock Rainforest National Monument.

Many of the letters requesting mineral withdrawal also recommended that the Rough and Ready Watershed (or South Kalmiopsis Roadless Area) be made into a National Conservation Area or other designation. These recommendation are beyond the scope of this analysis and would not meet the Purpose and Need for Action. Congress would be responsible for taking this type of action.

An Alternative that requires mineral examinations to prove the validity of the claims prior to approving a Plan of Operations

Many people (including some members of Congress - see Appendix B) suggested the Agencies challenge the validity of the mining claims covered in the Plan of Operations. They requested that mineral examinations be completed prior to approving any Plan of Operations. The Forest Service does not initiate a mineral examination unless the locator proposes to conduct mining in an area that has been withdrawn from mining or as part of the patent process. The claims covered in the proposed Plan of Operations would be examined if the moratorium on processing patent applications was lifted. The range of alternatives is satisfied with No Action representing an alternative that does not approve any mining and future mineral examination possible as part of the patent process. Alternative 9 requires more information be generated before full scale mining or road development is approved. The suggested alternative was not developed since it is not consistent with Forest Service policy and No Action and Alternative 9 would have similar impacts.

An Alternative that considers helicopter ore haul for full scale mining

An alternative that eliminates all road improvement and requires access from the air for full scale mining (400,000 tons) was considered but eliminated from detailed study. Such an alternative would be extremely expensive to implement and may be tantamount to denial of access. This SDEIS fully considers Alternative 9, which approves limited sampling (up to 5,000 tons of ore could be removed using helicopters) without significant road improvement.

An Alternative that “buys out” the claims

Some people suggested that the agencies purchase the claims. Such an alternative would not meet the Purpose and Need as described in Chapter One.

An Alternative that would import off-site fill and/or soil to assure revegetation of mine pits

Use of off-site materials (fill and topsoil) to assure revegetation of mine pits was considered. Potential adverse effects of use of such materials are likely to be greater than the benefits of using them. Import of soil could require more round trips along the access route and attendant crossings of Rough and Ready Creek. Imported material would have an increased risk of spread of noxious weeds or non-native vegetation.

An Alternative that would close roads within the Analysis Area

An Alternative that would close roads within the Analysis Area

Closure of all or most roads on federal lands in the Analysis Area was proposed by some members of the public. The EIS acknowledges that some existing roads do not currently meet all proposed Road Management Objectives (RMOs). Many low-standard roads in the area were constructed for minerals access and are not safe for public travel. However, consideration of the long term need for these roads is dependent on what alternative is selected in the Nicore EIS, and future needs. Given these needs, roads may be improved, treated or closed, under a separate analysis that focuses on watershed restoration. A Botanical Area Management Plan is in the works and is likely to contain some decisions about access.

An Alternative that would address watershed restoration needs without mining

Some members of the public believe the Nicore EIS would be an appropriate vehicle to decide on restoration projects that would occur without any Plan of Operations approved. Such an alternative does not meet the Purpose and Need. The selection of any alternative (including No Action) does not preclude future actions taken to maintain or restore the watershed.

An Alternative that would analyze mining claims outside than the 35 acres proposed

Some people suggested that this EIS analyze an alternative that would approve mining on other, more accessible claims held by the mine proponent. The mining proponent has not indicated specific interest in mining areas outside of the deposits shown in Figure 13, all of which have similar access requirements. The alternatives already considered provide a full range of access options from helicopter sampling to four miles of road construction and six miles of reconstruction.

An Alternative that would require the stockpile site to be placed off of federal lands, or outside of the Area of Critical Environmental Concern

The stockpile site contemplated in Alternatives 6 though 11 are along the haul route on mining claims owned by the mine claimant. Stockpiling is an acceptable use of the mining claims at this location. The site selection and other stipulations effectively resolves issues related to stockpiling (see Mitigation discussion in this Chapter).

An Alternative that uses cable (tram) access from Mine Site C to avoid stream crossings.

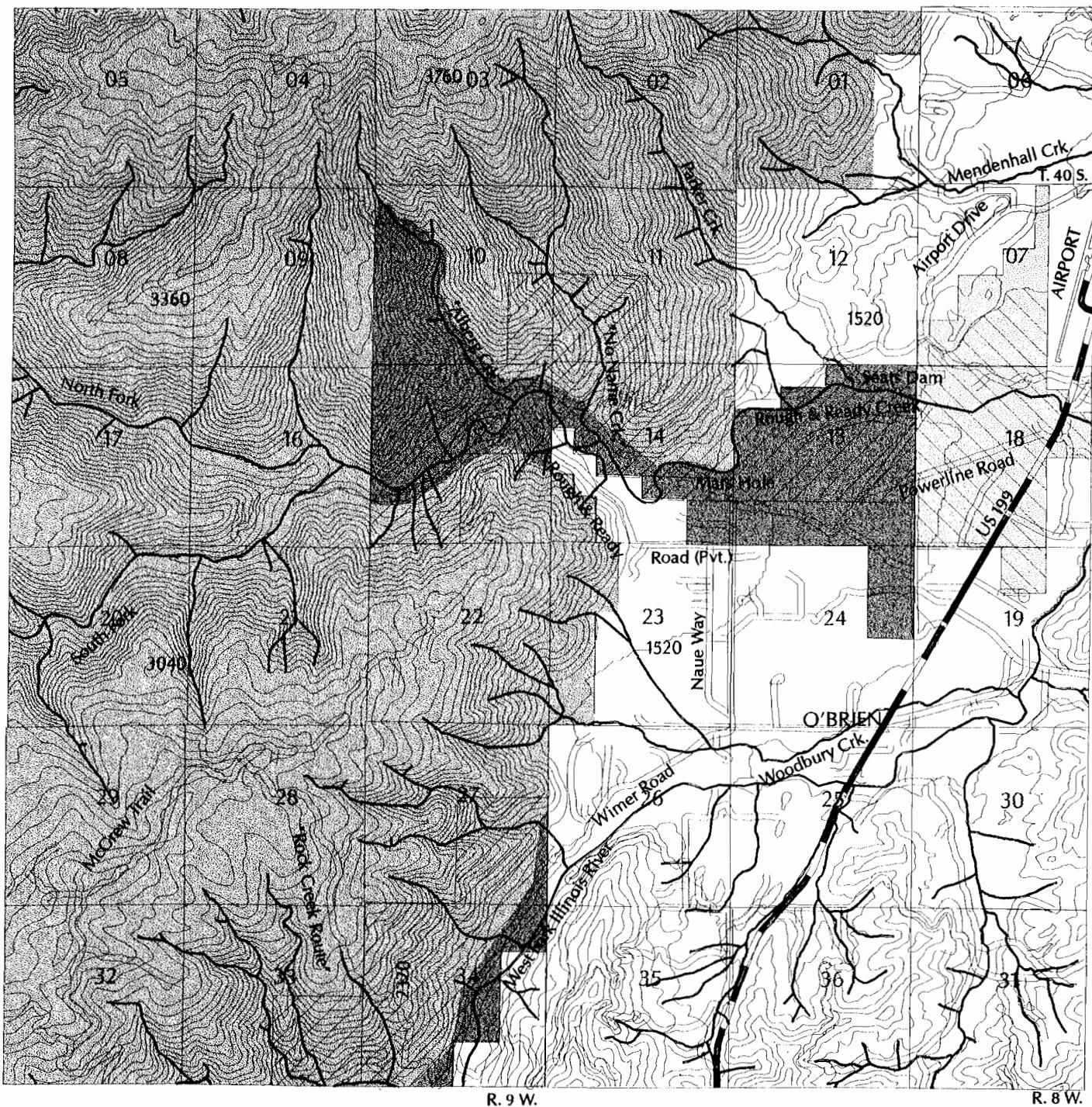
This alternative was not considered because the economical and operational feasibility of cable ore haul is uncertain. Alternatives 10 and 11 use a cable system to avoid several miles of roads within riparian reserves, multiple stream crossings, and several rare plant sites. Site C can be accessed with one stream crossing. The feasibility of the cable system to C has not been studied, but is certain to be extremely expensive. The Preferred Alternative 9 completely avoids stream crossings.

Sequencing of Activities

Some people suggested that mining impacts could be minimized by requiring that ore be removed from each sample site and the roads closed prior to work on the next site. This option was not developed because the miner has stated that, at least in the initial phase of the operation, ore must be sampled from all sites so a prototype processing operation can be developed (November 1993 POO modification memo in analysis files). Completion of each site before entering the next would reduce the impacts of road use and would likely be more cost-effective than operating at multiple sites concurrently. The Proposed Action and all alternatives do require reclamation be completed annually. No more than five acres would be unreclaimed at any one time. Roads would be stormproofed annually in full mining alternatives.

NO ACTION

The No Action alternative would not approve the Nicore Plan of Operations. Roads would not be constructed, reconstructed, or maintained. *Figure 3 shows the existing mapped roads within the analysis area.* The Forest Service has proposed Road Management Objectives for many of these roads (road management objectives are summarized in Chapter Three with further information in the Analysis Files). Treatments to meet these objectives would not occur under this decision, but would be considered as a part of regular Forest Service watershed restoration program. Chapters Three and Four, and the Summary of Environmental Effects later in this Chapter provide more detail about the conditions that would continue under the No Action Alternative.



NO ACTION EXISTING CONDITION

LEGEND

- National Forest Lands
- National Forest - Inventoried Roadless Area
- Bureau of Land Mgmt
- State and Private Lands
- USFS Botanical Area
- BLM Area of Critical Environmental Concern
- Streams
- US 199
- Existing Roads
- Contour Lines

Scale: 1:53356

Figure 3

MITIGATION INCLUDED IN ALTERNATIVES TO THE PROPOSED ACTION

Alternatives 6 through 11 would include the following mitigation to minimize adverse effects and meet laws, regulations, standards and guidelines:

PERMITS

Goal: To assure all appropriate agency permits are in place before mining operations begin.

All necessary permits would be obtained from applicable state, federal, or other agencies prior to beginning operations annually. Permits that may be required include (but are not limited to):

- a) Oregon Department of Environmental Quality (DEQ) - National Pollutant Discharge Elimination System Permit;
- b) Oregon Department of Environmental Quality - Water Pollution Control Facility Permit;
- c) Oregon Department of Environmental Quality - Crushing/Screening Permit
- d) Oregon Division of State Lands - General Authorization Permit;
- e) Oregon Division of State Lands - Removal/Fill Permit;
- f) Oregon Department of Geology and Mineral Industries Operating Permit
- g) Oregon State Water Master Permit to Withdraw Water from Rough and Ready Creek (for use in dust abatement and other road activities).
- h) Oregon Department of Transportation Permit for Highway 199 Access.

Not all permits would necessarily be required for all alternatives.

Cost: The costs of these permits ranges between \$2,000 and \$10,000 the first year, with additional fees (less than \$1,000) required annually. The Oregon Department of Environmental Quality - National Pollutant Discharge Elimination System Permit (DEQ-NPDES) could bring the cost up to \$10,000 if an individual permit is necessary. It would cost closer to \$2,000 if a general permit would suffice. This decision is not made until the miner submits a permit application to DEQ.

Effectiveness: The proponent is responsible for obtaining all necessary permits and alerting Agencies prior to annual start-up. Obtaining a permit does not necessarily mean an operator would comply with stipulations in the permit. Routine and random inspections and monitoring reports are necessary to assure compliance.

PROCESSING FACILITY

Goal: To reduce the potential for unnecessary damage to surface resources.

Under all alternatives, no Plan of Operations would be approved without a processing facility identified and any further analysis required is completed. Under Alternative 9, a test plant would have to be built, or other processing facility identified, prior to POO approval.

Cost: No immediate cost. Cost of future analysis to approve the Plan of Operations would depend on the facility proposed.

Effectiveness: Highly effective way to eliminate surface disturbance before a processing facility is identified. Some uncertainty in the economic viability of the Proposed Action and all the alternatives would be mitigated by evidence that a processing facility exists that would handle the ore in the amounts proposed.

RECLAMATION

Goal: To assure disturbance of mine and stockpile sites are minimized, and to assure that roads are treated properly when they are no longer needed for mining. A reclamation plan detailing *how* reclamation would be accomplished is a required part of the Plan of Operations and must be completed prior to final approval. Reclamation objectives include:

a) *Reclamation Bond:* A reclamation bond would be required in all action alternatives. If the operator fails to meet requirements, the bond would cover costs related to annual and/or final reclamation of the mine sites, stockpile site, and project roads.

Cost: Estimated as \$50,000, developed by the Oregon Department of Geology and Mineral Industries along with the FS and BLM.

Effectiveness: A bond is a highly effective way to assure that the reclamation is accomplished in a timely manner.

b) *Drainage and erosion control at the stockpile and mine sites:* Geophysical technical modeling (contracted by the proponent) for slope stability is recommended in alternatives that include pit development at Mine Site D. Reclamation of the mining pits is not expected to include extensive re-contouring (thus disturbing surrounding lands). The topography at the reclaimed pits would be required to be uneven to reduce risk of erosion. The top foot of soil at all mine sites would be set aside and used to provide a growing medium for native plants. For all mining sites and the stockpile site, the proponent would be required to contract with a Certified Engineer to design drainage an exit point that is armored and does not drain toward any streams or unstable slopes. Reclamation of all disturbed mine sites would occur during each year's operating season.

Cost: Approximately \$10,000.

Effectiveness: Mine pits are likely to remain as depressions. Erosion associated with the pits is not likely to exceed a few yards per year. Rainwater may saturate the soil/rock in the pits at some times of the year.

c) Restoration of native vegetation at mine sites and stockpile site: Natural regeneration is expected to occur over time.¹⁴ Regeneration is unlikely to be hastened significantly, but some seeding and planting could help short-term restoration. Native seed would be required for revegetation (seed would come from areas at or near the mine and stockpile sites and would have to be collected the year before they are spread).¹⁵ Soil amendments (mulch, fertilizer) may be recommended on a small scale. Some planting may be required, but in quantities are expected to be small. Minimum disturbance would be emphasized in all alternatives.

Specific revegetation prescriptions would be developed by knowledgeable plant resource specialists and would respond to post-mining/stockpiling conditions. Prescriptions would be subject to FS and BLM approval. Non-motorized or helicopter access may be required to plant or scatter seeds on reclaimed mine sites during the off-season (September or October 15 to June 15). The stockpile site may require mechanical treatment for compaction prior to revegetation. Any vegetation cleared at mine sites or along roads would be retained for later use in reclamation (cut vegetation would be placed on top of the ground to supply nutrients and achieve erosion control).

Cost: Seed collection and scattering is estimated to cost about \$500/acre.

Effectiveness: Complete restoration of vegetation at the mine pits and stockpile site is not expected in the short term. Natural revegetation is likely to occur on the most favorable sites; with some sites more difficult to reclaim. Natural regeneration of disturbed mine sites has been observed.

d) Stormproofing and erosion control along the haul route: Detailed annual maintenance and stormproofing guidelines, including the use of drainage dips and waterbars, are in the analysis files. Vegetation removed during road, mine or stockpile site development may be used for road development activities, as approved by the FS and BLM. Annual and final reclamation could include requiring earthen barriers and ripping the first quarter mile of the road surface to eliminate future road use. Vegetation removed in operations (mine pit, stockpile site, road development) may also be used for erosion control on roads. During storms, when water is actually running on the road surface, all haul would be suspended to reduce sedimentation.

Road Management Objectives (RMOs - further discussion elsewhere in the FEIS) for National Forest roads were reviewed as part of the project analysis. The project area is largely inaccessible due to road condition, fords not maintained, and a gate on the private road. The objective for many roads would eliminate motorized vehicles except when specifically approved for mining access. Treatments on roads approved for mining access would be funded by the miner. Treatments on roads not included in approved Plan of Operations would likely be funded through the Forest Service watershed restoration program.

¹⁴Previously disturbed areas show a range of conditions, some areas have literally no evidence of natural revegetation, others have sparse populations of herbaceous species and small trees.

¹⁵FS policy for the Pacific Northwest states that to the extent practicable, seeds and plants used in erosion control...and other vegetation projects shall originate from genetically local sources of native plants. Further guidance is given in the Siskiyou National Forest Plan Minerals Standard and Guideline 10-7, which requires use of natural vegetation in restoration.

Cost: The cost of annual road stormproofing and closure is estimated as \$200/mile.

Effectiveness: Stormproofing is an effective method of reducing sedimentation from roads. Road closures can reduce or eliminate traffic but are sometimes breached. Earthen barriers and ripping road entries are very effective closure methods. Access would continue to be limited by the high flows, since crossing structures would be removed annually.

e) Clean-up of Mine and Stockpile Sites: All work areas would be kept clean at all times. Refuse would be regularly removed from federal lands. The operator would contact the Agencies immediately prior to seasonal shutdown and before equipment removal to allow for site inspection and annual reclamation measures (36 CFR 228.10).

Cost: Regular clean up is part of the operating costs displayed in Chapter Four. The reclamation bond is expected to be sufficient to remove all equipment, supplies, refuse, etc. from federal lands.

Effectiveness: Very effective, since compliance is mandatory under an approved Plan of Operations.

ORE STOCKPILING

Goal: To ensure that stockpile site meets criteria set by the BLM.

An alternative stockpile site is proposed for Alternatives 6-11. This site is:

- a) outside riparian reserves (to meet Northwest Forest Plan Guideline MM-2);
- b) hidden from Botanical Wayside, proposed Interpretive Trail viewpoints and Hwy 199;
- c) avoids special status plants and unique habitats (site has been previously disturbed);
- d) limited to 10 acres (Alternative 9 would require about 10 acres for helicopter operations; other sites would likely not exceed 5 acres).
- e) no more than 40,000 tons of ore would be stockpiled at any one time.
- f) piles would be covered by a canvas cloth to prevent erosion.
- g) stockpile site would be designed for grade and drainage control.

The power line route between Highway 199 and the alternative stockpile site (about 0.75 miles) would be improved to accommodate highway-legal haul vehicles in all action alternatives (including 9). Some improvement at the intersection of the power line and the Highway would be expected.

A temporary Watchman's Quarters would be approved as needed to provide security at the stockpile site. Adequate sanitation facilities would also be required. For Alternative 9, at least part of the stockpile site would be over 100 yards from the power line and designed to accommodate helicopter operations, including clearing of approaches. The helicopter most likely would be serviced, housed and fueled at the Illinois Valley Airport, although the stockpile site could also be used.

Cost: Some of the costs to develop the stockpile site are part of the cost of operations discussed in Chapter Four. However, vegetation clearing costs were not included and could exceed \$500 per acre.

Effectiveness: The alternative stockpile site is an appropriate use of BLM lands, given an Approved Mining Plan of Operations.

ROAD CONSTRUCTION, RECONSTRUCTION, and IMPROVEMENT

Goal: To assure roads are safe for intended uses and are designed to minimize adverse effects.

Road specifications are summarized previously in the description of the Proposed Action and are detailed in the Road Access Documentation in Appendix K. Road development would be designed to meet all BLM and FS standards, including Road Management guidelines in the Northwest Forest Plan.¹⁶ The following Best Management Practices would be incorporated into all aspects of road work and project design. Some of the BMPs listed address topics that are also discussed throughout this EIS.

- M-2. Administering Terms of BLM Permits or Leases**
 - R-1. General Guidelines for the Location and Design of Roads**
 - R-2. Erosion Control Plan**
 - R-3. Timing of Construction Activities**
 - R-4. Road Slope Stabilization (Planning)**
 - R-5. Road Slope and Waste Area Stabilization (Preventive)**
 - R-6. Dispersion of Subsurface Drainage Associated with Roads**
 - R-7. Control of Surface Road Drainage Associated with Roads**
 - R-8. Constraints Related to Pioneer Road Construction**
 - R-9. Timely Erosion Control Measures on Incomplete Roads and Stream Crossing Projects.**
 - R-10. Construction of Stable Embankments (Fills)**
 - R-11. Control of Sidecast Material**
 - R-12. Control of Construction in Streamside Management Units**
 - R-13. Diversion of Flows Around Construction Sites**
 - R-14. Bridge and Culvert Installation**
 - R-15. Disposal of Right-of-Way and Roadside Debris**
 - R-17. Water Source Development Consistent With Water Quality Protection**
 - R-18. Maintenance of Roads**
 - R-19. Road Surface Treatment to Prevent Loss of Materials**
 - R-20. Traffic Control During Wet Periods**
 - R-22. Restoration of Borrow Pits and Quarries**
 - R-23. Obliteration of Temporary Roads and Landings**
- W-3. Protection of Wetlands**
- W-4. Oil and Hazardous Substance Spill Contingency Plan and Spill Prevention Control & Countermeasure (SPCC) Plan**
- W-6. Control of Activities Under Special Use Permit**
- W-7. Water Quality Monitoring**
- W-8. Management by Closure to Use (Seasonal, Temporary, and Permanent)**
- M-1. Water Resources Protection on Locatable Minerals Operations**
- VM-3. Revegetation of Surface Disturbed Areas**

¹⁶Some alternatives do not meet ALL aspects of the Standards and Guidelines. See Chapter Four Analysis regarding the Aquatic Conservation Strategy and Riparian Reserve Standards and Guidelines for more information.

Rock needed for road development (generally surfacing) would come from sources free of Port-Orford-cedar root disease and weeds. Rock native to the vicinity would be preferred. Rock would be subject to approval by the Agencies. Within the analysis area there are three sites on BLM and one site on private lands suitable for use in road development (these are indicated on a map in the analysis file and described in the Road Access Documentation in Appendix K).

Mitigation to reduce rock fall into Rough and Ready Creek from Bench Road Construction would include rock blankets to reduce airborne fragments during blasting, log cribs to catch rock fall, and special drilling and loading of powder to reduce overall movement and airborne fragments.

Cost: Cost of road development varies by alternative and is displayed in Chapter Four.

Effectiveness: Adherence to road development specifications can be tightly administrated and is a mandatory part of any authorized Plan of Operations. For each BMP, a detailed description, estimate of effectiveness and monitoring recommendations are in the analysis files. Methods to reduce rock fall have proven very effective on other projects.

FUEL TRANSPORTATION, STORAGE AND SPILL PLAN

Goal: To assure safe fuel storage and transportation. To clarify procedures in the event of an fuel or other hazardous material spill, to protect water quality and human health.

All alternatives require a Fuel Transportation, Storage and Spill Contingency Plan as part of the approved Plan of Operations. The proponent would be responsible for preparing an adequate plan that meets all regulations. The plan would describe the equipment needed on site for sponging up or limited flow of spills in waterways. Communications in each vehicle would be planned to assure quick response to spills. Holding areas would be designed for storage of petroleum products if 660 gallon containers (or larger) are used. Best Management Practices W-4 mentioned above provide additional guidance for the spill plan.

Cost: The cost of prevention is minuscule compared to the cost of a clean-up. The reclamation bond is expected to cover clean-up costs in the event of a spill.

Effectiveness: Adherence to the Plan of Operations, including fuel transportation and storage and spill planning, is mandatory. The operator can be shut down for non-compliance and the reclamation bond used to clean up any spills.

POR-ORFORD-CEDAR ROOT DISEASE CONTAINMENT

Goal: To reduce the risk of introduction of Port-Orford-cedar root disease from operations.

All action alternatives would include a Port-Orford-Cedar (POC) Root Disease Containment Strategy, aimed at reducing the risk of introduction of root disease into the project area. These actions are guided by Siskiyou National Forest Management Goals, Standard and Guidelines (see S&G 12-8), and the Aquatic Conservation Strategy Objectives 8 and 9. Disease control measures considered include:

- a wash station equipped with high pressure water equal to or greater than 125 psi through a quarter inch nozzle and adequate drainage. The wash station may as far away as in Cave Junction.
- equipment would have to be washed before operations begin or if the equipment works elsewhere and returns mid-season
- Water used for washing vehicles would come from a clean source (as defined by the Forest Service/BLM) or would be treated with clorox.
- Road construction, improvement and haul would be done during the dry season (June 15 through October 15 - work on the north side of Rough and Ready Creek would not occur after September 15 except under the Proposed Action and Alternative 11). No wet season operation. Suspend haul during dry season storms if roads become muddy.
- Road specifications would establish and maintain an inslope road template and berms to prevent downslope flow (as topography and site conditions allow).
- Clean sources of rock would be required for road surfacing (as defined by the Agencies).
- Road improvement specifications consider adding rock to wet spots.
- Where possible, coordinate prevention and disease control activities with adjacent landowners and Agencies.
- Roadside Sanitation of POC (Removing POC from within 25 feet of roads)
- Lifting and paving of the roadway 50 feet on either side of infested areas near the West Fork Illinois River (applies only to Alternative 10).

A specific containment strategy for the Preferred Alternative 9 is Appendix J.

Cost: Costs would be in the thousands of dollars to implement the disease control strategy for any alternative.

Effectiveness: The Disease Control Strategy is based on the best available research, however effectiveness of the any one of the disease control strategies is uncertain. A range-wide study of Port-Orford-cedar and disease control strategies is underway and would include information about effectiveness of the treatments. These treatments, used in combination and with consistency, should effectively reduce the risk of introducing the disease from this operation. However, there would be a remaining risk regardless of alternative selected.

RESTRICTIONS ON ROAD USE

Goal: To provide for worker and public safety and reduce risk of resource damage.

Project access roads would be gated to restrict vehicular traffic. Specific gate locations would be established by the Forest Service. Motorized access beyond the closures would be restricted to mining operations and administration. Motorized access to the north side of Rough and Ready Creek would be prohibited between September 15 and June 15 annually in all Alternatives except for 9 and 11. Alternatives 9 and 11 would allow access until October 15.

Alternative 9 would also require restrictions on non-motorized use of affected areas during helicopter operations. The proponent would be required to assure that the public is aware of the closures and remain out of the area (flaggers at popular spots such as the road to Mars Swimming Hole would likely be required).

For all alternatives, stop signs, speed limits, dust abatement, or other traffic control methods may be employed. The proponent would be required to submit an annual road safety plan, subject to Forest Service and BLM approval. Vehicles used on county and state roads would be required to meet all laws and regulations. Communications between ore haul vehicles (CB radio, for instance) would be desirable.

Cost: Costs for gates are displayed in Chapter Four. During helicopter operations, additional costs would be incurred to notify and stop people from entering the area.

Effectiveness: Moderate. Closures certainly reduce traffic, but sometimes can be breached. Location, design, monitoring and administration of the closures are keys to effectiveness. Administration of traffic control during operations is likely to be effective.

NOISE CONTROL

Goal: To assure that noise generated from the mining operation does not exceed state thresholds.

Operations (including mining, ore haul, helicopter use, stockpile operations) would be limited to the hours of 7AM and 7PM, excluding Sundays and holidays, when no operations would be approved. The operator would be responsible to establish a baseline for ambient noise levels, and to monitor noise generated from the project to assure that applicable state standards are met. Vehicles used on county and state roads would be required to be entirely highway legal in terms of weight, size, noise emission and other applicable state standards. Helicopters would remain at least 1000 feet (vertical and horizontal distances) from any residences.

Cost: Very low.

Effectiveness: Limits on operating periods and vehicles are easy to administrate.

DUST ABATEMENT

Goal: To provide for traffic safety and air quality and reduce visual impacts.

Dust abatement would be required on portions of the haul route, mine sites, and stockpile site. Several methods of dust abatement may be approved (see Road Access Documentation in the project file). Any dust abatement method would have to meet all federal and state laws and would be subject to Forest Service and BLM approval.

Cost: The cost of dust abatement is estimated in the cost of operations displayed in Chapter Four.

Effectiveness: High. Dust abatement is commonly used in Forest operations.

FISHERIES

Goal: To assure fish migration is not impeded by the operation, and assure that state and federal recommendations regarding in-stream activities are met.

Seasonal bridges at major crossings and seasonal culverts at smaller tributaries are key components within most alternatives (see Alternative discussions and Figure 11, Alternative Comparison Chart). Seasonal bridges would be designed to facilitate salmonid migration. Seasonal bridges and/or culverts would be placed in creeks on or after June 15 and removed by September 15 annually, per in-stream work restrictions recommended by the Oregon Department of Fish and Wildlife and the National Marine Fisheries Service. Crossing construction material, including fill, would be stockpiled during the off-season out of the high water channel in a location approved by the Forest Service. Crossings #2, #3, and #4 would be eliminated.

Cost: The cost of removal and replacement of crossing structures is part of the Cost of Operations displayed in Chapter Four. Elimination of three crossings proposed in the Plan of Operations submitted by the miner would reduce crossing costs, but would require road construction (see Chapter Four for comparisons between alternatives). Reducing the operating season by one month per year would not cost more money per se, but might require more ore haul trucks or personnel to meet production goals during the operating season.

Effectiveness: High. Limits on operating season are easy to enforce.

SENSITIVE PLANTS, UNUSUAL HABITATS AND NOXIOUS WEEDS

Goal: Reduce impacts on PETS plant species.

To the extent possible, sensitive plants and unusual habitats (including unoccupied habitat for *Arabis macdonaldiana*) would be avoided in final road location and mine pit design. Off-road vehicle use would not be approved. Equipment would be restricted to specified locations. Rock and soil removed in road construction or reconstruction activities would be piled on existing roads or other specified areas; this material may be used to backfill mine pits. Tailings or other material would not be piled on rare plant areas (these would be flagged by FS or BLM personnel prior to ground disturbance).

Bulbs of *Calochortus howellii* that may be affected by the proposal would be harvested and replanted at a suitable location. Direct impacts on fens would be avoided.

The proponent would also be responsible for noxious weed control at the mine sites, stockpile site, and along the haul route. Risk of noxious weed introduction would be reduced through the POC Root Disease mitigation described previously; vehicle and equipment washing prior to entering the area, and weed free rock would be required in road improvement.

Scotch broom growing along the Wimer road should be removed (cooperation with the county and private land owners would be necessary) to prevent spread of this species to the Oregon Mountain Botanical Area, the access road to mining site B, and the Rough and Ready Creek watershed.

Cost: Cost of road improvement is discussed in Chapter Four. Cost of *calochortus* replanting is expected to cost less than \$1000. Cost of noxious weed eradication would vary depending on how well prevention strategies were implemented.

Effectiveness: Direct impacts to fens are likely to be avoided. Some rare plants and their habitat would be disturbed in all action alternatives (see Chapter Four for details). Mine administration would assure that off-road vehicle use does not occur during the operating season and that materials are piled in appropriated places.

Noxious weed control is best achieved through prevention. Once noxious weeds are established, they are difficult to control. Some risk of noxious weed introduction would remain regardless of how well prevention methods are applied. The effectiveness of transplanting *calochortus* bulbs is unknown and was suggested by a prominent botanist (Dr. Frank Lang).

SANITATION FACILITIES

Goal: To protect worker safety and water quality.

Adequate sanitation facilities would be required at all work sites. The proponent would prepare a sanitation plan subject to FS and BLM approval as part of the final Plan of Operations.

Cost: Sanitation needs area not expected to exceed \$5000.

Effectiveness: Very effective.

MONITORING

Environmental monitoring programs that meet the requirements of all permitting agencies would be implemented as part of any action alternative and would be developed prior to final project approval and would be part of the final Plan of Operations. Monitoring programs would be designed to quantify and measure environmental impacts accompanying construction, operation, reclamation and post-closure condition of the analysis area, with reference to pre-operational data obtained during baseline monitoring. Impacts that result in violations of regulatory stipulations would require changes in the way the project is implemented, including additional mitigating measures.

The proponent would be required to submit an annual report detailing monitoring data, interpretation and changes indicated by the monitoring results. However, if a regulatory threshold is exceeded, it must be brought to the attention of all appropriate agencies within 30-days (unless a shorter time frame is indicated through regulations, such as a hazardous substance spill).

Monitoring would also be achieved through random or routine inspections by permitting agencies. The operator may be required to fund monitoring by the agencies (or an impartial third party), particularly if monitoring results reported by the miner do not match results reported by the agencies.

At a minimum, monitoring would consist of the following elements:

Adherence to Plan Of Operations

The operator would be responsible for daily inspections and reports regarding adherence to stipulations in the Plan of Operations. The permitting agencies would also provide regular and random inspections.

Water Quality

Surface Water Chemistry: Surface water was sampled and analyzed by the United States Geological Survey (USGS - summarized in Chapter Three, full report in the analysis files). This data can be used as a baseline for comparison for samples taken during and following operations.

Stream Temperature: Stream temperature monitoring is an ongoing Forest Service activity (contingent on funding). The agencies are expected to continue to do this monitoring.

Ground Water Chemistry: The Forest Service has sampled several springs downslope of Mine Site B to provide baseline data to compare to samples taken during and following operations. The operator would also be responsible for obtaining well samples within the analysis area pre- and post- operations.

Accidental Spills: The approved monitoring plan would provide for effects analysis following any accidental spill.

Fisheries

Baseline data for fish habitat condition, species present, population size and distribution has been established through stream surveys, which currently are on an 8 to 10 year survey interval, contingent on funding. Federal and state agencies are expected to continue the stream survey program.

Port-Orford-cedar

The operator would be required to report any incidence of dead or dying Port-Orford-cedar within the mine and stockpiles sites and along the haul routes. Adherence to the POC Root Disease Containment Strategy would be a requirement of the Plan of Operations. Daily and random inspections would occur to assure requirements are met. POC monitoring would also occur Forest-wide as part of the regular Forest monitoring program.

Noxious Weeds

The operator would be required to report any incidence of noxious weeds within the mine and stockpiles sites and along the haul routes. Noxious weed eradication would follow any reports.

Sensitive Plants

The presence, distribution, and abundance of sensitive plants along the haul route would be surveyed on a regular (multi-year interval) basis. Long-term plots may be established to determine effects on individuals or groups of individuals deemed prone to disturbance.

Effects on Residents

Ambient and operation generated noise levels would be measured and recorded before and during operations. Noise levels and operating times of "equipment, facilities, operations and activities" would be reported as per OAR-34-035 (3) and (4). The requirement for such monitoring can be suspended when compliance is demonstrated to the satisfaction of the administering Forest Service Officer.

Air Quality

An air quality monitoring station has been established near the analysis area at the Illinois Valley Airport. Oregon Department of Environmental Quality, in cooperation with the Forest Service, provides ongoing data collection from the monitoring station.

Wildlife

Sightings of any PETS wildlife species should be reported to the District Wildlife Biologist (the miner would be provided with a list of PETS species). Macro-invertebrate sampling would be required for all alternatives that include road haul.

ACTION ALTERNATIVES CONSIDERED

ALTERNATIVE 6 - Private Road, Ridge Route, Seasonal Bridges

Alternative 6 would approve road access to Sites A, B, C and D. It would require the mine claimant to make a reasonable effort to secure access via the existing private road¹⁷. Mine Site A would be accessed via the Ridge Route (The Ridge Route is 3.5 miles new construction). *Figure 4 shows the Alternative 6 haul route.* For the purposes of this analysis, the private road would be widened and paved to mitigate for noise, dust, and safety.¹⁸ Use of the existing private road would eliminate the need for four crossings of the main stem of Rough and Ready Creek. Seasonal bridges would be required at Crossings #5, #6, and #7. Culverts would be placed at two tributary crossings; these would be removed and replaced annually. A year-round culvert would be placed at the National Forest boundary just beyond the Rough and Ready Creek road.

¹⁷If access cannot be secured by the claimant, the FS would be required to provide access via federal land.

¹⁸The Forest Service may choose an alternative that requires the claimant to attempt to secure access through the private land, but does not have the authority to regulate the road design criteria.

Alternative 6 would require approximately 3.8 miles new road construction and 6.1 miles reconstruction.¹⁹ Total haul route is about 15.5 miles. The entire haul route would be designed to accommodate street legal haul vehicles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 6. It would approve the alternative stockpile site.

ALTERNATIVE 7 - Bench Road Construction, Ridge Route, Seasonal Bridges

Alternative 7 would provide road access to Sites A, B, C and D. It would construct 0.4 miles of road construction on the north side of Rough and Ready Creek. This road would require full bench construction through a steep peridotite rock outcrop. Mine Site A would be accessed via the Ridge Route. The haul route to Sites B and D are otherwise the same as the Proposed Action. Seasonal bridges would be required at Crossings #1 #5, #6, and #7. Culverts would be placed at two tributary crossings. These would be removed and replaced annually. A year-round culvert would be placed at the Wing and Farren ditch. *Figure 5 shows the Alternative 7 haul route.*

Alternative 7 would require approximately 4.2 miles new road construction and 5.5 miles reconstruction. Total haul route is about 15.4 miles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 7. It would approve the alternative stockpile site.

ALTERNATIVE 8 - Bench Road Construction, Ridge Route, Seasonal Bridges, No "D"

Alternative 8 would approve road access to Sites A, B, and C but would eliminate access to site D. It would construct 0.4 miles of new road on the north side of Rough and Ready Creek. This road would require full bench construction through a steep peridotite rock outcrop. Mine Site A would be accessed via the Ridge Route. The haul route to Site B is otherwise the same as the Proposed Action. Seasonal bridges would be required at Crossings #1 and #5. Culverts would be placed at two tributary crossings. These would be removed and replaced annually. A year-round culvert would be placed at the Wing and Farren ditch. *Figure 6 shows the Alternative 8 haul route.*

Alternative 8 would require approximately 4.2 miles new road construction and 4.9 miles reconstruction.²⁰ Total haul route is about 13.3 miles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 8. It would approve the alternative stockpile site.

¹⁹Miles of road construction in Alternatives 6, 7 and 8 have increased since the SDEIS because the 1.6 mile stretch of the Mendenhall Fireline is no longer considered an existing road. Miles of reconstruction have been reduced by 1.6 miles to account for this change.

²⁰Miles of road construction in Alternatives 6, 7 and 8 have increased since the SDEIS because the 1.6 mile stretch of the Mendenhall Fireline is not considered an existing road. Miles of reconstruction have been reduced by 1.6 miles to account for this change.

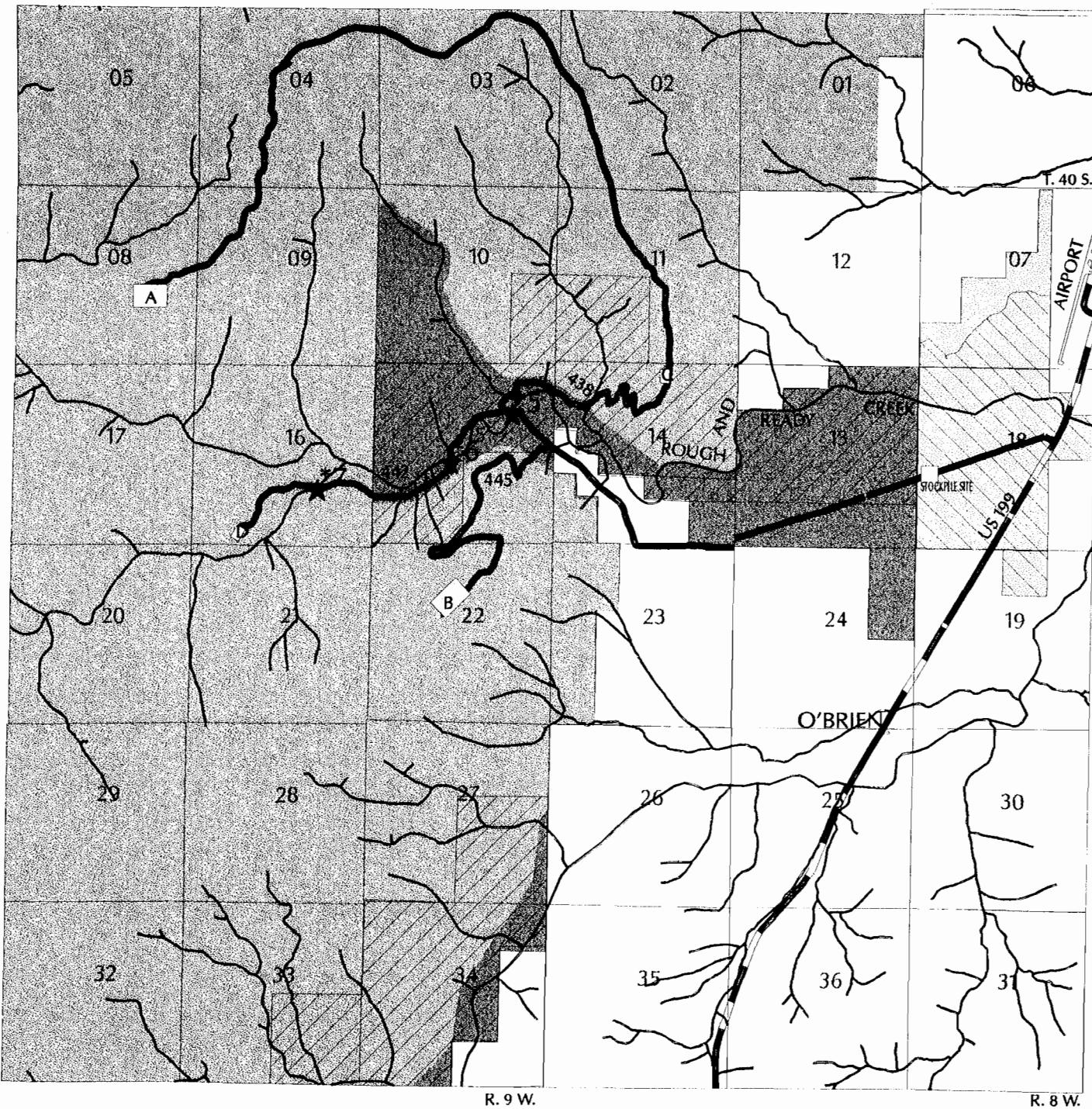
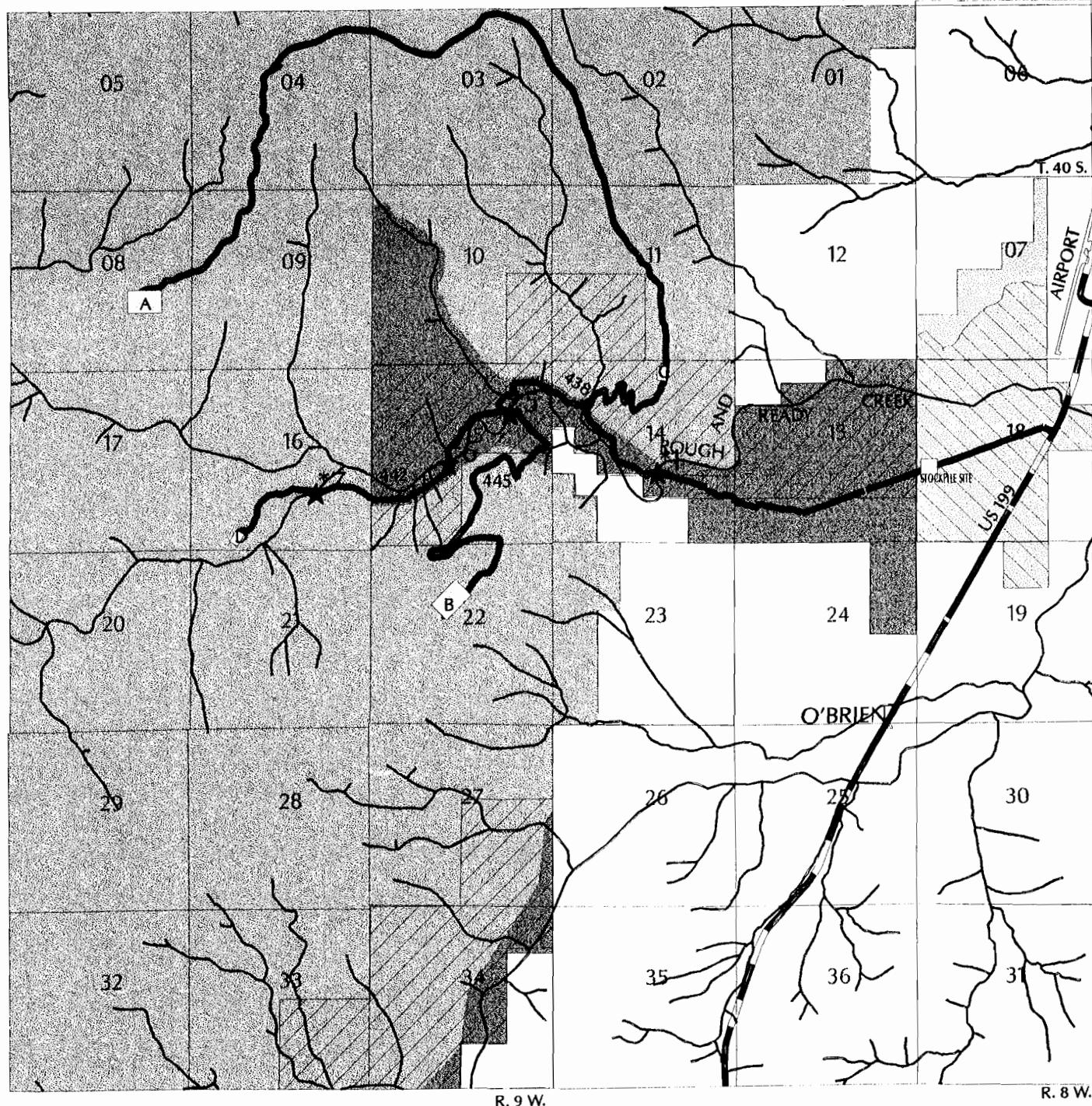


Figure 4

ALTERNATIVE 7

Bench, Ridge, Bridge



LEGEND

- | | |
|--|---|
| | National Forest Lands |
| | National Forest - Inventoried Roadless Area |
| | Bureau of Land Mgmt |
| | State and Private Lands |
| | USFS Botanical Area |
| | BLM Area of Critical Environmental Concern |
| | Streams |
| | US 199 |
| | Project Roads |
| | Proposed Stream Crossing |



Figure 5

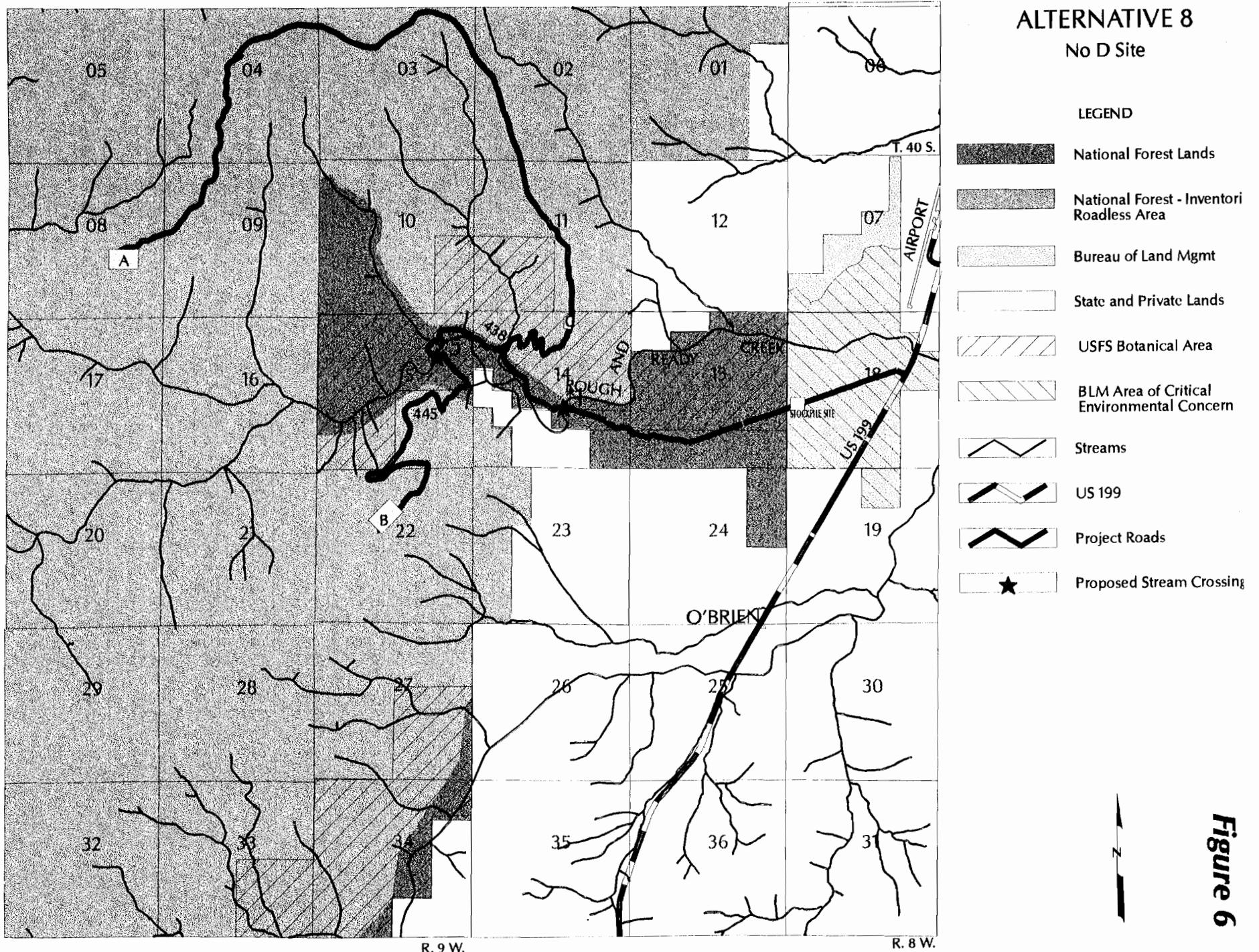


Figure 6

ALTERNATIVE 9 - PREFERRED - Limited Road Access, Helicopter Sampling

Alternative 9 would allow sampling of mine sites A, B, C, and/or D. This alternative would require Nicore to sample 5,000 tons of ore from the mine sites. Sampled ore would be hauled in helicopter buckets. Figure 7 shows the amount ore from each mine site, the number of trips and total time required to haul that ore, the number of trips estimated to haul equipment, and the number of trips estimated to haul personnel for each site. All totaled, about 124 hours of flight time would be required to haul 5,000 tons of ore and other trips.

	Mine Site A	Mine Site B	Mine Site C	Mine Site D
Area Mined	0.2 Acres (about 8700 sq feet)	0.2 Acres (about 8700 sq feet)	0.03 Acres (about 1360 sq feet)	0.03 Acres (about 1360 sq feet)
Tonnage of Ore	2,143	2,143	357	357
Flight Time - Hours to Haul	60.33	44.48	3.73	9.07
Number of Trips to Haul	286	286	48	48
Additional Trips (Equipment and Personnel)	15	13	8	10

Figure 7. Information related to Helicopter Sample Sites Proposed in Alternative 9.

No significant road improvement would be approved. The miner could walk tracked vehicles (such as a backhoe) to Mine Site B up Road 461 ("the Rock Creek Road), however equipment would have to be flown to the other mine sites. The Rock Creek road would not be approved for daily travel with personnel vehicles. No stream crossings for any vehicle would be approved.

Sampling would be limited to approved sites where surveys have determined that PETS and Survey and Manage Species can be avoided. All of the mine sites have been previously sampled, and this alternative would limit disturbance to previously sampled areas. The mine pits themselves would disturb less than one acre total (approximately 0.2 acres per mine site).

Alternative 9 would require the miner to sample and process some ore to resolve the economic and operational uncertainties associated with the project, without incurring the environmental degradation associated with road development and use.²¹ Nicore would be given five years to stockpile and process the ore (a test plant would have to be identified before any Sampling Plan of Operations would be approved). Five years is expected to provide adequate time to resolve plan uncertainties.

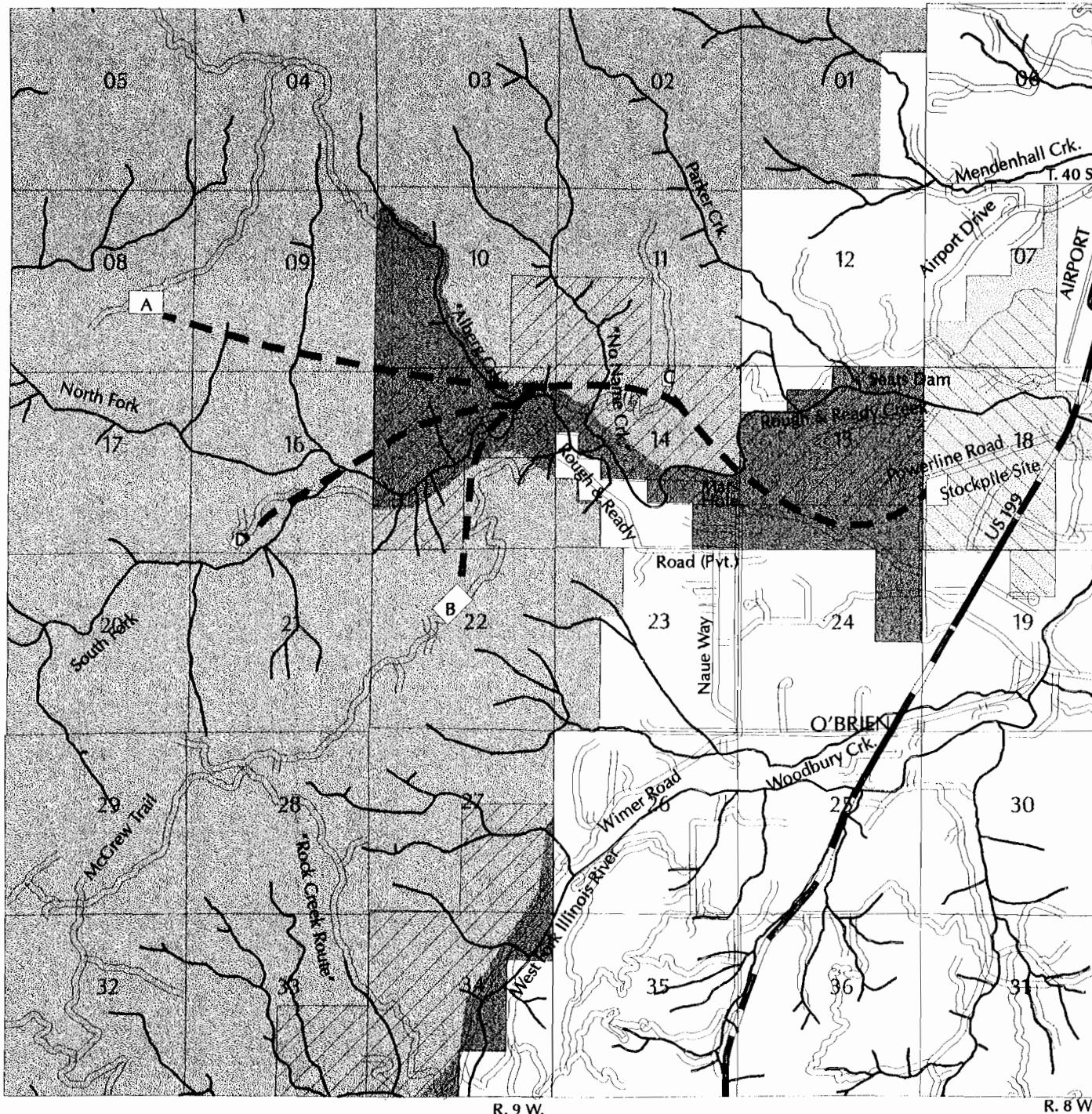
²¹Uncertainties about the project are documented throughout this EIS. The Surface Use Determination is in Appendix C.

Once the miner completed the sampling, he could submit a new Plan of Operations, with additional economic and operational analysis based on the findings of the sample processing.²² That plan would be subject to appropriate environmental analysis (information in this EIS would be used and supplemented as needed).

The alternative stockpile site would be used. The stockpile and mine sites would be designed for helicopter maneuver (bucket loading/unloading). The stockpile site would need to be larger in this alternative than in alternatives that haul ore by truck. A minimum of 12 acres would be required for the stockpile site under Alternative 9. A preliminary design showing the basic lay-out of the site was prepared by the BLM and is in the Analysis Files. Several trees would have to be cut to make the area safe for helicopter operations. The BLM has reviewed the area and believes it is an appropriate use the site. The BLM would fulfill all legal survey requirements prior to any ground disturbance. The Illinois Valley Airport could also be used for helicopter servicing, which may reduce the acreage to be cleared at the stockpile site. The powerline road between 199 and the stockpile site would be improved to facilitate moving ore to an unknown location.

Figure 8 shows the vicinity of the sample sites, the stockpile site proposed for Alternative 9, and the flight path between the sample sites and the stockpile site.

²²Appendix E discusses the requirements to be met with the sample and lists the information that would need to be included in a future full-scale mining proposal.



ALTERNATIVE 9 HELICOPTER SAMPLES

LEGEND

- National Forest Lands
- National Forest - Inventoried Roadless Area
- Bureau of Land Mgmt
- State and Private Lands
- USFS Botanical Area
- BLM Area of Critical Environmental Concern
- Streams
- US 199
- Existing Roads
- Flight Routes

Scale: 1:53356

Figure 8

ALTERNATIVE 10 - Rock Creek Road, Cable Site “D”, Bench Road Construction, Seasonal Bridges, No Site “A”

Alternative 10 would approve road access to Sites B and C (one Seasonal Bridge would be placed at Crossing #1). Road access to Sites A would not be approved. Access to Site B would be approved via the Wimer Road (4402), Rock Creek Road (461), and Road 445 from the south. Ore could be removed from Mine Site D, but Road 442 would not be approved for ore haul. Instead, a mile-long new road would be constructed to a cable landing in Section 21, about $\frac{1}{2}$ mile due south of the mine site. Ore would be cabled to the landing, then hauled out by trucks via the 445 Road. All routes south of Rough and Ready Creek would be built to accommodate highway legal vehicles to avoid the need for a reload site at the junction of 4402 and 461. Mining equipment (tracked vehicles) could be walked into Site D (see No Action - Existing Condition Map, Figure 3), but the road and stream crossings would not be further developed. Mine Site C would be accessed via the Bench Road. A year-round culvert would be placed at the Wing and Farren ditch. *Figure 9 shows the Alternative 10 haul route.*

Alternative 10 would require approximately 1.4 miles new road construction and 8.8 miles reconstruction. Total haul route is about 14.3 miles. Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 10. It would approve the alternative stockpile site.

ALTERNATIVE 11 - Private Road, Cable Site “D”, Year-Round Bridge, No Site “A”

Alternative 11 would approve road access to Sites B and C (a year-round bridge would be placed at Crossing #5). Road access to Site A would not be approved. Ore could be removed from Mine Site D, but Road 442 would not be approved for ore haul. Instead, a mile-long new road would be constructed to a cable landing in Section 21, about $\frac{1}{2}$ mile due south of the mine site. Ore would be cabled to the landing, then hauled north, out the 445 road. Mining equipment (tracked vehicles) could be walked into Site D using existing routes (see No Action - Existing Condition Map, Figure 3), but the road and stream crossings would not be further developed. A year-round culvert would be placed at the National Forest boundary just beyond the Rough and Ready Creek road. No other tributary crossings would be necessary. *Figure 10 shows the Alternative 11 haul route.*

Alternative 11 would require approximately about 1.25 miles new road construction and 6.0 miles reconstruction. Total haul route is about 9.6 miles.

Mitigation described in the Proposed Action and additional mitigation included for all action alternatives would apply to Alternative 11. It would approve the alternative stockpile site.

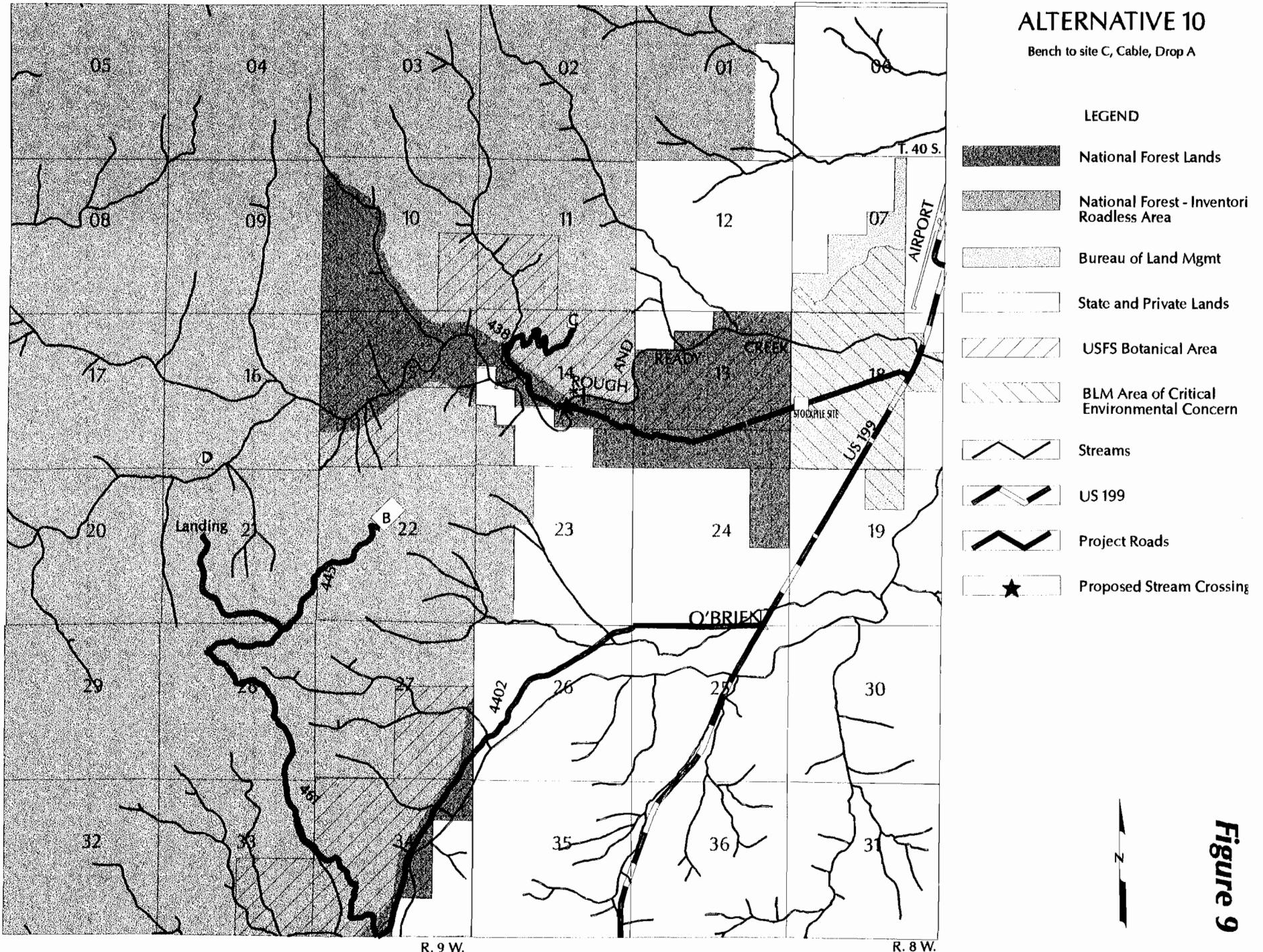


Figure 9

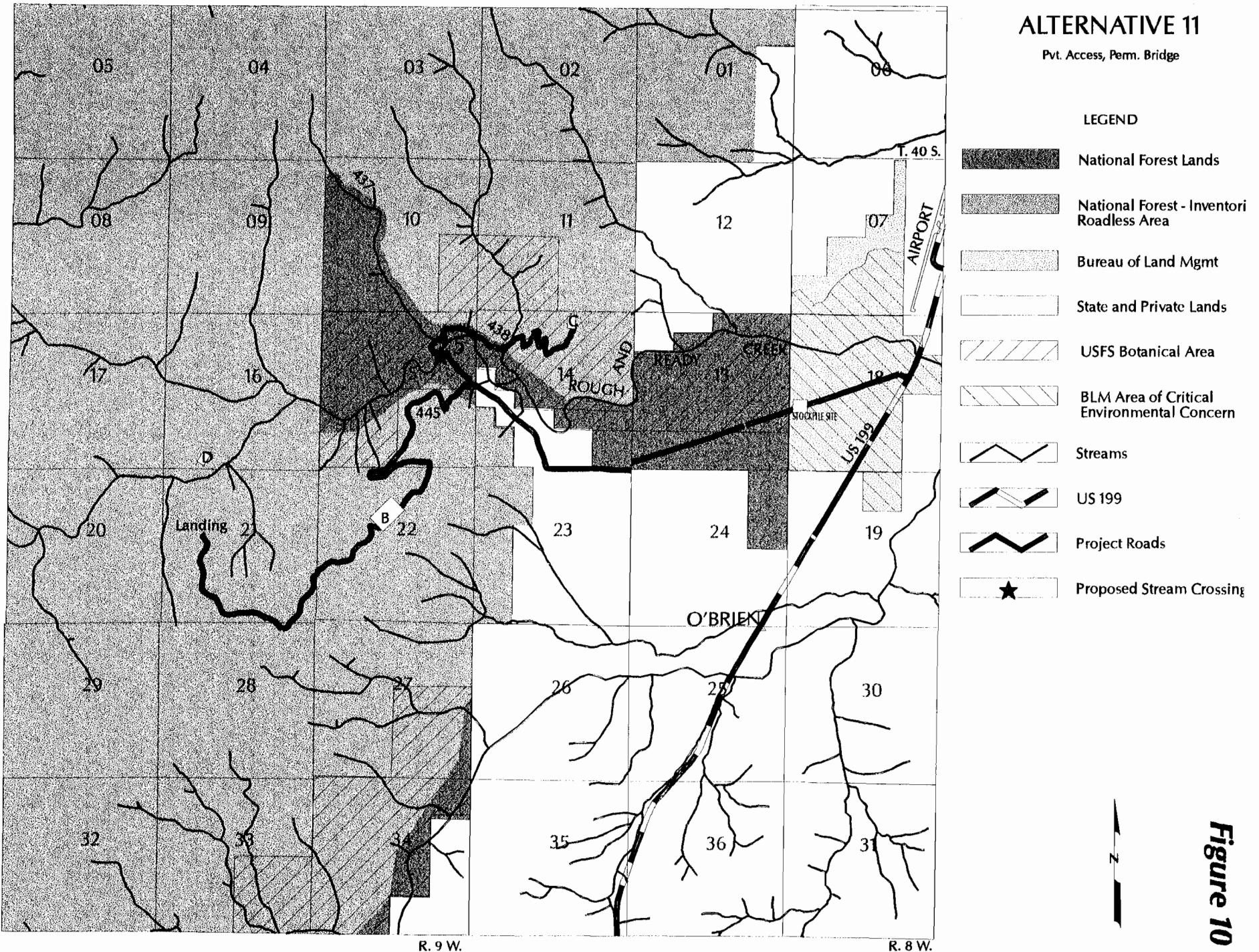


Figure 10

ALTERNATIVES COMPARED

Figure 11 below compares the components of the Proposed Action and its alternatives.

	ALTERNATIVES							
	PA	NA	6	7	8	9	10	11
Mine Site A Access	Alberg Route	Existing Alberg Route currently impassable ²³	Ridge Route	same as Alt. 6	same as Alt. 6	Helicopter	no	no
Mine Site B Access	0.25 miles construction up 445 Road	Existing routes are currently impassable in spots	same as PA	same as PA	same as PA	Tracked vehicles only, via Rock Creek Route	Rock Creek Route	same as PA
Mine Site C Access	Existing 438 Road	Existing route currently inaccessible due to impassable fords.	same as PA	same as PA	same as PA	Helicopter	same as PA	same as PA
Mine Site D Access	Existing 442 Road	Existing 442 road currently inaccessible due to impassable fords.	same as PA	same as PA	no	Helicopter	1 mi. new road to cable landing	same as Alt. 10
Bench Road Construction	no	no	no	yes	yes	no	yes	no
Utilizes Rough and Ready Cr. Private Road	no	private route	yes	no	no	no	no	yes
Utilizes Wimer Road/ Rock Creek Route	no	Rock Creek route currently impassable	no	no	no	limited trips, very minor road work	yes	no
Crossing 1	ford	no	no	seasonal bridge	seasonal bridge	no	seasonal bridge	no
Crossings 2, 3, 4	ford	no	no	no	no	no	no	no

²³ Routes considered "currently impassable" have places that currently cannot be crossed with pickup trucks.

	ALTERNATIVES							
	PA	NA	6	7	8	9	10	11
Crossing 5	ford	existing ford currently impassable	seasonal bridge	seasonal bridge	seasonal bridge	no	no	permanent bridge
Crossing 6, 7	ford	existing fords currently impassable	seasonal bridge	seasonal bridge	no	no	no	no
Total Miles of Road Construction	0.55	0	3.8	4.2	4.2	0	1.4	1.25
Total Miles of Road Reconstruction	7.70	0	6.1	5.5	4.9	Minor repair Rock Cr Route	8.8	6.0
Stockpile Site	on powerline near Hwy 199	no	on powerline Near FS Boundary	same as Alt. 6	same as Alt. 6	same as Alt 6, but enlarged to 10 acres	same as Alt. 6	same as Alt. 6
Miles Haul Route	14.3	0	15.5	15.4	13.3	0	14.3	9.6

Figure 11. Alternative Comparison Chart

COMPARISON OF ENVIRONMENTAL IMPACTS

The environmental impacts of the Proposed Action and its alternatives are summarized and compared in the discussions below. The analytical basis for these conclusions are in Chapters Three and Four and in the Specialist Reports in the Analysis Files.

Proposed Action

Soil Productivity: The Proposed Action would result in about 83 acres of total disturbance (pit development plus roads).

Slope Stability: The Proposed Action includes Mine Site D, the one site at risk of failure.

Erosion and Sediment: The Proposed Action is predicted to produce 193 cubic yds of sediment from road development and use.

Stream Crossings: The Proposed Action is associated with seven major low-water fords, and nine tributary crossings. About 585 cubic yards of sediment may be delivered to Rough and Ready Creek from the crossings.

Stream Flow and Water Temperature: Implementation of the Proposed Action could lead to the withdrawal of over 40,000 gallons of water each day for dust abatement, given appropriate water rights. This is about 1.5 percent of Rough and Ready Creek's low flow. Resulting temperature increases are not expected to be measurable, but the trend would be toward warmer water due to water withdrawal. Temperature could also increase due to fords and potential disruption of through-flow channels near Crossing #3.

Nickel Concentrations in the Water: The Proposed Action has less new road construction and equal road surfacing requirements as compared to Alternatives 6 and 7. Slight increases are possible but are unlikely to affect public health.

Hazardous Material Spill: The Proposed Action is associated with a greater risk of hazardous material spill than all the alternatives because it has the greatest number of stream crossings and is associated with an estimated 3,390 round trips per year. The overall risk of such a spill is thought to be low.

Proposed, Endangered, Threatened, and Sensitive Fish: The Proposed Action would be associated with a "likely to adversely affect" finding on coho, cutthroat, chinook and steelhead. Eleven factors or indicators would be degraded in the Matrix of Factors and Indicators including water temperature, habitat access, sediment, off-channel habitat, streambank condition, floodplain connectivity, road density, human disturbance, riparian reserves, erosion rates and harassment or incidental take.

Port-Orford-cedar: The Proposed Action crosses Rough and Ready Creek several times and includes two or more routes across the No Name Fan area where there are some large POC. It would also reconstruct the existing Alberg Road, which contains notable POC stocking. The risk is somewhat reduced by limiting operations to the dry season, although no provisions for gating roads are now part of the Plan of Operations. The risk would be highest when roads were wet but passable.

Noxious Weeds: The Proposed Action is associated with the highest risk of introduction and spread of noxious weeds into the project area. It would locate a stockpile site near a known star thistle population and would not adequately limit the spread of these weeds.

PETS Plants and Botanical Diversity: The Proposed Action may impact 15 PETS plant species along the haul route. *Arabis Macdonaldiana*, listed as endangered under the Endangered Species Act, would be affected by this haul route. The Proposed Action would construct 0.3 miles of road in the Rough and Ready Botanical Area with the haul route traversing 3.8 miles within the botanical area and 0.75 miles within the BLM ACEC.

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: The Proposed Action would not meet all elements of the Aquatic Conservation Strategy (ACS) or all the Riparian Reserve Standards and Guidelines. About 4.6 miles of road development in Riparian Reserves, the high number of stream crossings and their design, and use of the Alberg Route are some of the reasons the Proposed Action would not be consistent with the ACS.

Wild and Scenic River Eligibility: The Proposed Action may degrade the current highest potential classification (scenic) in the vicinity of six main stem stream crossings. It is likely to degrade the botanical ORV.

Operating Costs: Road development under the Proposed Action would cost about \$683,000. Haul costs would exceed \$2 million. Dust abatement would cost about \$310,000.

Economics: The Proposed Action is associated with a -\$10.1 million present net value and a cost benefit to cost ratio of 0.58. Economic viability is uncertain.

Effects on Residents: The Proposed Action haul route is at least 400 feet from any residence, and the closest mine site is 0.5 miles away. People who cherish solitude would likely be disturbed by increased traffic and activity in the area. All legal requirements related to air and water quality, dust, noise and safety would be met. Property values are expected to increase.

Visual Quality, Recreation and Interpretive Development: The Proposed Action would degrade visual quality by developing and using roads. User conflicts would increase as areas currently inaccessible with motorized vehicles would be accessible. Views from the planned Botanical Wayside Interpretive Development would be degraded by the stockpile site.

Roadless Character: The roadless character associated with the South Kalmiopsis (SK) area would be degraded by 7 miles of haul roads developed, and 0.25 miles of new construction within the SK.

No Action

Soil Productivity: No pits would be developed or ground disturbed. Current levels of recovery would be expected to continue.

Slope Stability: No Action does not include Mine Site D.

Erosion and Sediment: No Action would not include any new road development, and erosion from existing sources would continue.

Stream Crossings: No new stream crossings would be developed. Three low-water fords (Crossings #5, #6 and #7) exist but are currently impassable with pickups due to the presence of large boulders.

Stream Flow and Water Temperature: No decreases in low flow or increases in water temperature are expected.

Nickel Concentrations in the Water: The concentration of nickel ranges from 11 to 36 parts per billion in samples taken from Rough and Ready Creek, and ranges from 30 to 40 parts per billion in spring samples taken from the O'Brien area. These values exceed Oregon State ambient water standards, but do not pose health risks.

Hazardous Material Spill: No Action is associated with the current very low risk of a spill from existing traffic. It would not incur any increased risk.

Proposed, Endangered, Threatened, and Sensitive Fish: Several factors are currently in a “marginal” or “outside optimum range” category. Current fish habitat conditions would be maintained.

Port-Orford-cedar: The No Action Alternative continues the existing risk of introduction of POC root disease into the analysis area. POC grows along the ditch on the private Rough and Ready Creek road. Residential traffic is likely to import the disease in the foreseeable future. Residents could employ disease control measures such as roadside sanitation to reduce the risk of introduction.

Noxious Weeds: Noxious weeds are a current concern in the project area.

PETS Plants and Botanical Diversity: Roads currently traverse the Rough and Ready and Oregon Mountain Botanical Areas and BLM Area of Critical Environmental Concern (ACEC). No additional risk to PETS plants would occur.

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: Some roads currently contribute sediment to the creek and do not contribute to meeting Aquatic Conservation Strategy guidelines. Otherwise, No Action would be consistent with the ACS and Riparian Reserve Guidelines, as long as it was deemed a legal alternative.

Wild and Scenic River Eligibility: No Action would maintain current classifications and ORVs.

Operating Costs: No Action would not include road development, haul, cable yarding, dust abatement or gate costs.

Economics: No Action has the greatest present net value, which is zero. It also has a benefit to cost-benefit ratio of zero.

Effects on Residents: Residents in the project area enjoy solitude and low ambient noise levels. Dust is a current problem on private land. No Action would not degrade the current quality of life. Property values would be expected to increase.

Visual Quality, Recreation and Interpretive Development: Current conditions would prevail.

Roadless Character: Current roadless character would be maintained. About 60% of the project area is part of the South Kalmiopsis Roadless Area. Several low standard roads currently exist within the Roadless Area.

Alternative 6

Soil Productivity: Alternative 6 has the maximum acreage of pits developed (35) and total ground (pits and roads) disturbed (87 acres).

Slope Stability: Alternative 6 includes Mine Site D, the one site at risk of failure. The Final Plan of Operations would require geophysical modeling and specific design criteria to assess and minimize the risk.

Erosion and Sediment: Alternative 6 is predicted to produce 19 cubic yds of sediment from road development and use.

Stream Crossings: Alternative 6 is associated with three seasonal bridges, and three tributary crossings. About 35 cubic yards of sediment may be delivered to Rough and Ready Creek from the crossings (about 6 percent of the amount estimated for the Proposed Action).

Stream Flow and Water Temperature: Implementation of the Alternative 6 could use about 43,600 gallons of water each day for dust abatement, given appropriate water rights. Removal of water would trend the creek toward warmer temperatures but measurable increases are not expected.

Nickel Concentrations in the Water: Alternative 6 could result in slight increases in nickel delivered to drinking water but increases are unlikely to affect public health.

Hazardous Material Spill: Alternative 6 has similar risk to the Proposed Action; there are far fewer crossings, but it has nearly double the number of round trips, due to smaller ‘highway legal’ vehicles used. The overall risk of such a spill is thought to be low.

Proposed, Endangered, Threatened, and Sensitive Fish: Alternative 6 would be associated with a “likely to adversely affect” finding on coho, cutthroat, chinook and steelhead. Seven factors or indicators would be degraded including sediment, streambank condition, road density, human disturbance, riparian reserves, erosion rates, and incidental take or harassment.

Port-Orford-cedar: Alternative 6 includes a haul route along private Rough and Ready Creek Road, which is a high risk area for introducing the disease. The high number of trips through the private land exacerbates the risk. The crossing of No Name Creek is another risk site. Construction of the ridge road could make access from the north (via Parker Creek) possible during the wet season. A Port-Orford-cedar Root Disease Containment strategy (described previously) would be added to the final Plan of Operations. Paving the private road would reduce the risk. The residents along the private road would be encouraged to implement disease control measures.

Noxious Weeds: Alternative 6 would include mitigation measures to reduce risk of introduction and spread of noxious weeds into the project area. The alternative stockpile site does not contain known populations of noxious weeds.

PETS Plants and Botanical Diversity: Alternative 6 may impact 13 PETS plant species. *Arabis macdonaldiana*, listed as endangered under the Endangered Species Act, would be affected by this haul route. Alternative 6 would traverse 2.9 miles of the Rough and Ready Botanical Area and 0.75 miles of the ACEC. No roads would be constructed within the botanical areas.

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: Alternative 6 better meets the elements of the Aquatic Conservation Strategy (ACS) and Riparian Reserve Standards and Guidelines as compared to the Proposed Action. This route has fewer stream crossings and uses temporary bridges, and is associated with less road development in Riparian Reserves.

Wild and Scenic River Eligibility: Alternative 6 is not likely to degrade the current highest potential classification (scenic) in the vicinity of the access road. Alternative 6 may degrade the botanical ORV.

Operating Costs: Road development under Alternative 6 would cost about \$722,000. Haul costs are about \$2.8 million; about 35% more than the Proposed Action, because smaller trucks would be used, requiring more trips. Dust abatement would cost about \$149,000.

Economics: Alternative 6 is associated with a -\$10.6 million present net value. It has a benefit to cost ratio of 0.57 (similar to the Proposed Action). Economic viability is uncertain.

Effects on Residents: Alternative 6 would have significant effects on 4 residences (dust, noise) within 100 feet of the haul route. The closest mine site is 0.5 miles away from the closest residence. Some of the effects would be mitigated by paving the private road, and requiring smaller trucks (less noisy). The smaller trucks would result in double the number of trips, however. Legal requirements related to air and water quality, dust, noise, safety, and similar concerns would be met as a condition of the Plan of Operations. Assessed value of private properties along the road are likely to increase with road improvements.

Visual Quality, Recreation and Interpretive Development: Alternative 6 would degrade visual quality by developing and using roads. User conflicts would be minimized by closing the area to all but mining-related motorized traffic. The alternative stockpile site would resolve issues with visuals from the Botanical Wayside.

Roadless Character: The roadless character associated with the South Kalmiopsis (SK) area would be degraded by 10 miles of haul roads developed, and 5.4 miles of new construction within the SK.

Alternative 7

Soil Productivity: Alternative 7 has the maximum acreage of pits developed (35) and total ground (pits and roads) disturbed (87 acres).

Slope Stability: Alternative 7 includes Mine Site D, the one site at risk of failure. The Final Plan of Operations would require geophysical modeling and specific design criteria to assess and minimize the risk.

Erosion and Sediment: Alternative 7 is predicted to produce 119 cubic yds of sediment from road development and use.

Stream Crossings: Alternative 7 is associated with four seasonal bridges, and three tributary crossings. About 39 cubic yards of sediment may be delivered to Rough and Ready Creek from the crossings.

Stream Flow and Water Temperature: Implementation of the Alternative 7 could lead to the withdrawal of over 43,000 gallons of water each day for dust abatement, given appropriate water rights. Removal of water would trend the creek toward warmer temperatures but measurable increases are not expected.

Nickel Concentrations in the Water: Alternative 7 could result in slight increases in nickel delivered to drinking water but increases are unlikely to affect public health.

Hazardous Material Spill: Alternative 7 has less risk than the Proposed Action because there are fewer stream crossings. The overall risk of such a spill is thought to be low.

Proposed, Endangered, Threatened, and Sensitive Fish: Alternative 7 would be associated with a “likely to adversely affect” finding on coho, cutthroat, chinook and steelhead. Eight factors or indicators would be degraded in the Matrix of Factors and Indicators including sediment, pool quality, streambank condition, road density, human disturbance, riparian reserves, erosion rates and harassment or incidental take.

Port-Orford-cedar: Alternative 7 is associated with fewer risk factors than the Proposed Action or Alternative 6. Alternative 7 constructs the ridge road, which could make access from the north (via Parker Creek) possible during the wet season. It also includes the crossing of No Name Creek on Road 438. A Port-Orford-cedar Root Disease Containment strategy (described previously) would be added to the final Plan of Operations.

Noxious Weeds: Alternative 7 would include mitigation measures to reduce risk of introduction and spread of noxious weeds into the project area. The alternative stockpile site does not contain known populations of noxious weeds.

PETS Plants and Botanical Diversity: Alternative 6 may impact 15 PETS plant species. *Arabis Macdonaldiana*, listed as endangered under the Endangered Species Act, would be affected by this haul route. The Proposed Action would construct 0.4 miles of roads in the Rough and Ready Botanical Area with the haul route and traverse 3.8 miles within the botanical area. It would also develop 0.75 miles of road in the ACEC.

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: Alternative 7 includes approaches and bridges at four stream crossings and Bench Road construction. These elements do not meet the intent of the Aquatic Conservation Strategy. The design of the bridges would mitigate for concerns about fish passage and sediment delivery.

Wild and Scenic River Eligibility: Alternative 7 may degrade the current highest potential classification (scenic) in the vicinity of the access road. Alternative 7 may degrade the botanical ORV.

Operating Costs: Road development under Alternative 6 would cost about \$693,000 (similar to the Proposed Action). Haul costs are estimated as about \$2.2 million; 7% more than the Proposed Action, because the haul route is longer. Dust abatement would cost about \$222,000.

Economics: Alternative 7 is associated with a -\$10.2 million present net value. It has a benefit to cost ratio of 0.57, similar to Alternative 6 and the Proposed Action. Economic viability is uncertain.

Effects on Residents: Alternative 7 would have effects similar to the Proposed Action.

Visual Quality, Recreation and Interpretive Development: Alternative 7 would degrade visual quality by developing and using roads. The Bench Road would degrade the view for some people living on Rough and Ready Creek Road. User conflicts would be minimized by closing the area to all but mining-related motorized traffic. The alternative stockpile site would resolve issues with visuals from the Botanical Wayside.

Roadless Character: The roadless character associated with the South Kalmiopsis (SK) area would be degraded by 10 miles of haul roads developed, and 4.2 miles of new construction within the SK.

Alternative 8

Soil Productivity: Alternative 8 has slightly fewer acres of pits developed (33) and less total ground (pits and roads) disturbed (73 acres).

Slope Stability: Alternative 8 avoids risk of mining Site D. No other risk to slope stability are predicted.

Erosion and Sediment: Alternative 8 is predicted to produce 100 cubic yds of sediment from development and use of the Bench Road.

Stream Crossings: Alternative 8 is associated with two seasonal bridges, and two tributary crossings. About 16 cubic yards of sediment may be delivered to Rough and Ready Creek from the crossings (about 3 percent of the amount estimated for the Proposed Action).

Stream Flow and Water Temperature: Implementation of the Alternative 8 could lead to the withdrawal of about 37,500 gallons of water each day for dust abatement, given appropriate water rights. Removal of water would trend the creek toward warmer temperatures but measurable increases are not expected.

Nickel Concentrations in the Water: Alternative 8 could result in slight increases in nickel delivered to drinking water but increases are unlikely to affect public health. It is associated with less roading than Alternative 7 and the Proposed Action.

Hazardous Material Spill: Alternative 8 has less risk than the Proposed Action; there are far fewer crossings and fewer trips. The overall risk of such a spill is thought to be low.

Proposed, Endangered, Threatened, and Sensitive Fish: Alternative 8 would be associated with a "likely to adversely affect" finding on coho, cutthroat, chinook and steelhead. Eight factors or indicators would be degraded including sediment, streambank condition, pool character and quality road density, human disturbance, riparian reserves, erosion rates, and incidental take or harassment.

Port-Orford-cedar: Alternative 8 is associated with risk similar to Alternative 7. The road to Site D would be eliminated, but that route does not have significant populations of POC.

Noxious Weeds: Alternative 8 would include mitigation measures to reduce risk of introduction and spread of noxious weeds into the project area. The alternative stockpile site does not contain known populations of noxious weeds.

PETS Plants and Botanical Diversity: Alternative 8 may impact 15 PETS plant species, but would impact fewer sites than Alternative 7 (there are about 30 plant sites on the road to Mining Site D).

Arabis macdonaldiana, listed as endangered under the Endangered Species Act, would be affected by this haul route. The Proposed Action would construct 0.4 miles of roads in the Rough and Ready Botanical Area with the haul route traversing 2.8 miles within the Rough and Ready Botanical area and 0.75 miles in the ACEC.

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: Alternative 8 would not meet all elements of the Aquatic Conservation Strategy (ACS) and Riparian Reserve Standards and Guidelines. This route has fewer stream crossings and uses temporary bridges, but is associated with the Bench Road construction within riparian reserves.

Wild and Scenic River Eligibility: Alternative 8 is not likely to degrade the current highest potential classification (scenic) in the vicinity of the access road. Alternative 8 would have fewer effects on the botanical ORV's by avoiding development of the road to Site D.

Operating Costs: Road development under Alternative 8 would cost about \$580,000. Haul costs would exceed \$2.1 million; similar to the Proposed Action. Dust abatement would cost about \$222,000.

Economics: Alternative 8 is associated with a -\$9.5 million present net value and a 0.57 benefit to cost ratio. Economic viability is uncertain.

Effects on Residents: Alternative 8 would have effects similar to the Proposed Action and Alternative 7.

Visual Quality, Recreation and Interpretive Development: Alternative 8 would degrade visual quality by developing and using roads. User conflicts would be minimized by closing the area to all but mining-related motorized traffic. The alternative stockpile site would resolve issues with visuals from the Botanical Wayside.

Roadless Character: The roadless character associated with the South Kalmiopsis (SK) area would be degraded by 9 miles of haul roads developed, and 4.2 miles of new construction within the SK.

Alternative 9

Soil Productivity: Alternative 9 would have little impact on soil productivity (about 5 acres would be disturbed).

Slope Stability: Alternative 9 incurs no risk to slope stability.

Erosion and Sediment: Alternative 9 is similar to the No Action alternative.

Stream Crossings: Alternative 9 would approve a limited number of fords with tracked vehicles to facilitate sampling; little sediment would be delivered at the crossings.

Stream Flow and Water Temperature: Alternative 9 would use far less water than other action alternatives. No temperature increases are likely.

Nickel Concentrations in the Water: Alternative 9 would not result in any appreciable exposure of peridotite rock, therefore no increases beyond natural are expected.

Hazardous Material Spill: Alternative 9 has very low risk of hazardous fluid spill.

Proposed, Endangered, Threatened, and Sensitive Fish: Alternative 9 would be associated with a "NOT likely to adversely affect" finding on coho, cutthroat, chinook and steelhead.

Port-Orford-cedar: Alternative 9 is similar to the No Action alternative. A POC Containment Strategy is shown in Appendix J for the Preferred Alternative. This strategy is likely to be effective in maintaining current risk.

Noxious Weeds: Alternative 9 would locate the stockpile site away from noxious weeds. Use of helicopters versus trucks significantly decreases the risk of spreading weeds to the mine sites and along haul routes. Risks of spreading weeds would be low. Helicopters would not land at any mine sites. Mitigation is in place to reduce or eliminate risks. Monitoring for the spread of noxious weeds would be required.

PETS Plants and Botanical Diversity: Alternative 9 would impact one species of PETS plants. Sampling would be designed to minimize impacts on this species.

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: Alternative 9 would maintain the existing condition relative to Aquatic Conservation Strategy (ACS) and Riparian Reserve Standards and Guidelines. It best meets the ACS of all the action alternatives.

Wild and Scenic River Eligibility: Alternative 9 would not degrade the current highest potential classification (scenic) or ORV's.

Operating Costs: Road development under Alternative 9 would cost about \$43,000. Haul costs are estimated as \$840,000 for a helicopter to move 5,000 tons of ore from the mine sites to the stockpile site. Dust abatement would cost about \$1000.

Economics: Alternative 9 is associated with a -\$970,000 present net value. It has a benefit to cost ratio of 0.1 (less than the Proposed Action and other action alternatives).

Effects on Residents: Alternative 9 would have short-term, intense effects (noise) on residents while operations occur. The flight path would remain 1,000 feet from any non-mining related buildings. All legal requirements related to air and water quality, safety, and noise would be met.

Visual Quality, Recreation and Interpretive Development: Alternative 9 would maintain existing character. The alternative stockpile site would resolve issues with visuals from the Botanical Wayside.

Roadless Character: Alternative 9 would maintain the existing roadless character of the SK.

Alternative 10

Soil Productivity: Alternative 10 would disturb about 85 acres of road and mine pit development.

Slope Stability: Alternative 10 includes Mine Site D, the one site at risk of failure. The Final Plan of Operations would require geophysical modeling and specific design criteria to assess and minimize the risk.

Erosion and Sediment: Alternative 10 is predicted to produce 154 cubic yds of sediment from development and use of Wimer and Rock Creek roads and the Bench Road.

Stream Crossings: Alternative 10 is associated with one temporary bridge and one tributary crossing. About 5 cubic yards of sediment may be delivered to Rough and Ready Creek from the crossings.

Stream Flow and Water Temperature: Implementation of Alternative 10 could lead to the withdrawal of about 40,000 gallons of water each day for dust abatement, given appropriate water rights. Removal of water would trend the creek toward warmer temperatures but measurable increases are not expected.

Nickel Concentrations in the Water: Alternative 10 could result in slight increases in nickel delivered to drinking water but increases are unlikely to affect public health. Reducing new road construction and the total distance of haul would reduce the area exposed to fresh weathering and subsequent nickel delivery.

Hazardous Material Spill: Alternative 10 has less risk than the Proposed Action because there are far fewer crossings. The overall risk of such a spill is thought to be low.

Proposed, Endangered, Threatened, and Sensitive Fish: Alternative 10 would be associated with a “likely to adversely affect” finding on coho, cutthroat, chinook and steelhead. Eight factors or indicators would be degraded including sediment, streambank condition, pool character and quality, road density, human disturbance, riparian reserves, erosion rates, and incidental take or harassment.

Port-Orford-cedar: Alternative 10 would increase the risk of spreading the disease to healthy populations of POC above the Wimer Road toward Site B. Other risk factors are eliminated. A Port-Orford-cedar Root Disease Containment strategy (described previously) would be added to the final Plan of Operations.

Noxious Weeds: Alternative 10 would include mitigation measures to reduce risk of introduction and spread of noxious weeds into the project area. Risks would be higher than Alternatives 7 and 8 because the haul route would traverse the Wimer Road with its serious population of scotch broom. The alternative stockpile site does not contain known populations of noxious weeds.

PETS Plants and Botanical Diversity: Alternative 10 may impact 17 sensitive species of PETS plants, more than any other alternative. *Arabis macdonaldiana*, listed as endangered under the Endangered Species Act, would be affected by this haul route. The Proposed Action would construct 0.4 miles of roads in the Rough and Ready Botanical Area with the haul route traversing 3.5 miles within the two FS botanical areas. The haul route would also include 0.75 miles within the BLM ACEC.

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: Alternative 10 better meets the elements of the Aquatic Conservation Strategy (ACS) and Riparian Reserve Standards and Guidelines as compared to the Proposed Action and Alternatives 6 and 7. It is associated with less road development in Riparian Reserves. However, it does include the Bench Road, which does not meet the intent of all Riparian Reserve Standards and Guidelines.

Wild and Scenic River Eligibility: Alternative 10 would maintain Rough and Ready Creek’s Wild and Scenic River eligibility although it may degrade some botanical values.

Operating Costs: Road development under Alternative 10 would cost about \$770,000. Haul costs are estimated as about \$870,000. Dust abatement would cost about \$363,000. Alternative 10 would also include the \$1.6 million dollar cable ore-hauling operation from Site D.

Economics: Alternative 10 is associated with a -\$9.0 million present net value and a benefit to cost ratio of 0.55; economic viability is uncertain.

Effects on Residents: Alternative 10 would have intense effects on the residents who live at the 22 homes within 100 feet of the Wimer Road. The closest mine site is 0.5 miles away from the closest residence. Some of the effects would be mitigated by increased surfacing on the Wimer road, and requiring smaller trucks (less noisy). The smaller trucks would result in double the number of trips, however. Legal requirements related to air and water quality, dust, noise, safety, and similar concerns would be met as a condition of the Plan of Operations. Assessed value of private properties along the road are likely to increase with road improvements.

Visual Quality, Recreation and Interpretive Development: Alternative 10 would degrade visual quality by developing and using roads. The Bench Road would be immediately visible from a few residents. User conflicts would be minimized by closing the area to all but mining-related motorized traffic. The alternative stockpile site would resolve issues with visuals from the Botanical Wayside.

Roadless Character: The roadless character associated with the South Kalmiopsis (SK) area would be degraded by 6 miles of haul roads developed, including a mile of new construction, and the cable operation.

Alternative 11

Soil Productivity: Alternative 11 reduces the total ground disturbance to 58 acres.

Slope Stability: Alternative 11 includes Mine Site D, the one site at risk of failure. The Final Plan of Operations would require geophysical modeling and specific design criteria to assess and minimize the risk.

Erosion and Sediment: Alternative 11 resolves this issue by eliminating all high risk road segments.

Stream Crossings: Alternative 11 is associated with one Rough and Ready Creek crossing (#5) and which would be designed as a year-around bridge. It also would have three tributary crossings.

About 12 cubic yards of sediment may be delivered to Rough and Ready Creek from the crossings.

Stream Flow and Water Temperature: Implementation of Alternative 11 lead to the withdrawal of about 27,000 gallons of water each day for dust abatement, given appropriate water rights.

Removal of water would trend the creek toward warmer temperatures but measurable increases are not expected.

Nickel Concentrations in the Water: Alternative 11 could result in slight increases in nickel delivered to drinking water but increases are unlikely to affect public health. Reducing new road construction and the total distance of haul would reduce the area exposed to fresh weathering and subsequent nickel delivery.

Hazardous Material Spill: Alternative 11 has fewer risks than the Proposed Action and Alternatives 6, 7, 8, and 10 (it is associated with fewer trips and only one major stream crossing). The overall risk of such as spill is thought to be low.

Proposed, Endangered, Threatened, and Sensitive Fish: Alternative 11 would be associated with a “likely to adversely affect” finding on coho, cutthroat, chinook and steelhead. Six factors or indicators would be degraded including sediment, road density, human disturbance, riparian reserves, erosion rates, and incidental take or harassment.

Port-Orford-cedar: Alternative 11 includes a haul route along the private Rough and Ready Creek Road, which is a high risk area for introducing the disease. The crossing of No Name Creek is another risk site. A Port-Orford-cedar Root Disease Containment strategy (described previously) would be added to the final Plan of Operations. The residents along the private road would be encouraged to agree on disease control measures. The use of a year-around bridge would increase the risk of use of the road system while it is wet.

Noxious Weeds: Alternative 11 would include mitigation measures to reduce risk of introduction and spread of noxious weeds into the project area. The alternative stockpile site does not contain known populations of noxious weeds.

PETS Plants and Botanical Diversity: Alternative 11 may impact 12 sensitive species. *Arabis macdonaldiana*, listed as endangered under the Endangered Species Act, would be affected by this haul route. Alternative 11 would avoid all road construction within Rough and Ready Botanical Area. The haul route would traverse 1.9 miles within the botanical area (the least of the operational mining alternatives).

Aquatic Conservation Strategy/Riparian Reserve Standards and Guidelines: Alternative 11 better meets the elements of the Aquatic Conservation Strategy (ACS) and Riparian Reserve Standards and Guidelines as compared to the Proposed Action and Alternatives 6, 7, 8, and 10. This route has fewer stream crossings and uses a permanent bridge, and is associated with the least amount of haul within Riparian Reserves. It would require culverts at three tributary crossings.

Wild and Scenic River Eligibility: Alternative 11 is likely to maintain current eligibility of the creek, although it may degrade some botanical values.

Operating Costs: Road development under Alternative 11 would cost about \$700,000. Haul costs are estimated as \$970,000. Dust abatement would cost about \$149,000. Alternative 11 would also include the \$1.6 million dollar cable ore-hauling operation from Site D.

Economics: Alternative 11 is associated with a -\$7.5 million present net value and a benefit to cost ratio of 0.59 (best benefit to cost ratio as compared to the Proposed Action and all other action alternatives); economic viability is uncertain.

Effects on Residents: Alternative 11 would have significant effects on 4 residences (dust, noise) within 100 feet of the haul route. The closest mine site is 0.5 miles away from the closest residence. Some of the effects would be mitigated by paving the private road. Larger, noisier trucks would be used but the number of trips would be about one-third the amount estimated for Alternative 6. Legal requirements related to air and water quality, dust, noise, safety, and similar concerns would be met as a condition of the Plan of Operations. Assessed value of private properties along the road are likely to increase with road improvements.

Visual Quality, Recreation and Interpretive Development: Alternative 11 would degrade visual quality by developing and using roads. User conflicts would be minimized by closing the area to all but mining-related motorized traffic. The alternative stockpile site would resolve issues with visuals from the Botanical Wayside.

Roadless Character: The roadless character associated with the South Kalmiopsis (SK) area would be degraded by one mile of road construction to the cable landing site and the development of 5 miles of road within the SK. Alternative 11 reduces the haul route within the SK by half as compared to Alternative 7.

CHAPTER THREE

AFFECTED ENVIRONMENT

This chapter briefly describes the environmental components that might be affected by the Nicore project. It forms the basis for the Environmental Consequences of the No Action Alternative. The focus of this chapter is on significant issues as discussed in Chapter Two, however some discussion about other resources that might be affected is included. Discussions from previous analysis efforts are summarized and incorporated by reference, including the West Fork Illinois River Watershed Analysis, the Rough and Ready Wild and Scenic River Eligibility Study, Siskiyou and Northwest Forest Plan and associated documents, BLM Resource Management Plan and associated documents, Draft BLM Area of Critical Environmental Concern Management Plan and associated documents, Draft Species Management Guides for various sensitive plants, State Plans for Anadromous Fish restoration, and other documents.

PHYSICAL ENVIRONMENT

The physical setting of Rough and Ready Creek watershed is described at length within the Physical Science Report for the Nicore Project, the West Fork Illinois River Watershed Analysis and the Rough and Ready Creek Wild and Scenic Eligibility Study (available in the Analysis files).

Ninety three percent of the Rough and Ready watershed is underlain by ultramafic rocks (peridotite and serpentinite) and weathered soils. The characteristics of the soils at the four proposed sites are listed in Figure 12. All the information is from the Josephine County Soil Survey, completed in December 1983. The type of soils found near the proposed ore pits in the Rough and Ready Drainage make up approximately 11.5 % of the total land area in Josephine County.

Permeability is slow in all soils. Organic content ranges from 3 to 10%. The surface layer (topsoil) is a stony clay loam and generally very shallow (2-10"). This topsoil contains a high percentage of rocks greater than 3" in diameter (25-75%). The sub-soil in these associations is generally even more rocky than the surface layer.

Of particular interest to this analysis are the nickel, chrome and cobalt-bearing soils known as laterites. These residual soils lie on an old 'upland weathered surface and in lower slump and benches as well as in outwash deposits mixed with sand and gravel on the valley floor' (Ramp, 1978). Laterites are generally formed under warm, wet conditions over many, many years (Bates and Jackson, 1979). The nickel content in the soil varies by site but ranges from 0.57-1.23%, cobalt from 0.07 to 0.14%, and chrome from 1.06-2.56%.

	Site A	Site B	Site C	Site D
Soil Types	33F & 58F (Eightlar- Dubakella Complex & Pearsoll-Rock outcrop complex)	58F & 31E, (Pearsoll-Rock outcrop complex & Eightlar extremely stoney clay)	58F (Pearsoll-Rock outcrop complex)	58F (Pearsoll-Rock outcrop complex)
Soil Taxonomy	Clayey-skeletal, serpentinitic, mesic Typic Xerochrepts and Mollie Haploxeralfs; Clayey-skeletal, serpentinitic mesic mollie Haploxeralfs.	Clayey-skeletal, serpentinitic mesic lithic Xerochrepts; Clayey-skeletal, serpentinitic mesic mollic Haploxeralfs.	Clayey-skeletal, serpentinitic mesic lithic Xerochrepts	Clayey-skeletal, serpentinitic mesic lithic Xerochrepts
Soil Chemistry				
pH	6.1-7.8	6.1-7.3	6.1-7.3	6.1-7.3
CEC	25-75 meq/100 grams of soil (NH4OAc)	Similar	Similar	Similar
Soil & Water Features				
Flooding Potential	None	None	None	None
High Water Table	Greater than Six Feet in Depth	Greater than Six Feet in Depth	Greater than Six Feet in Depth	Greater than Six Feet in Depth
Bedrock Depth	Varies between 20 inches to greater than 60 inches in depth.	Greater than 60 inches in depth.	Greater than 60 inches in depth.	Greater than 60 inches in depth.
Bedrock Hardness	Hard	Hard	Hard	Hard
Hydrologic Group	C&D - Very slow infiltration rate and high run-off rate	C&D - Slow to very slow infiltration rate and high run-off rate	D - Very slow infiltration rate and high run-off rate	D - Very slow infiltration rate and high run-off rate
Physical & Chemical Properties				
Permeability	<0.06 to 0.2 in/hr (very low)	<0.06 to 0.2 in/hr (very low)	<0.06 to 0.2 in/hr (very low)	<0.06 to 0.2 in/hr (very low)
Shrink-Swell Potential	Moderate to High	Moderate to High	High	High
Erosion Factors	k=0.17 to 0.24	k=0.17 to 0.24	k=0.17 to 0.24	k=0.17 to 0.24

Figure 12. Soil Features in Mine Sites A, B, C and D

Ramp notes that there are at least 512 acres in bench deposits of nickel bearing laterite, and at least as many acres have potential (but were not sampled by Ramp). There are also at least 1000 acres of outwash (Rough and Ready alluvial flat) that also contain low concentrations of nickel, chrome and cobalt. Figure 13 shows the 512 acres of nickel bearing laterites mapped by Ramp.²⁴

The dominant erosion process in this watershed over long time scales is large landslides (see West Fork Illinois River Watershed Analysis); gullying and rill erosion are more important on shorter time scales. Roads and stream crossing approaches exist throughout the proposed haul route. These are not currently passable with pickups, but have been used extensively in the past. These roads and crossings contribute small, but generally not measurable quantities of sediment to the stream system. The dominant erosion processes on these surfaces are surface wash and rilling.

Rough and Ready Creek is known for its exceptional water clarity and lack of fine sediment.²⁵ Existing rates of coarse sediment transport along the bed of the stream were modeled at a cross-section located near Proposed Crossing #4. The simulated flow level for the modeling exercise was bankfull flows, or those flows expected to occur on average once every 1.5 to 2 years. These are the flows most linked to channel bed formation and maintenance. The model (winxspro) estimated that bankfull flows transport approximately 1,860 tons per day through this cross-section. There have been no measurements of bedload sediment transport taken to validate this estimate.

Streamflow varies by tributary and by season. Generally, the area is noted for its 'flashy' nature, marked by a rapid rise and fall in stream flow in response to precipitation. Summer flows are often critically low, the stream goes sub-surface in several locations in many years.

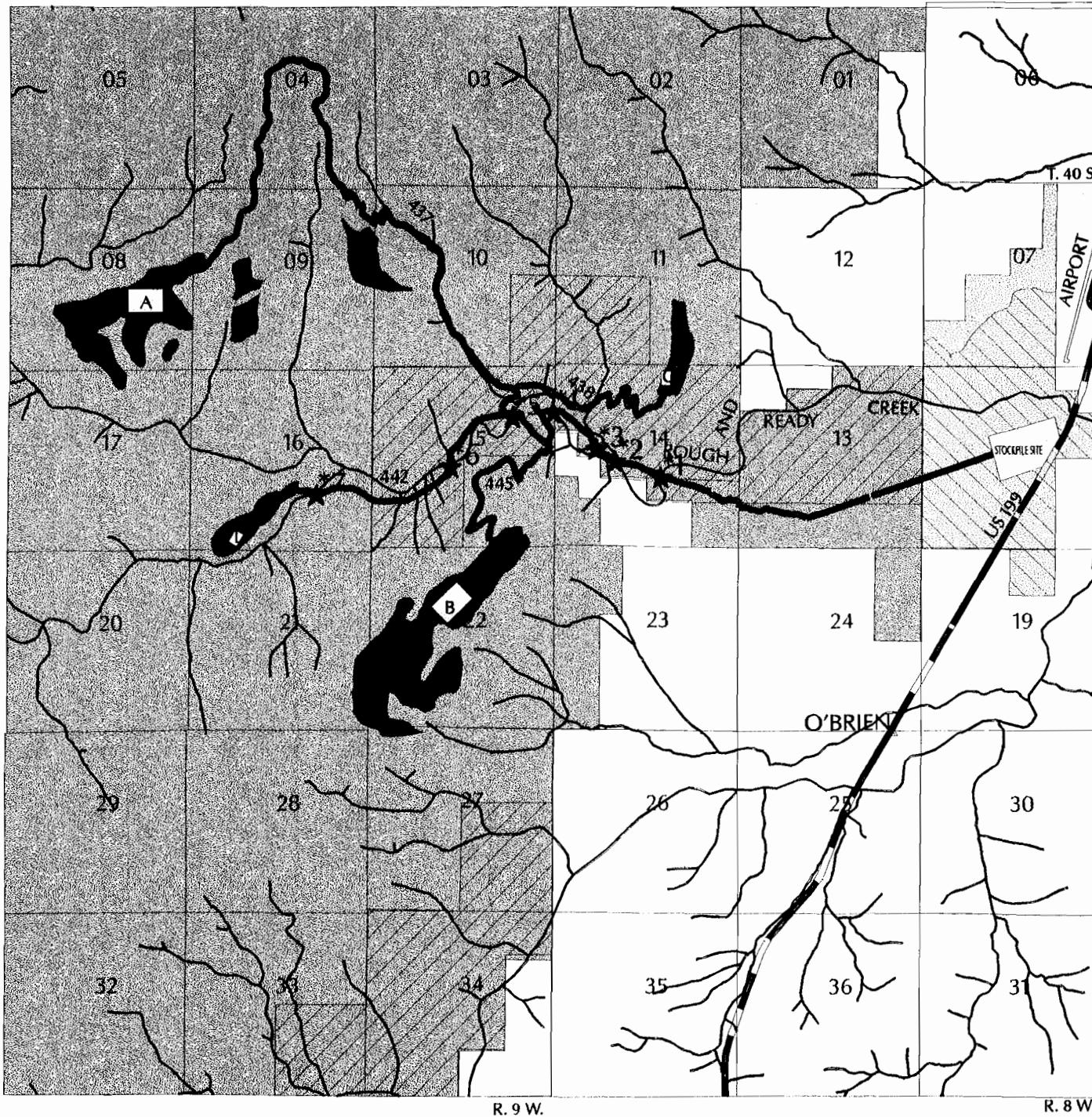
Few flow measurements have been taken on Rough and Ready Creek. In the summer of 1997, however, Oregon Department of Water Resources, Josephine County branch took the following data:

R&R near Mouth	May 16	48.7 cfs
	June 6	41.9 cfs
R&R below Seats Dam	May 16	39.3 cfs
	June 6	50.1 cfs
	July 2	16.6 cfs
	July 18	9.8 cfs
	Aug 15	3.6 cfs
	Aug 29	4.3 cfs

Stream flow is used to support numerous beneficial uses in the area. According to data collected by the Oregon Department of Water Resources, there are recorded water rights on Rough and Ready Creek for domestic use, stock, irrigation, and fish.

²⁴Figure 13 represents the extent of reasonably foreseeable future mining. The sites proposed for mining under the current Plan of Operations are nested within these deposits. The mine claimant has stated that mining of these 512 acres would take over 50 years to accomplish.

²⁵Rough and Ready Creek is considered optimum for sediment in relationship to beneficial uses such as swimming (primary contact), fish, domestic, etc.



Nickel Bearing Laterites Mapped
In Rough & Ready Area

LEGEND

- [Shaded Box] National Forest Lands
- [Hatched Box] Bureau of Land Mgmt
- [Unshaded Box] State and Private Lands
- [Black Box] Laterite Deposits
- [Hatched Box] USFS Botanical Area
- [Hatched Box] BLM Area of Critical Environmental Concern
- [Wavy Line] Streams
- [Solid Line] US 199
- [Solid Line with Hatching] Project Roads
- [Star] Proposed Stream Crossing

Figure 13

Summer water temperatures in R&R exceed the 64 degree (F) State standard for many days during the season (water temperatures exceeding 80 degrees (F) have been measured during low flow). Rough and Ready Creek, and the West Fork Illinois River, are considered Water Quality limited due to high summer water temperatures and are legally listed as impaired under Section 303(d). High stream temperatures are inherent to the watershed. The Department of Environmental Quality (DEQ) is in the process of determining Total Maximum Daily Loads (TMDL) relative to temperature increases. The mining operation would be subject to DEQ and other stipulations and regulations.

The geochemistry of the surface waters (9 sites) and the chemistry of the bed sediments (8 sites) in R&R Creek was studied as part of a monitoring program established by the US Geological Survey. They found that pH values ranged from 7.63 to 8.58, conductivity from 120 to 277 uS/cm, and that alkalinity ranged from 75 to 182 ppm. Additionally, “the concentration of elements that may be a concern for aquatic and public health are generally low, particularly for Copper, Zinc, Arsenic, Cobalt, Selenium, Uranium and nitrates” (Miller, et al 1998).

The report goes on to conclude, “High alkalinites...indicate good capacity for buffering acid generation from possible sources such as acid rain and acid-mine drainage”(ibid).

The USGS also found that “nickel...is elevated relative to average fresh water values” (ibid.). Currently, the concentration of nickel in water samples taken from Rough and Ready Creek and some nearby springs exceeds the Department of Environmental Quality Ambient Water Standards for fish and water ingestion (13.4 ppb). Water samples taken in the mainstem of Rough and Ready Creek ranged from 13 to 17 parts per billion (ppb). Samples taken from tributaries and springs along the creek ranged from 11 to 36ppb. Samples were also taken (by the Forest Service) from springs used for drinking water. Nickel concentrations there ranged from 30 to 40ppb. The USGS and Forest Service water chemistry data is in the analysis files.

Numerous springs emerge along the length of the channel. Many of these issue from channel banks and through-flow in the gravel. Roads existing within the watershed may have affected these springs, particularly near Crossing #6. The term hyporheic zone refers to the interface between ground and surface water; the hyporheic zone was found to be unusually extensive at the Rough and Ready alluvial fan (see Wild and Scenic River Eligibility Study).

Groundwater depths are not known, but wells in the area vary in depth. Recharge of wells from filling of the Wing and Farren ditch has been reported (see G. Buck, W. Brown, and other scoping comments in the analysis files).

Rough and Ready Creek is noted for its unusual channel morphology and large substrate in its lower gradient, unrestricted reaches. The alluvial fan at the mouth of Rough and Ready Creek is unique for a stream of this size within the Klamath Province. Thus, the geological/hydrological character of the main stem is considered an Outstandingly Remarkable Value.

There are other streams within project area, including Rock Creek, Woodbury Creek, and numerous unnamed tributaries in Section 27 that drain to the West Fork of the Illinois River. Little specific data is available regarding these creeks. Review of topographic maps and air photos suggest they are steep, sparsely vegetated, and flashy in response to precipitation.

Water quality in the West Fork Illinois River is good, although not as clear as Rough and Ready Creek. The sources of sediment to the West Fork likely include roads, streamside slides, and channel bed and bank erosion (studies have not been done to confirm this assumption).

PROPOSED, ENDANGERED, THREATENED and SENSITIVE FISH SPECIES

Native salmonids present within the analysis area include: resident rainbow and cutthroat trout; and anadromous winter steelhead trout, fall chinook salmon, and coho salmon.

Resident rainbow and cutthroat trout occur throughout Rough and Ready Creek and many of its tributaries. The upper reaches of both the North and South Forks are likely more significant spawning and rearing sites than the main stem.

Winter steelhead trout spawn and rear throughout most of Rough and Ready Creek and many of the tributaries. Observations during summer 1997 identified low to moderate concentrations of juveniles at the proposed creek crossing sites and throughout the lower reaches of the creek.

Fall chinook salmon are known to spawn and rear on Rough and Ready Creek. Habitat on the West Fork of the Illinois River, immediately adjacent to Rough and Ready Creek, is currently classified as High Value Native Fall Chinook Salmon Habitat by the State of Oregon.

Juvenile and adult coho salmon have been documented on Rough and Ready Creek. Most recently, three juvenile coho were found at Seats Dam (USFS 1998). The area has not been identified as High Value Habitat for coho by ODFW, but 300 feet on either side of the main stem is part of the critical habitat for coho designated by the National Marine Fisheries Service under the Endangered Species Act.

Coho salmon are listed as threatened under the Endangered Species Act. Chinook salmon are proposed for listing. FS Region Six sensitive species include steelhead and cutthroat trout. Rough and Ready Creek does not inherently provide high quality habitat for any of these species. Cool springs and a few deep pools provide some potential refugia for fish, but the high temperatures, low flows and seasonal barriers to juvenile salmonid migration from dams and diversions make Rough and Ready Creek a relatively inhospitable environment for anadromous fish.

Figure 14 describes existing fish habitat conditions within the lower reaches of Rough and Ready Creek. The ‘response reach’ is the area most likely to be affected by activities (lower gradient reaches in the vicinity of the stream crossings). The definitions of “optimum”, “marginal” and “outside optimum range” were established for the Klamath/Siskiyou Mountains, but have not been adapted to serpentine environments. Criteria for optimum vs. outside optimum range is available in the Fish, Wildlife, and Aquatic Conservation Strategy Evaluation in the analysis file.

FACTORS AND INDICATORS	Lower Rough and Ready Creek Response Reach		
	Optimum	Marginal	Outside Optimum Range
Temperature			X
Physical Barriers		X	
Sediment	X		
Large Wood		X	
Pool Quality		X	
Off-channel Habitat		X	
Width/Depth Ratio		X	
Streambank Condition		X	
Floodplain Connectivity		X	
Changes in Peak Flow	X		
Road Density and Location		X	
Human Disturbance History		X	
Riparian Reserves		X	
Landslide and Erosion Rates	X		
Harassment and Incidental Take	X		

Figure 14. Matrix of Factors and Indicators for Fish Habitat- Existing Condition

POR-T-ORFORD-CEDAR ROOT DISEASE

Port-Orford-cedar (POC) is a conifer endemic to southwestern Oregon and northwestern California. POC occupies a variety of ecological zones; moist areas are favored, but it also grows on dry sites. *Phytophthora lateralis* (POC root disease) was first encountered on POC in nursery stock in Seattle, Washington, in 1923. It has now spread to about seven percent of the area occupied by POC on National Forest; disease centers are scattered throughout the northern half of the natural range of POC. High risk areas for infestation are stream courses, drainages, or low-lying areas downslope from infestation centers. Long distance spread of the disease pathogen has occurred through earth movement in road construction, road maintenance, logging, and traffic flow on forest roads. Road use during wet periods is associated with high risk. Movement of the pathogen in soil clinging to the feet of cattle and elk has also been documented. Topography has a considerable influence on spread; concave areas with POC are especially vulnerable because they are easily flooded.

Within the analysis area, POC is found in riparian areas and around small seeps. POC is the primary riparian component in some areas. The larger POC are 20 to 40 inches in diameter and are 200 to 400 years old. POC also grows outside of riparian areas in some places outside of riparian areas. POC provides many ecosystem benefits including shade, soil nutrients, long lasting wood in creeks and beauty.

The West Fork Illinois River Watershed Analysis includes a map of POC and root disease distribution within the watershed. Root disease has been identified on the West Fork, but has not been found in the Rough and Ready Creek watershed.²⁶

There are two possible explanations for the lack of root disease in the Rough and Ready Watershed:

- (1) Limited Access - the area is generally inaccessible to motorized traffic, especially during the wet season;
- (2) Gaps in POC distribution inhibit the spread.

Two areas within the Rough and Ready Creek watershed that may be accessed by the Proposed Action haul route are particularly vulnerable to the spread of root disease; the No Name Fan area and the population up Alberg Creek. They are vulnerable because they are low-lying populations in wet areas that are near roads. The presence of the cedar is an integral part of the habitat in these areas. Other areas of concern include the ditch lines of roads where POC is concentrated and headwater areas.

NOXIOUS WEEDS

Serpentine-dominated landscapes are inhospitable to many plants, including noxious weeds. Noxious weeds are designated by the Secretary of Agriculture or by individual states. Noxious weeds generally possess one or more of the following characteristics: aggressive and difficult to manage, poisonous, toxic, parasitic, a carrier or host of a serious insect or disease, or being native or new to or not common to the United States or parts thereof.

Some non-native species can grow on serpentine, and in some cases, can out-compete native vegetation. Known noxious weeds species within the analysis area include scotch broom (*Cytisus scoparius*), yellow star thistle (*Centaurea solstitialis*), Himalayan blackberry (*Rubus discolor*), knapweed (*Centaurea sp*), mullein (*Verbascum thapsus*), orchard grass (*Dactylis glomerata*), cheat grass (*Bromus tectorum*), intermediate wheat grass (*Elytrigia intermedia*), velvet grass (*Holcus lanatum*), bull thistle (*Cirsium vulgare*), white clover (*Trifolium repens*), and dandelion (*Taraxacum officinale*). Survey data reveals that noxious weeds have not occupied the proposed mine sites. Most of the haul route is also free of noxious weeds, except along the powerline on BLM lands.

Two species are of greatest concern, scotch broom and star thistle. A large population of scotch broom occurs along the Wimer Road, between Hwy 199 and the National Forest boundary. Star thistle grows along 199 at the Botanical Wayside and near the miner's residence.

²⁶Two concentrations of dead cedars along Rough and Ready Creek were investigated, but root disease was not found. The trees were probably damaged by flathead borers (found on site) and/or high water.

Standard and Guideline 12-6 in the Siskiyou National Forest Plan states, "Control of noxious weeds should be accomplished in cooperation with state, county, and private organizations through Weed Control Districts or Coordinated Resource Management Agreements. Preventative management is critical to an effective control program."

Botanical area management emphasizes controlling noxious weeds. The Illinois Valley Garden Club and other groups have spearheaded efforts to eradicate star thistle from the Botanical Wayside (hand pulling). Their efforts have been successful, and the population appears to be diminishing. The current risk of spread is high within the BLM ACEC, along the power line and other roads in the analysis area. Areas commonly accessed by the public, such as the "Mars" swimming hole, are at risk of establishment of noxious weeds.

BOTANICAL DIVERSITY AND SENSITIVE PLANTS

The analysis area is renowned for its botanical diversity and abundance of rare plant species. Scientific and educational interest in the area (along with the rest of the Josephine Peridotite Sheet) is high. The low calcium, high magnesium, and the high metal concentrations in serpentine soils result in conditions toxic to many common species. Some species have developed mechanisms to deal with these conditions; serpentine endemics are species found *only* within serpentine habitats. The highest concentrations of rare plants within the analysis area are found on rocky slopes, wet areas, alluvial flats, and Jeffrey pine savannah habitats.

Several botanical areas have been designated within the analysis area. The BLM ACEC, Forest Service Rough and Ready Botanical Area, Forest Service Oregon Mountain Botanical Area, and the State Botanical Wayside comprise about 3500 acres within the analysis area. The botanical resources are also recognized as an Outstandingly Remarkable Value (ORV) within the Rough and Ready Creek corridor. The presence of many rare and endemic plant species throughout the analysis area has been documented in the following reports:

*Appendix F of the Siskiyou National Forest Plan FEIS includes a description of the Rough and Ready Botanical Area.

*A Preliminary Flora for the Rough and Ready Creek watershed (Borgias 1994) included 278 species.

*The 1993 Rough and Ready Wild and Scenic River Eligibility Study includes known and potential plant lists.

*The Oregon Natural Heritage Program (ONHP) maintains a database of known rare plant habitats and sites. This database has been updated to include plant surveys accomplished in 1997.

*The West Fork Illinois River Watershed Analysis discusses 45 Siskiyou endemics found within the West Fork Illinois River Watershed, many of which also grow in the analysis area.

The analysis within this EIS focuses on the rarest (PETS) species within the analysis area; these are federally listed endangered species, FS Region 6 "Sensitive" and BLM "Special Status" species. The mine and stockpile sites, and existing and proposed roads that may be used for ore haul have been surveyed for presence of these plants. Private land was not surveyed. Potential effects would occur on fourteen species of PETS plants: *Arabis macdonaldiana*, *Calochortus howellii*, *Cardamine nutallii* var. *gemmata*, *Epilobium oreganum*, *Fritillaria glauca*, *Gentiana setigera*, *Hastingsia atropurpurea*, *Microseris howellii*, *Monardella purpurea*, *Perideridia erythrorhiza*, *Salix delnortensis*, *Senecio hesperius*, *Streptanthus howellii*, and *Viola primulifolia* var. *occidentalis*. Some species discussed in the SDEIS were removed from the Pacific Northwest Regional Forester's Sensitive list in May 1999 and are not discussed further: *Epilobium rigidum*, *Hieracium bolanderi*, *Poa piperi*, *Sanicula peckiana* and *Mimulus douglasii*.

The sensitive plants occur on four types of habitats: ultramafic, riparian, rock outcrops, and forested. Most of the suitable ultramafic habitat within the analysis area is currently intact or if disturbed, is within the tolerance limits of the species of concern. Riparian habitats have been degraded, and created, by human disturbance, such as road and diversion ditches. Several species of water-loving plants, including some uncommon species, have colonized human-created habitats. Rock outcrops and forested habitats are found throughout the area. Roads have degraded these habitats, but some plants are becoming re-established on roads that are no longer being used. Information known about the 14 PETS plant species is summarized below:

Macdonald's rockcress (*Arabis macdonaldiana*) is endemic to the Red Mountain of the North Coast Range of California; it has federal protection as Endangered. The USDI FWS made a decision in 1997 that all known populations of *Arabis macdonaldiana* share the same taxonomy and genetic material. It occurs on barren to shrub-covered shallow, rocky, ultramafic soils which are peridotite in origin (Jeffrey pine woodland community). Elevation ranges from 500 to 4,000 feet. Known populations on the Siskiyou NF are found between North Fork Smith River and Diamond Creek, Packsaddle Mountain and East Fork Illinois River. A specimen from the project area sent to arabis expert Dr. Linda Vorobik was confirmed to be *A. macdonaldiana*. The Rough and Ready populations extend the range of this species in Oregon. In June of 1998, Vorobik visited these sites and located an additional population and unoccupied suitable habitat on the proposed ridge road to mining site A. Six locations total are known in the analysis area.²⁷

Howell's mariposa lily (*Calochortus howellii*) is endemic to the Illinois Valley in southwest Oregon. It occurs on serpentine soils, dry rocky slopes, often on *Ceanothus* brush-covered slopes or in open Jeffrey pine stands, from 800 to 4,200 feet elevation. The northernmost known populations on the Siskiyou NF occurs just north of Eight Dollar Mountain and the southernmost site is at the foot of Oregon Mountain. Between these two sites, additional populations are discontinuous and scattered. The westernmost population occurs at Oregon Mountain and the most eastern population known is that of Democrat Gulch. Most populations are sparse and scattered. Seventeen locations are known within the analysis area.

Purple toothwort (*Cardamine nuttallii* var. *gemma*) is endemic to the Siskiyou Mountains of Josephine and Curry Counties, Oregon to adjacent Del Norte and possibly Siskiyou Counties, California. It occurs on gravelly serpentine soils on ridges, Jeffrey pine forests, near Darlingtonia bogs, and at a wide range of elevations. Known populations on the Siskiyou NF occur at Red Mountain, Oregon Mountain, Waldo, Snow Camp, Wimer Road, Tincup Pass, Canyon Creek, Eight Dollar Road, Pearsoll Peak, Lemmingsworth Gulch, and Vulcan Peak. Five locations are known in the analysis area.

Oregon willow-herb (*Epilobium oreganum*) is a Klamath Province endemic occurring in Darlingtonia bogs, and other wet serpentine areas from 500 to 7800 feet elevation. All extant populations in Oregon are found on scattered sites in Josephine County. In California, it is found in Siskiyou, Trinity and Humboldt Counties. Known populations on the Siskiyou NF occur along the west side of the Illinois Valley. The majority of plants are found from Eight Dollar Mountain southwest to Josephine Creek. At the south end of its range in Oregon it is found along the Oregon Mountain Road. Most populations are less than 100 plants. Two locations are known in the analysis area.

²⁷Survey results, including specific locations of rare plants, are mapped in the Analysis File.

Siskiyou fritillaria (*Fritillaria glauca*) is found from southern Douglas County, south through the Siskiyou Mountains of Josephine and Curry Counties in Oregon and into California. It occurs on gravelly serpentine slopes and ridges, from 1,800 to 6,400 feet elevation. On the Siskiyou NF this plant is found in about 20 geographical areas. There is one off-forest site at Waldo Lookout.

Six locations are known in the analysis area.

Elegant gentian (*Gentiana setigera*) is found in Siskiyou Mountains in southwestern Oregon and in northern California. It occurs on serpentine wet meadows, bogs, and seeps on slopes at low elevation. On the Siskiyou NF there are about 10 geographical areas where this plant is found. Three locations are known in the analysis area.

Purple-flowered rush lily (*Hastingsia atropurpurea*) has a limited range from Eight Dollar Mountain along the west side of Illinois Valley south to Parker Creek in Josephine County, occurring on wet meadows, rocky seeps, serpentine Darlingtonia bogs, often in open areas on gentle slopes, and streambanks in partial shade, from 1,600 to 2,000 feet elevation. Known locations on the Siskiyou NF include Eight Dollar Mountain, Woodcock Creek, Josephine Creek, and Days Gulch. A population of two plants was reported at Rough and Ready Creek in 1989, next to the crossing of road 442/441. This population was not relocated in 1997 and is assumed to be extirpated.

Howell's microseris (*Microseris howellii*) is geographically restricted to serpentine areas of the Siskiyou Mountains, southern Josephine County, Oregon, especially on the west edge of the Illinois Valley. All populations are from 1,000 to 3,500 feet elevation on soils formed from ultramafic rocks. Habitat consists of slopes or flat ground with varying exposures, predominantly within Jeffrey pine/incense cedar/chaparral vegetation. Known populations on the Siskiyou NF occur on Rough and Ready Flat, Illinois River, Eight Dollar Mountain, Oregon Mountain, Days Gulch, Eagle Gap, Tennessee Mountain, Wimer Road, and Cedar Log Bog. It is found off-forest along Deer Creek, Woodcock Bog, and Waldo. Eight locations are known in the analysis area.

Siskiyou monardella (*Monardella purpurea*) is known from Curry and Josephine Counties, Oregon and adjacent California, where it grows on rocky, open slopes on serpentine soils or serpentine bedrock from 1,400 to 4,000 feet elevation. Also found on chaparral, woodland and montane forest. Typical associates include Jeffrey pine, western white pine, and shrubs. Known populations on the Siskiyou NF are documented from the trail to Silver Peak, Lemmingsworth Gulch, Oregon Mountain, York Creek, Vulcan Peak, Rough and Ready Creek and Weston Ridge.

Four locations are known in the analysis area.

Red-root yampah (*Perideridia erythrorhiza*) Known from Douglas, Klamath, and Josephine Counties in Oregon, where it inhabits vernally moist depressions in heavy, poorly drained soils. Typical vegetation types associated with this plant are oak or pine woodlands below 5,000 feet in the Cascade Mountains. Josephine County sites are in serpentine habitats. On the Siskiyou National Forest it is found on Josephine Creek and Rough and Ready Botanical Area. There are two locations off-forest at Eight Dollar Mountain. One location is known in the analysis area.

Del Norte willow (*Salix delnortensis*) is known from Curry and Josephine County in Oregon and Del Norte County in California, where it grows on streambeds, streambanks, and gullies on serpentine soils, below 1,500 feet elevation. Known populations on the Siskiyou NF are at Rough and Ready Creek, Josephine Creek, Box Canyon Creek, Star Flat, Cedar Camp, Road to Snow Camp, Meadow Creek, Quosatana Creek, headwaters of Hunter Creek, and Wimer Road.

Four locations are known in the analysis area.

Siskiyou butterweed (*Senecio hesperius*) is endemic to the Illinois Valley area of the Siskiyou Mountains and southern Josephine County, Oregon, where it grows on serpentine soils at lower elevations, on gentle to moderate slopes. Generally found in open Jeffrey pine savannah. Most of the known populations are within the boundaries of the Illinois Valley Ranger District. Known populations on the Siskiyou NF occur along Free and Easy Creek, Eight Dollar Mountain and vicinity, Cedar Log RNA, Josephine Creek, Rough and Ready Creek, and West Fork Illinois River. It is found off forest along Laurel Road, Woodcock Bog, and Waldo Hill. Twelve locations are known in the analysis area.

Howell's streptanthus (*Streptanthus howellii*) is known from the Siskiyou Mountains, Josephine and Curry Counties in Oregon, and Del Norte and Siskiyou Counties in California. It grows on dry, rocky, serpentine slopes in conifer/hardwood forests; at 1,000 to 4,500 feet elevation. Known populations on the Siskiyou NF are found near the California line on the road to Sanger Peak, Rock Creek, Cedar Creek, Snow Camp, Lemmingsworth Gulch, Wimer Road, Vulcan Peak, Carpenter Gulch, Eight Dollar Mountain, Josephine Mountain, and South Chetco Rim Trail. Twenty-nine locations are known in the analysis area.

Western bog violet (*Viola primulifolia* ssp. *occidentalis*) is known from Curry and Josephine Counties, Oregon and Del Norte County, California. It is found in Darlingtonia bogs on serpentine soils at lower elevations. Most of the known populations on the Siskiyou NF are within the boundaries of the Illinois Valley Ranger District. Two locations are known in the analysis area.

Draft species management guides have been prepared for six of the sensitive species: *Calochortus howellii*, *Epilobium oreganum*, *Gentiana setigera*, *Monardella purpurea*, *Senecio hesperius*, and *Microseris howellii*. A “critical fen” from the Draft Fen Conservation Agreement occurs within the analysis area, but is not on any proposed haul route. Studies continue to map and assess the plant composition within all the small wetlands and fens in the area. An analysis using satellite imagery to correlate wet habitats with plant composition also continues.

The West Fork Illinois River Watershed Analysis, the Southwestern Oregon LSR Assessment, the Siskiyou National Forest Plan FEIS and Medford BLM District Resource Management Plan address general vegetative conditions (plant associations, seral stages and density) across serpentine habitats. Discussions in those documents are incorporated by reference and will not be repeated here.

Survey and Manage Guidelines from the Northwest Forest Plan apply to this project. Known sites include a lichen, *Bryoria tortuosa*, within the Rough and Ready Area of Critical Environmental Concern and FS Botanical Area. Surveys for vascular plants (*Cypripedium fasciculatum*, *Cypripedium montanum* and *Allotropa virgata*) have been completed. Habitat for all Survey and Manage Species would be avoided in the Preferred Alternative. Surveys for lichens, fungi and bryophytes would be needed if another alternative (besides No Action or Alternative 9) is selected.

AQUATIC CONSERVATION STRATEGY

The Aquatic Conservation Strategy is a four-pronged approach to maintenance of the natural disturbance regime relative to riparian and aquatic ecosystems. Components of the Aquatic Conservation Strategy include the Riparian Reserve, Key Watersheds, Watershed Analysis, and Watershed Restoration.

Riparian Reserves - Riparian Reserves within the analysis area include: fish-bearing streams, permanently flowing non-fish-bearing streams, seasonally flowing or intermittent streams, wetlands less than 1 acre, constructed ponds and/or wetlands greater than 1 acre (i.e., water diversion ditches, etc.). The characteristics of riparian habitat within serpentine landscapes is displayed in Figure 15.

Key Watersheds - Neither Rough and Ready Creek nor the West Fork of the Illinois River was identified as a Key Watershed in the Northwest Forest Plan.

Watershed Analysis - Rough and Ready Creek was included in the recent West Fork of the Illinois River Watershed Analysis (1997).

Watershed Restoration - Rough and Ready Creek is not presently identified as either a Key Watershed (FS/BLM) or Coastal Salmon Recovery Initiative Core Area (Oregon Department of Fish and Wildlife - ODFW). Therefore, watershed restoration opportunities are a lower priority than others with these designations. However, watershed restoration opportunities were identified for this watershed in the recent West Fork Illinois River Watershed Analysis.

CHARACTERISTICS OF RIPARIAN HABITAT AND ITS FUNCTION WITHIN SERPENTINE ENVIRONMENTS	
	SERPENTINE HABITAT
Stream Morphology/ Substrate	High energy system with cobble substrate, rock weathers directly to silt and clay leaving a lack of sands and gravel.
Riparian Zone	Riparian zone very narrow. Riparian vegetation sometimes limited to plants with roots in the creek, rarely extends further than 20 feet from the active channel.
Late-Successional Conditions	May not be capable of providing high quality late-successional habitat (e.g. for species such as spotted owl).
Shade-Producing Vegetation	Trees are larger in narrow riparian zones than surrounding vegetation, but rarely exceed 36" dbh. Stand density generally not capable of exceeding 70% canopy cover; often less than 40%. Port-Orford-cedar is primary source of shade.
Large Wood	Riparian zones not capable of providing ready source of large wood to stream system. Large wood delivered to streams quickly flushed through system.
Intermittent Streams	High proportion of landmass consisting of intermittent Riparian Reserves. Intermittent streams flow during a shorter period of the year. Vegetation alongside intermittent channels varies little from upland conditions.
Perennial Springs and Seeps	Water emerges from bedrock shear zones on slopes and streambanks.
Rare Plant Species	Many rare species are related to riparian habitats, including fens, vernal pools, and seeps.
Response to Disturbance	Revegetation following disturbance slow to become established. Gullies are long lasting.

Figure 15. Riparian Characteristics within the Analysis Area.

WILD AND SCENIC RIVER ELIGIBILITY AND OUTSTANDINGLY REMARKABLE VALUES

Rough and Ready Creek was considered for its Eligibility for Wild and Scenic (W&S) River status. Portions of the creek were found eligible in 1993. The Outstandingly Remarkable Values (ORV's) include botanical, hydrological/geological, and wildlife. These values and the potential classification of various segments of the creek are described in the Wild and Scenic River Eligibility Study in the project file. The next step in the process is a study to determine whether the creek is suitable for inclusion into the W&S River System. The US Congress makes the ultimate decision whether or not to include the river in the system. Until such time that the creek is found not suitable, it will be managed to protect its free-flowing characteristics, potential classification (Wild, Scenic or Recreational) and ORVs.

WORLD NICKEL SITUATION

The world nickel reserves contain at least 130 million tons of nickel (60% in laterites and 40% in sulfide deposits). In addition, there extensive deep-sea resources of nickel on the ocean floor, particularly in the Pacific Ocean. Reserves accessible with current technology would supply about 70 years of total world demand at current levels (Kuck 1999). Despite the larger amount of nickel reserved in lateritic ores, nickel extraction is more expensive from laterites, thus, most of the world's nickel comes from sulfide deposits. However, lateritic ore enjoys a major advantage in the combination of low mining cost and high value content. These two factors provide strong incentive to find economical means of extracting nickel from laterites (Reimann, et al 1998). Most of the world's production achieved from laterite use high grade (1.8% to 3.5%) ore (*ibid.*). Ore grades in the project area are thought to range from 0.8% to 1.0%.

The largest nickel laterite deposits are located in New Caledonia, Cuba, Indonesia and the Philippines. Together, these account for 75% of the total world nickel laterite resources. Burundi in central Africa contains about five percent of the world's known laterites (Russell 1998).

Current utilization of the total Western World nickel mining capacity is around 86%, an historically high figure. Operating rates are predicted to decline as low as 76% with the opening of new mines at Voisey's Bay in Canada in 2001-2003 (AME Mineral Economics 1998). Anaconda Nickel Limited of Australia has predicted a long term period of depressed nickel prices (about \$2.25/pound) as the nickel market prepares for the imminent substantial supply of nickel from new low-cost producers (Anaconda Nickel Limited 1998).

Stainless steel accounts for 40% of primary nickel consumed in the United States and two-thirds of world primary consumption. Demand for nickel-free grades of stainless steel is strong because of robust automotive sales. About 66,000 tons (35 percent of total consumption) of nickel was recovered from purchased scrap in 1998 (Kuck 1999).

The world nickel supply grew faster than demand in 1998. In August, the London Metal Exchange cash price dropped below \$4,300 per metric ton (\$1.95 per pound) - the lowest level in more than a decade. The oversupply situation is expected to continue for 4 or 5 years because of mine and smelter capacity additions in Australia, Canada, Indonesia, and Venezuela.

Since 1975, world demand for stainless steel has grown at an average rate of 4.5% per year. This growth rate is projected to continue for the next 20 years (*ibid.*).

The only nickel smelter in the United States closed in April 1998 because of low nickel prices. The smelter, near Riddle, Oregon, had been producing ferro-nickel from ores imported from New Caledonia (the adjoining mine on Nickel Mountain has been idle since 1996).

Cobalt is a valuable by-product of nickel laterites. The average cobalt credit per pound of nickel produced at the 1995 level is 24 cents (AME Mineral Economics 1998). Iron and chrome are also present.

Substitutes for nickel would result in increased cost or some trade-off in the economy or performance of the product. Aluminum, coated steels, and plastics can replace stainless steel to a limited extent in many applications

SOCIAL SETTING

About 7,500 acres within the analysis area are privately owned. The private land is generally residential and small wood lot, except for the land along Highway 199, which has been developed for industrial and commercial enterprises such as Rough and Ready Lumber Mill and the Illinois Valley Airport. The mill and airport has operated 24 hours/day from time-to-time. Both have noises, lights, and odors associated with their operations that can carry throughout the local valley. Within the analysis area, State and County road access is limited to Highway 199, Airport Drive, and Naue Way. These roads receive use by all kinds of traffic including heavy trucks and equipment. Some roads within the analysis area traverse private land and use is restricted by the landowner(s). People living along Rough and Ready Creek Road enjoy a sense of solitude because of the restricted access.

Recreation within the analysis area includes swimming, botanical exploration, hiking, and horseback riding. Most use occurs in the lower reaches of Rough and Ready Creek that are currently accessible to motorized vehicles.

The Siskiyou National Forest Plan Final Environmental Impact Statement discussed the social and economic factors affected by National Forest decisions. The Forest Plan FEIS states (page B-73, FEIS Appendix B):

In-migration has become a dominant force in the area's growth. In-migrants favor the area because of its high amenity and quality of life characteristics, i.e. clean air and water, the pace of life, and outdoor recreation. A significant proportion are retired persons.

Development of an interpretive trail within the Oregon State Botanical Wayside and BLM ACEC is in progress. The trail is sponsored by community groups and agencies, including the Illinois Valley Community Response Team (CRT), Garden Club, BLM and Oregon State Parks. The site is considered part of the overall strategy for economic development in the CRT Illinois Valley Strategic Plan.

Additional interpretive development opportunities intended to increase opportunities for nature-based tourism are being planned by IV CRT, among others. To this end, they have worked with the Scenic Byway Committees in the states of California and Oregon to designate Highway 199 a "Scenic Byway." Rough and Ready Creek has been identified as one of the top tourist resources in the Illinois River Valley, and is a centerpiece for interpretation along the byway (Brandt memo, February 27, 1999). The lower reaches of Rough and Ready Creek remain accessible during the winter months, which makes it particularly important for off-season tourism (*ibid.*).

The West Fork Illinois River Watershed Analysis and the Rough and Ready Creek Wild and Scenic River Eligibility Study discuss the educational, scientific and amenity values associated with the analysis area. The area is highly valued by scientists and professors who bring groups to the alluvial flats to experience the botanical diversity and unique geological features. The serpentine geology has been the focus of many ecological studies and workshops.

ROADLESS CHARACTER

About 60 percent of the analysis area is associated with "roadless character," a wild or primitive environment that is not readily accessible by road. Roadless character is valued by many people for its lack of human intrusion and opportunities for solitude. Roadless areas provide refuge for plants and animals because adverse effects related to access (wildlife harassment, habitat degradation, noxious weed introduction, and trash dumping, among others) are eliminated. Many people value the presence of a large roadless area near a rural population center such as Cave Junction. For more information on people's values, see the West Fork Illinois River Watershed Analysis.

The area described as the South Kalmiopsis Roadless Area (SK) in Appendix C of the Siskiyou National Forest Plan does not necessarily possess roadless character, and there may be lands that possess this character that are not within the Appendix C boundary. Still, the Forest Plan inventoried roadless area description provides a useful baseline for roadless character effects analysis. The portion of the SK within the analysis area is consistent with the roadless area description in the Forest Plan.

Most road development within the area had occurred prior to the Forest Plan analysis. The development of mining roads likely had significant effects on roadless character when they were built (most of the roads appear to be in prior to the 1960's). Inspiration Mining Company extensively sampled the analysis area in the 1970's; the transportation system within the SK was improved to facilitate their explorations.

A roadless area study to consider additions to the Kalmiopsis Wilderness was initiated in the early 1970's, and again in the 1980's. The 1984 Oregon Wilderness Act did not add the analysis area to the Wilderness. The 1989 Siskiyou Forest Plan allocated these areas to non-Wilderness uses, including Administrative Study and Botanical Area.

The roadless character of the area has been maintained despite the presence of roads because access is limited (the unimproved character of the roads, a gate at the private land, unmaintained creek crossings). The SK portion of the analysis area has had infrequent disturbance from mining exploration, and roads have had administrative (to access the Mendenhall Fire, for example), and generally non-motorized recreational use.

CHAPTER FOUR - ENVIRONMENTAL CONSEQUENCES

Chapter Four discusses the analytical basis for the alternative comparison shown in Chapter Two. The primary focus of this chapter is the effects on the issues described in Chapter One. This chapter also includes discussions about other effects.

SOIL PRODUCTIVITY

Road development and use, pit development, and ore storage may disturb ultramafic soils and lead to reduced soil productivity. The effects are expected to be localized, and would not extend beyond directly disturbed areas. Reclamation objectives emphasize minimum disturbance; Alternatives 6 through 11 would include specific guidance to minimize loss of soil productivity. Concurrent reclamation (stabilizing and vegetating disturbed areas annually) and keeping equipment to specified areas would help minimize soil disturbance.

Soils at the mine sites themselves, as well as in the vicinity of developed roads, will likely become less productive from surface disturbance and compaction, sub-soil exposure, displacement of organics, loss of soil structure, and mixing of soil horizons. Disturbed sites in the area do not revegetate quickly and are visible for many years following disturbance.²⁸

Figure 16 displays the amount of disturbance by alternative. Most of the road system and mine sites have been previously disturbed. Disturbance associated with this proposal would ‘set back’ any recovery that is already occurring these sites. The loss of soil productivity increases with miles of road and acres of mine pit development.

	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Miles Haul Route	14.3	15.5	15.4	13.3	0	14.3	9.6
Acres of Pit Development	35	35	35	33	0.5	20	20
Total Disturbed Acres (Haul Route Pits and Stockpile)	83	87	87	73	10.5	85	58

Figure 16. Soil Disturbance by Alternatives

Cumulative Effects

At least 512 acres of nickel-bearing laterite occur in the watershed, and would likely be mined given a successful operation. There are about 250,000 acres of ultramafic soils across the Josephine Peridotite Sheet (Hotz 1964- see reference in physical science report). Thus, even continued mining would be unlikely to affect overall soil conditions across the sheet. Several miles of road also currently exist, and many sites have been previously disturbed within the analysis area. The Mendenhall Fire resulted in 8,000 acres of burned area and nearly 5 miles of bulldozed fireline near the project area. The fire area is currently in a recovery mode with little human interference.

²⁸Roads that have not been maintained are evident on aerial photographs. Observations of disturbed areas reveal that revegetation rates vary and are often slow.

SLOPE STABILITY and EROSION

The public has raised numerous concerns about whether the mining pits will be stable or whether they will cause erosion. Mine Site D is on a steeper slope, associated with a higher risk of failure. Road construction is associated with risk of erosion and sediment delivery to streams.

Slope Stability

The mined pits are expected to remain as topographic depressions²⁹, estimated at six feet below the current elevation. If water from rain or surface runoff exceeds the infiltration rate³⁰ in the pits, the accumulation could result in mass failures, especially on steeper slopes. Sites A, B, and C are on relatively level slopes and thus have a low risk of failure. Alternatives that include mining at Site D (PA, 6, 7, 10, 11) are associated with a greater risk of mass failure. The risk of failure due to sampling at Site D (Alternative 9) is almost as small as No Action and Alternative 8, which would not include any development of Site D. Effects of such a failure could be locally significant and could temporarily affect water quality and reduce land productivity for the foreseeable future. Future mining of the laterite deposit around site D (see Figure 13 in Chapter Three) would likely increase this risk.

Water that may accumulate in the pits could also exceed the holding capacity of the pits and spill out over the top. This would likely result in gullying of the hillslope at the point of exit. The sediment eroded from the gully might then be delivered to the stream system. This risk would be mitigated through the design of an exit point that is armored and does not drain toward any streams or unstable slopes.

Erosion and Sediment Delivery

Road construction and use is likely to generate sediment via loose material washed off the road surface during storms, and dust that is blown or carried off the road by vehicles. This sediment becomes relevant to water quality if it is delivered to the channel. Road segments closest to stream channels pose the greatest risk of sediment delivery. Most of the haul route is along existing roads segments. The existing road segments that lie nearest streams, presented in order of greatest to lowest risk of sediment delivery, based on professional judgement, are:

1. Road segment that parallels Alberg Creek (Alberg road).
2. Road segment that parallels unnamed tributary in the W ½ of SW 1/4 of section 34, hereafter referred to as 'section 34' tributary.
3. Road segment that parallels the unnamed tributary in the w ½ of se 1/4 section 4, hereafter referred to as 'section 4' tributary.
4. Road segment that accesses site D.

These segments are identified on a map in the Physical Science report in the Analysis Files.

²⁹Reclamation objectives emphasize minimum disturbance rather than re-contoured mine pits.

³⁰Infiltration rate has not been quantified.

The amount of sediment delivery predicted at these sites was estimated by multiplying road width (25 feet, in order to include cut and fill slope), segment length (see Figure 17), and depth of wash (0.25" across the surface). The estimate for depth of wash represents a maximum amount.

Erosion and sediment delivery are currently occurring at these sites, but do not appear to be limiting attainment of beneficial uses. Road use and reconstruction would disrupt the armor layer that develops under conditions of low or no use and delay the on-going recovery of these site. However, in all cases road would be designed to minimize risk of sediment delivery. Figure 17 identifies those alternatives that use these road segments, and the maximum amount of sediment estimated to become delivered to stream channels.

Road construction may also generate sediment. The new road segment of greatest concern is the 0.4 mile Bench Road adjacent to Rough and Ready Creek, included in Alternatives 7, 8 and 10. Coarse and fine material is likely to enter Rough and Ready Creek from this site. It is not possible to accurately estimate the quantity of sediment that would be introduced, but given the length of the road and observations from other sites, it is assumed to be between 50-100 cubic yards of material. Rough and Ready is capable of transporting this material through the system at high flows, but the material would likely remain where it falls during the summer and fall months.

The Proposed Action would also require 0.3 miles road construction within Riparian Reserves between Crossings #3 and #4. This route would need annual reconstruction because it is in Rough and Ready Creek's high water channel.

Road Segment (length)	PA	No Action	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Alberg (5280')	x	existing road	-	-	-	-	-	-
Section 34 (2800')	-	existing road	-	-	-	few trips with tracked vehicles	x	-
Section 4 (2200')	x	existing road	-	-	-	-	-	-
Access to Site D (1000')	x	existing road	x	x	-	-	-	-
New Construction Crossing # 3 to #4 (1580')	x	-	-	-	-	-	-	-
Bench Route (2000')	-	-	-	x	x	-	x	-
Est. Sediment Delivery From Above Roads	193 cubic yds	existing risk	19 cubic yds	119 cubic yds	100 cubic yds	1 to 5 cubic yards	154 cubic yds	existing risk

Figure 17. Sediment Sources and Estimated Delivery to Streams

Airborne dust may also be delivered to streams in the form of fine sediment. The risk of impact to beneficial uses is small and may be mitigated by dust abatement. There exists a trade off between impacts from use of water (discussed later in this chapter) or other dust abatement methods and the small risk of sediment delivery from dust.

The fine sediment washed off of road surfaces and into tributaries during storm events may negatively impact aquatic habitat, and water uses under the Proposed Action. The cubic yards associated with alternatives 6, 7 & 10, while not desirable are very likely not large enough to be measurable. Winter water clarity may be decreased by the Proposed Action, especially during the first storm of the season.

Fine sediment may also be generated at the mining pits and the stockpile sites. These sites are generally situated well away from existing drainage such that erosion is likely to be very minor. The highest risk is associated with ponding of water during the winter months, water over-topping the edge of the pit and gully creation. Pit design would be such that an armored surface or other mitigation would guard against this source. Similarly, the stockpile location would be engineered to mitigate for this concern. Sediment erosion from these sources is anticipated to be minor and less than 2 to 5 cubic yards annually at each site.

The use of Best Management Practices and Road Design Criteria (documented in the analysis files) are essential to reduce the amount of sediment delivered to Rough and Ready Creek from road projects.

Helicopter samples in Alternative 9 could accidentally drop ore during transport, with the possibility of up to 2 cubic yards falling into the creek system. Turbidity could exceed state standards if this occurred.

Indirect and Cumulative Effects

Accelerated sediment delivery can have adverse effects on many beneficial uses, including domestic water quality, swimming, visuals, and fish habitat. Sediment delivery from the alternatives is not likely to significantly degrade drinking water quality or visuals. The main stem of Rough and Ready Creek is noted for its unique geology, which is considered an Outstandingly Remarkable Value (ORV). The increased sediment associated with all action alternatives is not likely to degrade this ORV. However, the Proposed Action and to a lesser extent Alternatives 6, 7, 8, 10 and 11 may result in fine sediment delivery that could degrade summer rearing and/or fall spawning habitat (see detailed discussion about Fish later in this chapter). Mitigation described in Chapter Two would reduce fine sediment.

Past activities within the Rough and Ready Watershed have likely resulted in some accelerated sediment delivery. The amount of sediment or site-specific effects are not known. The amount of coarse material deposited in the braided channels and broad alluvial flats is inherently high. The current situation is considered optimum in terms of sediment regime (see Chapter Three, Figure 14 in the PETS Fish section).

No other proposed projects that might contribute significant volumes of sediment are currently proposed in the area. However, the existing road system would likely be expanded in future proposals given a successful initial operation. Increased sediment is the likely outcome; future approaches to mining would likely include measures to mitigate these effects and fish habitat protection remains a high national priority. Stream temperatures are not likely to increase due to sediment transport. Most of the sediment transport would occur during winter months when temperatures are not in a critical state.

STREAM CROSSINGS

Rough and Ready Creek and its tributaries would be exposed most directly to new sediment at the stream crossings where road fill is placed in the channel. Crossing construction would also result in sediment being supplied to the channel. The proposed crossing sites have been used in the past and disturbance to vegetation has already occurred.

The Proposed Action utilizes low-water fords that would wash out and be replaced annually. The surface of the crossing fill would consist of crushed rock of less than 3 inches, with fines washed out ("washed rock").

Fine Sediment: Prior to winter flow, 100% of fines at low-water fords, 50% of the fines at culvert crossings, and 10% of the fines at bridge approaches, are estimated to be delivered to Rough and Ready Creek. These fines would move as suspended load when the winter flows reach higher levels. The fine material is expected to have a very low clay content, and thus would settle out of water column rapidly. This fine material would likely be transported during the first high-flow event of the season.

Under the Proposed Action, transport of the fines could exceed the '10% above background turbidity' clause under OAR 340-41-365, (2) (c). The operator may apply for a permit for exception from this clause as specified under OAR 141-85-100 et seq (Removal and Fill Permits, Division of State Lands). Downstream water users may find that pumps and filters require more frequent maintenance and replacement, especially if water is withdrawn during turbid winter flows. Turbidity may affect water potability (resulting in a need for additional water treatment).

Alternatives 6, 7, 8, and 11 are associated with negligible risk of adverse impacts, but are likely to meet state standards. No Action and Alternatives 9 and 10 are unlikely to supply enough sediment to have any negative effect.

Coarse Sediment: Coarse sediment is likely to be transported during annual high flows and deposited downstream on Rough and Ready's large alluvial fan. A low water year could result in sediment deposition nearer to the crossings. Significant impacts are unlikely.

Total Sediment: The total amount of sediment estimated to be delivered to Rough and Ready Creek from stream crossings is shown in Figure 18.

	PA	No Action	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Number of Main Crossings	7	Existing fords at Crossings #5, #6, #7.	3	4	2	0	1	1
Number of Tributary Crossings	9	Existing road crosses Alberg Creek 4 times, No Name once	3	3	3	*	1	3
Estimated Cubic Yd. Sediment from Crossings	585	0	35	39	16	<1	5	12

*One tributary crossing is on the Rock Creek route, limited trips with a tracked vehicle are possible.

Figure 18. Number of Stream Crossings and Estimated Sediment Delivery

Indirect and Cumulative Effects

Sediment delivery from the crossings in Alternatives 6 through 11 and No Action is not likely to significantly degrade drinking water quality or visuals. The greatest risk is with the Proposed Action, where local changes in channel slope may occur. Ten years of rock placement and downstream dispersal may become noticeable, but not significant (due the high stream power and the already dramatic effects of coarse sediment deposition at the lower reaches of Rough and Ready Creek and at its confluence of West Fork Illinois River). Increased sediment associated with the Proposed Action and all action alternatives is not likely to degrade the Hydrology/Geology ORV. However, the Proposed Action may block fish passage.

STREAM FLOW and WATER TEMPERATURE

Rough and Ready Creek has inherently low summer flows and high water temperatures. Summer flows are often critically low, and temperatures exceed state water quality standards. Rough and Ready Creek has been legally listed as impaired under the Section 303 (d) of the Clean Water Act. All alternatives would be required to meet DEQ standards relative to water quality and Total Maximum Daily Loads (TMDL) set by the state. Many aspects of the project may be consistent with DEQ and federal standards for water quality. Use of water for dust abatement, use of low-water fords, and development of the road near Crossing #3 are three actions that trend toward increasing water temperature and may not be consistent with standards.

Water Withdrawal for Dust Abatement

The Proposed Action and Alternatives 6, 7, 8, 10 and 11 would require dust abatement on some or all of the haul route. Water from Rough and Ready Creek would be most cost-effective to use in dust abatement and would reduce risk of introducing root disease or other foreign substance via water. Water withdrawal from Rough and Ready Creek, or other streams or rivers, would be subject to a water right by law. Water withdrawal would result in that much less water being delivered to Rough and Ready Creek and the West Fork Illinois River through either surface or subsurface pathways.

The estimated daily use of water varies depending on road use and how much of the road system is watered, air temperatures, soil moisture, and humidity. Use of water for dust abatement could remove up to thousands of gallons for water per day from the creek, leading to lower flows and higher temperatures. Additional water (approximately 70 gallons per piece of equipment) may also be required for equipment washing and for the stockpile site.

Roads are assumed to be 20' wide, and water use is 0.2 gallons per square yard. Watering is assumed to occur 2 times per day for all haul miles.³¹ Both the total estimated gallons of water and the percent of an August low flow value by alternative is displayed below.

	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Gallons per day	0	40,264	43,643	43,362	37,449	0	40,264	27,030
Percent of Low Flow (a 4cfs late August value)	0	1.56	1.69	1.68	1.45	0	1.56	1.05

Figure 19. Water Use Estimates for Dust Abatement

None of the action alternatives withdraw enough water to directly adversely affect aquatic values, however any reduction in water flow **trends** the watershed toward a degraded condition. This trend, while not measurable, would conflict with State Water Quality standards and the Total Maximum Daily Load (TMDL) process. The direct risk is lowest with the No Action and Alternative 9. The remaining alternatives are all very similar in terms of risk.

Use of Low Water Fords

The Proposed Action crossing designs would tend to pond water behind the built up fords and expose greater surface area to solar radiation. The amount of increased radiation would vary by site as a function of the geometry at that site. Generally, crossings with gently sloping banks (e.g. Crossing #1) have proportionally greater widths per rise in water elevation. The increase in water temperature would be negligible, but could lead to local changes in aquatic organisms at the sites and would not be desirable.

³¹The maximum amount of dust abatement is likely to be less than shown here, because not all roads are likely to be used for haul in any single day.

Road Development Near Crossing #3

Road development at Crossing #3, associated with the Proposed Action, may disrupt cold springs or through-flow channels in the No Name Fan Area, and lead to increased summer water temperatures in Rough and Ready Creek. Road construction in this reach is likely to displace the flow of these waters, measured as 5 to 10 degrees cooler than the mainstem creek. However, these changes are unlikely to increase overall temperatures in Rough and Ready Creek.

Indirect and Cumulative Effects - Low flow

Low flows have likely been reduced in the watershed from water withdrawal (see West Fork Illinois River Watershed Analysis for details). Continued development could lead to further withdrawals, depending on State-regulated water rights. Landowners with rights to the Wing and Farren Ditch are exploring ways to improve efficiency of water withdrawal and return water to Rough and Ready Creek.

Water withdrawal may lead to increased temperatures. Future water use would continue to exacerbate the inherently high summer water temperatures. These impacts are further discussed in the sections of PETS Fish and the Aquatic Conservation Strategy. Alternatives that call for potentially more water withdrawal would result in that much less water being delivered to the West Fork through either surface or sub-surface pathways.

If all 512 acres of laterites were mined, the trend toward decreasing water quality would be accelerated. Depending on the amount of road development and water withdrawal, effects could be measurable and could degrade beneficial uses.

Peak Flows

Changes to peak flows are not anticipated in the tributaries or mainstem of Rough and Ready Creek, due to proper drainage achieved with road design standards discussed in Chapter Two.

Compaction of the stockpile site may result in storm water runoff that would require engineering to properly disperse. Under any action alternative, this runoff would be designed to exit the site to a location that would minimize water and sediment delivery to the stream. There is a low risk associated with this issue under any alternative, but the ranking from least to highest risk is: No Action, #6=#7=#8=#10=#11, #9, PA. The Proposed Action (PA) and Alternative 9 have a higher risk because the Alternative 9 proposes a larger stockpile site, and PA proposes a site that is closer to Rough and Ready Creek than any of the other alternatives.

The indirect and cumulative effects of increases to peak flows are not expected to be discernable at the scale of the West Fork of the Illinois River, nor any point downstream. Cumulative impacts to peak flows are expected to be negligible, even if all foreseeable mining occurred. The additional road development would likely occur largely on ridgetops and the pits would likely be designed to drain at a variety of locations, reducing the likelihood that a large volume of overflow would become available to stream system simultaneously.

NICKEL CONCENTRATIONS IN THE WATER

Currently, the concentration of nickel in water samples exceeds the Department of Environmental Quality Ambient Water Standards for fish and water ingestion (13.4 parts per billion - also discussed in Chapter Three). Water samples taken in the mainstem of Rough and Ready Creek ranged from 13 to 17 parts per billion (ppb). Samples taken from tributaries and springs along the creek ranged from 11 to 36 ppb. Samples taken from springs used for drinking water ranged from 30 to 40 ppb. No Action and Alternative 9 would likely continue to generate similar concentrations; these amounts are considered background and inherent to the rock type through which the water flows. The Oregon Department of Environmental Quality is considering whether to list Rough and Ready Creek as Water Quality Limited due to the concentrations of nickel. *There are no current drinking water standards associated with nickel, nor are any of the concentrations reported in any samples cause for concern, according to the Oregon Department of Health* (see Kauffman memo in the analysis files). The mining of the laterite should present no problem to the chemical quality of waters within the watershed (Miller, et al 1998).

The delivery of nickel is associated with weathering of pyroxene and olivine, minerals in the peridotite rocks common in the Analysis Area. The oxidized nickel is not very soluble in the lateritic soil or serpentine rock, thus exposure or removal or stockpiling of these materials would not affect nickel concentrations in the water. The processes that would deliver elements such as nickel would not be affected, nor would any new elements be introduced to the watershed in any alternative. Mining and associated activities may expose the peridotite rock to increased weathering and delivery of nickel.

Road construction, reconstruction and improvement are likely to expose fresh surfaces of peridotite and slightly increase the amount of nickel delivered to surface waters. The use of peridotite as road surfacing could also increase the concentration of nickel in the waters. Increases would be localized, and would spike initially, then progressively fall back to background levels over a period of years to decades. The spike is proportional to the amount of exposure - see figure 20 below. None of the alternatives are likely to significantly increase the nickel delivered to any drinking water sources. The springs beneath Mine Site B are not likely to be affected because all project roads drain well away from the springs. The one drinking water source in Rough and Ready Creek could be affected, but none of the alternatives would increase nickel levels to concentrations thought to harm human or aquatic health.

The IDT considered a recommendation by Dr. Miller from the USGS to avoid the use of peridotite as road surfacing. However, the team found that the risk of import of non-native plants through the use of non-native rock is more significant than the potential increase in nickel, thus continues to support the use of peridotite, as opposed to non-native material, for road surfacing. The mining proponent may request any rock source for use in road improvements under an approved Plan of Operations and the Forest Service would take appropriate action on the request.

	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Acres of Pit developed	0	35	35	35	33	0.5	20	20
Haul Route Miles	0	14.3	15.5	15.4	13.3	0	14.3	9.6
Road Construction Miles	0	0.55	3.8	4.2	4.2	0	1.4	1.25
Road Reconstruction Miles	0	7.7	6.1	5.5	4.9	minor	8.8	6.0

Indirect and Cumulative Effects

Human activities on public and private land in and around peridotite rock may have led to increased concentrations of nickel within the watershed. Road construction, most of the residential development, and mine sampling occurred long enough ago that nickel levels have likely returned to background (Miller, personal communications 1999). Little fresh disturbance has occurred in the analysis area, with the exception of some road work and other development on private land in the lower reaches. Road development that may be necessary to accomplish 512 acres of mining could lead to increased weathering and more nickel in the water.

RISK OF HAZARDOUS MATERIAL SPILLS

The Proposed Action is associated with increased risk of fuel or other hazardous substances accidentally reaching Rough and Ready Creek, especially in the vicinity of the multiple stream crossings. People living within the analysis area have expressed concern that their drinking water could be fouled by an accidental spill. The risk of a serious spill is low, however the consequences may be serious and are dependant upon the beneficial uses of the water and its reaction to the material spilled. The most obvious hazard is hydraulic fluid and gas/diesel leaking or erupting during crossing. Some automotive oils would likely drip from vehicles; a spill plan would be required to respond to spills from broken lines or accidents.

The risk of hazardous substance spills is proportional to the number of exposure opportunities (vehicles crossing channels) and the risk of equipment failure at that moment(s). The risk at each crossing is proportional to stream width (length of exposure to risk), flow (seasonal or perennial), notification and reaction times, equipment quality and equipment maintenance. Crossings of Rough and Ready are wider and therefore pose more risk than tributary crossings. A spill plan is required in all action alternatives, including the Proposed Action and Alternative 9.

Figure 20 shows the number of annual round trips for ore trucks and the numbers of stream crossings for each alternative. This number does not include service or administrative vehicles, equipment move in and out, and other trips (estimated to increase the number of trips by about 15 to 20 percent). The risk of fluid spill is higher with alternatives that have more trips or more crossings. Alternatives 6 and 10 have relatively greater risk because they use smaller trucks that would require more trips to haul the same amount of ore. Approximately 20% additional traffic may be expected from incidental trips other than ore haul. No Action and Alternative 9 continue the current very low risk.

	Proposed Action	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Annual Number Round Trips	3,390	5,700	3,390	3,150	no ore hauling with trucks	3,100	1,940
Number Major Crossings	7 fills	3 bridge	3 bridge	2 bridge	none	1 bridge	1 bridge
Number Tributary Crossings	9	3	3	3	none with ore trucks	0	3

Figure 20. Estimated Number of Round Trips and Numbers of Crossings

Some residents drink water directly from the stream, thus a hazardous material spill could affect public health, especially in the event that the spill goes unnoticed and hazardous materials are ingested. This risk is low, but not zero. Compliance with state law would require reporting.

The potential for hazardous material to enter the groundwater also exists. Transport through the groundwater net and porous spaces in the soil make it far less likely that contamination would affect many, if any human water uses (shallow wells). PETS fish and other aquatic organisms may also be killed by a major spill. No other activities that could increase the risk of hazardous material spill are known in the analysis area.

A fuel transportation plan is required in all action alternatives. The plan would assure that fueling is done outside riparian reserves and proper safeguards for fuel transportation are in place. In Alternatives 6, 7, 8, 10, 11 and the Proposed Action, fuel would be transported in pick-ups or other small trucks. Under Alternative 9, fuel would need to be transported via helicopter.

Fears about toxicity of the ore and drinking water quality have been raised and are discussed elsewhere in this chapter. The mining of the laterite should present no problem to the chemical quality of waters within the watershed (Miller, et al 1998). No sulfides are known to occur within the watershed, thus acid mine drainage is not likely.

The pits themselves may fill up with water and produce conditions which would result in a chemical reduction of iron and other metals. This reduction would be similar to that of existing Darlingtonia bogs and ponds located on public and private lands within serpentine soils within the watershed and across the county. No adverse reactions from these existing water saturated conditions have occurred. No adverse chemical reactions are predicted if the pits do fill up with water and produce similar chemical conditions.

PROPOSED, ENDANGERED, THREATENED and SENSITIVE (PETS) FISH SPECIES

Figure 21 displays potential effects of the Proposed Action and its alternatives on the Fish Habitat Indicators discussed in Chapter Three.

Factors Indicators	Lower Rough and Ready Creek Reach (Response Reach)			Effects of the Proposed Action, Action Alternatives, and the No Action Alternative		
	Optimum	Marginal	Outside Optimum Range	Restore	Maintain	Degradate
<u>Water Quality</u> Temperature			x		6,7,8,9,10,11, NA	PA
<u>Habitat Access</u> Physical Barriers		x			6,7,8,9,10,11, NA	PA
<u>Habitat Elements</u>						
Sediment	x				NA,9	PA, 6,7,8,10,11
Large Wood		x			6,7,8,9,10,11, NA, PA	
Pool Character and Quality		x			PA, 6, 9, 11, NA	7,8,10
Off-channel Habitat		x			6,7,8,9,10,11, NA	PA
<u>Channel Conditions and Dynamics</u>						
Width/depth ratios		x			PA,6,7,8,9,10, 11, NA	
Stream-bank Condition		x			9,11, NA	PA, 6,7,8,10
Floodplain Connectivity		x			6,7,8,9,10,11, NA	PA
<u>Flow/Hydrology</u> Changes in peak flows	x				PA,6,7,8,9,10, 11, NA	
<u>Watershed Conditions</u>						
Road Density / Location		x			NA, 9	PA, 6,7,8,10,11
Human Disturbance History		x			NA	PA, 6,7,8,9,10,11,
Riparian Reserves		x			NA,9	PA, 6,7,8,10,11
Landslide and Erosion Rates	x				NA,9	PA, 6,7,8,10,11
<u>Harassment or Incidental Take</u>	x				NA,9	PA,6,7,8,10,11

Figure 21. Matrix of Factors and Indicators for Fish Habitat - Effects of the Alternatives

Discussion of Potentially Degraded Factors or Indicators

Temperature - The Proposed Action may result in increased water temperature in the vicinity of stream crossings. None of the other Alternatives are associated with this risk. The design of the crossings under the Proposed Plan of Operations may not meet state water quality standards relative to temperature.

Habitat Access - Low-water fords associated with the Proposed Action may impede fish passage at main stem and South Fork Rough and Ready Creek crossings during low flows, thus the “degrade” rating. Avoiding crossings or using bridges would maintain existing habitat access. Water withdrawals for the Nicore project are not expected to affect fish passage.

Sediment Regime - The previous discussion on sediment reveals that all action alternatives may increase the risk of fine sediment reaching the main channel of Rough and Ready Creek. Fine sediment delivery can reduce overall carrying capacity in the immediate vicinity of the proposed stream crossings, relative to both summer rearing and fall spawning habitat. Chinook salmon that may spawn immediately downstream of the proposed crossings may suffer from increased fines covering nests. At these sites, intra-gravel fines may be increased greater than 20 percent above existing background prior or just after fall spawning (see S&G 11-3 in the Siskiyou National Forest Plan). Steelhead, spawning much later in the season, are not likely to be adversely affected by this sediment. Some direct impacts to aquatic organisms can be expected during Bench Road construction. Sediment contributed from the road construction would likely be flushed out during high flows, but carrying capacity during low flows could be reduced until the sediment is transported downstream.

Large Wood - No significant direct effects on large wood would be expected from the alternatives. However, if Port-Orford-cedar root disease is introduced into these areas, the supply of large wood to the creeks may eventually (over decades) become degraded.

Pool Quality and Character - Main channel pool quality and character is likely to be maintained in all Alternatives. The “degrade” rating for Alternatives 7, 8 and 10 is related to the potential for large pieces of bedrock to be pushed into the creek from the Bench Road construction. This potential would be somewhat mitigated through road construction specifications, but cannot be completely eliminated.

Off Channel Habitat - The Proposed Action could potentially degrade off channel tributary habitats adjacent to the confluence of No Name Creek and the main stem of Rough and Ready Creek. All other alternatives are expected to maintain these habitats.

Stream Bank Condition - The Proposed Action and Alternatives 6, 7, 8, and 10 have the potential to degrade stream bank conditions at the proposed stream crossings through loss of vegetation, disruption of streamside springs, and bank erosion. The existing crossings have already disturbed streambanks in some locations. The Proposed Action is associated with the highest risk of further degradation. The No Action Alternative, Alternative 9 and Alternative 11 are expected to maintain the current condition.

Floodplain Connectivity - The Proposed Action would develop a road that may impact the No Name Fan, with the potential to disrupt floodplain connectivity between Crossings #3 and #4. The alternatives avoid this possibility.

Watershed Condition - Human disturbance would be increased in the Proposed Action and all action alternatives. All (except Alternative 9) include road development within Riparian Reserves. The more road development, including crossings, the more potential to degrade the watershed condition. Gates would mitigate some, but not all of the risk. Alternative 9 would constitute human disturbance in the area for five years, other alternatives would continue disturbance for ten years.

Harassment or Incidental Take - All Action Alternatives increase the risk of harassment and/or incidental take. Bench Road construction within Alternatives 7, 8 and 10 include additional risk from the blasting or ripping of bedrock immediately adjacent to the main stem, which could result in the direct take of steelhead. Mitigation to reduce the risk of rock fall into the creek would be employed.

Biological Evaluation Summary

The Proposed Action and Alternatives 6, 7, 8, 10 and 11 are associated with “**May Affect, Likely to Adversely Affect**” findings³² for chinook and coho salmon (chinook are proposed for listing under the Endangered Species Act, coho are currently listed as threatened). Critical habitat for these species (300 feet on either side of coho-bearing streams) may be adversely affected by these alternatives. Alternative 9 and No Action are associated with a “**No Effect**” finding for chinook and coho.

The Proposed Action and action alternatives **May Impact** the R6 sensitive species’ steelhead and cutthroat trout but **Will Not Likely Contribute** to a trend toward a federal listing or cause a loss of viability to the population or species.

Cumulative Effects

Active and proposed projects on federal lands that may affect listed species are submitted to the National Marine Fisheries Service (NMFS) as part of an annual programmatic Biological Assessment for Rogue River basin fish species. NMFS is aware of the Nicore project, but since the Preferred Alternative has no effect on any listed or sensitive fish, formal consultation was discontinued.

Within the watershed, the effects of past activities on fish are unknown. Three water diversions on the main stem inhibit adult fish migration during low flow conditions. The conditions for fish prior to construction of the diversions is unknown.

Many fish habitat characteristics would be affected by foreseeable future mining. Adverse effects on physical conditions described above (sediment, temperature, streamflow) could reduce carrying capacity for fish. Trends toward warming water could change the population and distribution of some species. Factors and Indicators degraded under the PA would be further degraded given mining of all 512 acres of laterite ore and haul via road. Other indicators could also be at risk (large wood, pools).

³² “Likely to adversely affect” means that the project has more than a negligible potential to adversely affect these species. The finding is based on the Matrix of Factors and Indicators.

POR-T-ORFORD-CEDAR ROOT DISEASE

The Proposed Action, and Alternatives 6, 7, 8, 10 and 11 all increase the risk of importing Port-Orford-Cedar (POC) root disease into the analysis area. Mitigation measures can effectively reduce the risk, given consistent application.

The amount of POC along the haul routes affects the degree of risk. The consequences of disease introduction are site-specific. The West Fork Illinois River Watershed Analysis and physical science reports further describe the function of POC and factors related to root disease spread in the area.

If introduced, the disease would have its greatest impact along Alberg Creek (particularly one mile through Section 10). POC is the major large tree component in this area, and understory POC are lacking. Alternatives 6 through 11 avoid this route.

The No Name Fan is another area of specific concern where about 5 acres of large POC are growing. This fact that this area is low-lying and tends to concentrate water also increases the risk of POC root disease infestation. Alternatives 6 through 11 avoid this area. The Proposed Action would traverse it twice.

POC is the primary shade-producing tree in Alberg Creek and the No Name Fan area; water temperature at these locations may increase over time if the trees die. The ridge-top road to Site A is associated with some concern that it could facilitate unrestricted access from Parker Creek.

The following mitigation measures would apply to the Proposed Action and alternatives as applicable:

- a wash station equipped with high pressure water equal to or greater than 125 psi through a quarter inch nozzle and adequate drainage. The wash station may be located in Cave Junction.
- equipment would have to be washed before operations begin or if the equipment works elsewhere and returns mid-season
- Water used for washing vehicles would come from a clean source (as defined by the Forest Service/BLM) or would be treated with clorox.
- Road construction and improvement work would be done during the dry season (June 15 through October 15 - work on the north side of Rough and Ready Creek would not occur after September 15 except under the Proposed Action and Alternative 11). No wet season operation would be approved.
- Road specifications would establish and maintain an inslope road template and berms to prevent downslope flow (as topography and site conditions allow).
- Clean sources of rock would be required for road surfacing (as defined by the Agencies).
- Road improvement specifications consider adding rock to wet spots.
- Where possible, coordinate prevention and disease control activities with adjacent landowners and Agencies.
- Roadside Sanitation of POC (Removing POC from within 25 feet of roads)
- Lifting and paving of the roadway 50 feet on either side of infested areas near the West Fork Illinois River (applies only to Alternative 10).

Port-Orford-cedar Root Disease Risk Assessment by Alternative

The Proposed Action - The Proposed Action crosses Alberg Creek several times. It includes two or more routes across the No Name Fan area where there are some large POC. The risk is reduced by limiting operations to the dry season. The risk would be highest when roads were wet but passable.

The No Action Alternative - The No Action Alternative continues the existing risk of introduction of POC root disease into the analysis area. The risk is highest along the private land in Section 14. POC grows along the ditch on the private road. Residential traffic is likely to import the disease in the foreseeable future. Residents could employ disease control measures such as roadside sanitation to reduce the risk of introduction. This analysis assumes that residents do not employ such measures. Another potential introduction site is the Mars swimming hole, also in Section 14. Alberg Creek would remain inaccessible, which reduces the risk of disease introduction into that drainage.

Alternative 6 - Alternative 6 includes a haul route along private Rough and Ready Creek Road, which is a high risk area for introducing the disease. The high number of trips through the private land exacerbates the risk. The crossing of No Name Creek is another potential risk site. Construction of the ridge road could make access from the north (via Parker Creek) possible during the wet season. Paving the private road would also reduce the risk. The residents along the private road would be encouraged to agree on disease control measures.

Alternative 7 - Alternative 7 is associated with fewer risk factors than the Proposed Action or Alternative 6. Alternative 7 constructs the ridge road, which could make access from the north (via Parker Creek) possible during the wet season. It also includes the crossing of No Name Creek on Road 438.

Alternative 8 - Alternative 8 is associated with risk similar to Alternative 7. The road to Site D would be eliminated, but that route does not have significant populations of POC.

Alternative 9 - Alternative 9 is also expected to maintain the existing condition relative to POC introduction. Access to the two areas of most greatest concern would be eliminated. Bringing tracked vehicles to Site B via the Rock Creek route moves equipment between an infested area (West Fork Illinois River) and an uninfested area (away from the river toward Rough and Ready Watershed). Limits on the number of trips and timing of the trips (dry season only) and equipment cleanliness is expected to effectively reduce the risk of spreading the disease. See Appendix J for a containment strategy specific to Alternative 9.

Alternative 10 - Alternative 10 accesses Site B (and the cable landing site for Site D) from the Wimer Road. POC root disease is spreading down the West Fork Illinois River and has been found along the Wimer Road. Alternative 10 would increase the risk of spreading the disease to healthy populations of POC above the Wimer Road toward Site B. Lifting and paving the road on either side of infested sites near the Illinois River would be recommended. Alternative 10 would include a crossing of No Name Creek.

Alternative 11 - Alternative 11 includes a haul route along private Rough and Ready Creek Road, which is a high risk area for introducing the disease. Alternative 11 would make fewer trips, therefore the risk is reduced as compared to Alternative 6. The risk would also be increased by installing a year-around bridge could allow traffic when the roads are wet. However, roads would not be improved to Site A or D, reducing the accessible mileage. The crossing of No Name Creek is another high risk site.

Dr. Don Zobel of Oregon State University has stated that the risks and consequences of POC root disease introduction are greater than estimated in this EIS. The Agencies acknowledge that Dr. Zobel is a credible expert regarding POC and the disease. The mitigation measures considered will not completely eliminate the risk of introduction.

NOXIOUS WEEDS

In general, weed competition is not a significant threat to sensitive plant habitat within the project area, still, measures to reduce the risk of spreading weeds are recommended.

Proposed Action - The Proposed Action is associated with the greatest risk of spread of noxious weeds. It increases access throughout the watershed. It also includes a stockpile site very near the known star thistle population.

No Action Alternative - The No Action Alternative maintains the current risk of spread of noxious weeds. Much of the analysis area is not accessible to motorized vehicles, and traffic via the existing road on private land is limited by residents. The private land and miner's residence are areas of the highest risk of establishment of noxious weeds.

Alternative 6 - Alternative 6 includes access via the higher risk private Rough and Ready Creek Road. It also would construct 3.8 miles of new road, and improve access along a ridge between Parker and No Name Creeks. It would include mitigation to reduce the risk of spreading noxious weeds. Access would be limited to mining-related traffic. Vehicle washing included in the POC mitigation would also help reduce the spread of noxious weeds from outside the analysis area. The alternative stockpile site would be located away from known noxious weed populations.

Alternative 7 and 8 - Alternatives 7 and 8 include about 4.2 miles of new road construction. Disturbed areas such as new roads are associated with increased risk of noxious weeds establishment. This alternative would include mitigation to reduce the risk of spreading noxious weeds. Access would not be increased into the watershed for all but mining-related traffic. Vehicle washing included in the POC mitigation would also help reduce the spread of noxious weeds from outside the analysis area. The alternative stockpile site would be located away from known noxious weed populations.

Alternative 9 - Alternative 9 is also expected to maintain the existing condition relative to noxious weeds. Use of helicopters versus trucks significantly decreases the risk of spreading weeds to the mine sites and along haul routes. Risks of spreading weeds would be low. Helicopters would not land at any mine sites. Mitigation is in place to reduce or eliminate risks. Monitoring for the spread of noxious weeds would be required. Alternative 9 would locate the stockpile site away from noxious weeds. Mitigation regarding POC would also help reduce the risk of noxious weeds.

Alternative 10 - Alternative 10 increases access up the Rock Creek Road. The Wimer Road is a higher risk area for introduction of noxious weeds due to unrestricted public traffic. A large population of scotch broom exists along the Wimer Road between Hwy 199 and the National Forest Boundary. A cooperative agreement with private landowners to eradicate this population of scotch broom is recommended. Alternative 10 would include mitigation to reduce the risk of spreading noxious weeds. Vehicle washing included in the POC mitigation would also help reduce the spread of noxious weeds from outside the analysis area. The alternative stockpile site would be located away from known noxious weed populations.

Alternative 11 - Alternative 11 would use the private Rough and Ready Creek route, which is a high risk area. Alternative 11 also includes a mile of new road construction. It would include mitigation to reduce the risk of spreading noxious weeds. Access would be limited to mining-related traffic. Vehicle washing included in the POC mitigation would also help reduce the spread of noxious weeds from outside the analysis area. The alternative stockpile site would be located away from known noxious weed populations.

BOTANICAL DIVERSITY/SENSITIVE PLANTS

Several FS sensitive and BLM special status plants are found along the haul route and mine sites proposed in various alternatives. Direct negative effects can include uprooting, burial, or crushing of plants while excavating the mine sites, or upgrading, building, or maintaining roads. Ore stockpiling can also bury or crush plants. Indirect impacts include soil disturbance that may render the habitat unsuitable for the plants. Light soil disturbance favors establishment and growth for some rare species (such as Howell's mariposa lily and Howell's streptanthus). Intense soil disturbance would have negative effects on Howell's mariposa lily, Siskiyou fritillaria, red-root yampah, and Siskiyou butterweed. Heavy soil disturbance, including churning and compaction, is incompatible with maintenance of suitable habitat for rare plants--the plants cannot survive or colonize heavily disturbed sites. Mining and road development and use would lead to heavy disturbance.

Within the analysis area, suitable habitat for many species exists, but is currently not occupied. Some of this suitable, but unoccupied, habitat may be disturbed through the mining and associated activities.

Soil disturbance may also favor noxious weeds or other more common plants. Reclamation is not expected to completely restore the area to pre-mining conditions and recovery is expected to be slow.

Some people have suggested that dust and air pollution generated by the project could affect vascular or other plants (lichens, mosses, etc.). Some effects are possible, but would be limited by meeting all air quality standards and the use of dust abatement. Dust and air pollution are not likely to have detectable impacts.

Roads may also adversely affect some plant habitats through disruption of drainage. Road drainage may also create new wet habitats. Individual plants may be affected by drainage disruptions. The impacts cannot be precisely predicted. Most impacts would be avoided through careful road design but some risk would remain.

Figure 22 displays the numbers of sites documented within 100 feet of the haul routes, or within the mine sites themselves. Most of the data comes from surveys completed in 1997 and 1998. Surveys were concentrated along the haul route and within the mining sites; this is an appropriate survey strategy for a project of this scale. The No Action Alternative would not directly impact any of these sites.

	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Number of Species on Haul Route/Mine Sites	57	64	84	60	10	81	38
Number of Plant Sites on Haul Route/Mine Sites	11	10	11	11	3	12	8

Figure 22. Numbers of PETS Plant Species and Plant Sites on the Haul Routes

Botanical Evaluation Summary

FS policy requires preparation of a Biological Evaluation (BE) so that PETS species receive full consideration in the decision-making process (FSM 2672.41). Discussions about the rare plant protection policies of both agencies are in the analysis file. Appendix G included in this FEIS describes the locations and impacts predicted from the Proposed Action and alternatives in more detail.

The findings displayed here are based on the worst case scenario. The species associated with “Will Impact” findings are Oregon Natural Heritage Program (ONHP) List 1 and/or potential impacts sites are located within “selected habitat” identified in Draft Species Management Guides. The “Will Impact” findings may be reduced during implementation if the road can be routed around significant sites.

Arabis “macdonaldiana” is listed as Endangered under the Endangered Species Act. It is also an Oregon Natural Heritage Program (ONHP) List 1 species. The Proposed Action and Alternatives 6, 7, 8 and 10 are associated with a “May Effect - Likely to Adversely Affect” finding. This finding may be reduced to “May Effect - Not Likely to Adversely Affect” by routing the road away from the known sites. No Action, Alternative 9, and Alternative 11 avoid these sites and are associated with a “No Effect” finding. Formal consultation with Fish and Wildlife Service has not been initiated since the Preferred Alternative is associated with No Effect. If the Proposed Action or Alternatives 6, 7, 8 or 10 were selected, consultation would be required.

Calochortus howellii is a BLM sensitive species, a FS R6 sensitive species, and is an ONHP List 1 species. A Draft Conservation Management Guide has been prepared for this species. The population along the haul route lies within “selected habitat” in the Draft Guide. It is abundant within its selected habitat, and the haul route makes up a limited portion of the area. It may also be impacted by the Proposed Action stockpile site.

For the Proposed Action and all action alternatives (except Alternative 9), this species is associated with a “**Will Impact Individuals or Habitat with a Consequence that the action May Contribute to a trend towards federal listing or a loss of viability to the population or species**” finding. The alternative stockpile site would avoid this plant. In addition, bulbs may be removed from the impacted area and replanted in a more protected area. No Action and Alternative 9 are associated with a “**May Impact**” finding due to the effects of the existing roads.

Cardamine nuttallii var. gemmata is a R6 sensitive species. The Proposed Action and Alternatives 6, 7, 8 and 10 is associated with a “**May Impact Individuals or Habitat but Will Not Likely Contribute to a trend towards a federal listing or cause a loss of viability to the population or species**” finding. A close relative *Cardamine nuttallii var. dissecta* is a BLM “tracking species”. It is within 100 feet of the haul route on BLM. No Action, Alternative 9 and Alternative 11 have a **No Impact** determination for this species.

Epilobium oreganum is a FS R6 sensitive species, a BLM sensitive species and an ONHP List 1 Species. Alternative 10 “**May Impact Individuals or Habitat but Will Not Likely Contribute to a trend towards a federal listing or cause a loss of viability to the populations or species**”. The Proposed Action and all other alternatives are associated with a “**No Impact**” finding.

Gentirana setigera is a FS R6 sensitive species and an ONHP List 1 Species. The Proposed Action and all alternatives except Alternative 10 are associated with a “**No Impact**” finding. Alternative 10 is associated with a “**Will Impact Individuals or Habitat with a consequence that the action May Contribute to a trend towards federal listing or a loss of viability to the population or species**” finding.

Fritillaria glauca is a FS R6 sensitive species and BLM special status species. No Action and the Preferred Alternative 9 are associated with **No Impact**. The Proposed Action and all other action alternatives are associated with a “**May Impact Individuals or Habitat but Will Not Likely Contribute to a trend towards a federal listing or cause a loss of viability to the population or species**” finding.

Microseris howellii is a FS R6 sensitive species, a BLM special status species and an ONHP List 1 species. It is also considered “Threatened” on lands managed by the State of Oregon. A Draft Species Management Guide has been prepared for this species, and selected habitat includes the Rough and Ready Botanical Area and ACEC. No Action and Alternative 9 are associated with a “**No Impact**” finding for this species. The Proposed Action and Alternatives 6, 7, 8, 19 and are associated with a “**Will Impact Individuals or Habitat with a Consequence that the action May Contribute to a trend towards federal listing or a loss of viability to the population or species**” finding.

Mimulus douglasii is a BLM tracking species. One site has been documented on BLM near the haul route. This site is expected to be avoided through careful road activities. The Proposed Action and all action alternatives are associated with a “**May Impact Individuals or Habitat but Will Not Likely Contribute to a trend towards a federal listing or cause a loss of viability to the population or species**” finding. No Action is associated with a “**No Impact**” finding for this species.

Monardella purpurea is a FS Sensitive Species and a BLM special status species. A Draft Species Management Guide has been prepared for this species. Selected habitat occurs within the West Fork Illinois River Watershed. No Action and Alternative 9 are associated with a “**No Impact**” finding for this species. The Proposed Action and Alternatives 6, 7, 8, 10 and 11 are associated with a “**Will Impact** Individuals or Habitat with a consequence that the action **May Contribute to a trend towards federal listing or a loss of viability to the population or species**” finding.

Perideridia erythrorhiza is a FS R6 and BLM special status species and an ONHP List 1 species. There are few known sites on the Siskiyou National Forest. No Action and Alternative 9 are associated with “**No Impact**”. The Proposed Action and Alternatives 6, 7, 8, 10 and 11 are associated with a “**Will Impact** Individuals or Habitat with a Consequence that the action **May Contribute to a trend towards federal listing or a loss of viability to the population or species**” finding for this species.

Salix delnortensis is a FS R6 sensitive species and a BLM special status species. No Action and Alternative 9 are associated with a “**No Impact**” finding. The Proposed Action and Alternatives 6, 7, 8, 10 and 11 are associated with a “**May Impact** Individuals or Habitat but **Will Not Likely Contribute** to a trend towards a federal listing or cause a loss of viability to the population or species” finding.

Senecio hesperius is a FS R6 and BLM sensitive species, and an ONHP List 1 species. A Draft Species Management Guide has been prepared that considers the Rough and Ready Botanical Area selected habitat. No Action and Alternative 9 are associated with a “**May Impact**” finding, due to locations on existing roads. The Proposed Action and Alternatives 6, 7, 8, 10 and 11 are associated with a “**Will Impact** Individuals or Habitat with a Consequence that the action **May Contribute to a trend towards federal listing or a loss of viability to the population or species**” finding. This species may also occur in the Proposed Action stockpile site. The alternative site avoids this species.

Streptanthus howellii is a FS R6 and BLM sensitive species, and an ONHP List 1 species. For the Proposed Action and Alternatives 6, 7, 8, 10 and 11, this species is associated with a “**Will Impact** Individuals or Habitat with a Consequence that the action **May Contribute** to a trend towards federal listing or a loss of viability to the population or species” finding. Alternative 9 is also associated with a “**Will Impact**” finding, however, it is **not likely** to result in a trend toward federal listing or cause a loss of viability. No Action is associated with a “**May Impact**” finding, due to effects from existing roads to this species.

Viola primulifolia ssp. occidentalis is a FS R6 and BLM sensitive species, and an ONHP List 1 species. It grows in fens with other Siskiyou endemic species including darlingtonia. The haul route in all alternatives (except 9) comes very close to one fen where this plant grows. Road widening in Alternative 10 may also lead to adverse effects. Thus, the Proposed Action and Alternatives 6, 7, 8, 10 and 11 are associated with a “**May Impact** Individuals or Habitat but **Will Not Likely Contribute** to a trend towards a federal listing or cause a loss of viability to the population or species” finding. No Action and Alternative 9 are associated with “**No Impact**.”

Cumulative Effects

Much of the project area has been impacted by mining, roading, and botanical collecting of rare plants. The pre-settlement distribution of rare plants is unknown. Most of the private lands have been cleared or otherwise developed.

If the laterite mining proved successful, more habitat and individual plants would likely be disturbed as more of the deposit was mined. Cumulative impacts are not precisely known, since the population distribution on all laterite deposits have not been inventoried. Cumulative impacts are likely similar to direct and indirect impacts; plants that grow along the haul route and within the mine sites are also likely to be found in neighboring areas. Continued inventories are recommended and may be required for future Plan of Operations that disturb more lands.

ACEC and MA-4 (Botanical Area) Standards and Guidelines

BLM and FS guidelines emphasize protection of the botanical resources in these areas. The overall principle of management for Botanical Areas is described in the Siskiyou National Forest Plan:

“Natural, physical and biological processes will prevail without human intervention. Plant life inhabiting this ecosystem will continue to flourish. The goal is to protect, preserve, and enhance the exceptional botanical features of the area.”

FS S&G MA4-10 states that “every effort should be made to protect botanical resources, especially sensitive plant species.” The mitigation described in Chapter Two is intended to meet this guideline.

About 7.7 miles of road currently exist within the Botanical Area and ACEC. Mine site C is within the Botanical Area; no sensitive plants are documented at the mine site. Reclamation is not expected to completely restore the area to pre-mining conditions and recovery is expected to be slow.

	PA	NA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Mi. New Construction in FS MA-4	0.3	0	0	0.4	0.4	0	0.4	0
Mi. Haul Route in FS MA-4	3.8	0	2.9	3.8	2.8	Limited Trips	3.5	1.9
Mi. ACEC Road Development	0.75	0	0.75	0.75	0.75	0.75	0.75	0.75

Figure 23. Road Construction and Reconstruction within the Botanical Area and ACEC.

ACEC guidelines are in the ACEC Management Plan. The use of the ACEC for stockpiling and ore haul is consistent with the guidelines.

AQUATIC CONSERVATION STRATEGY and RIPARIAN RESERVE STANDARDS AND GUIDELINES

Aquatic Conservation Strategy

This analysis of the Aquatic Conservation Strategy objectives integrates many of the previous discussions and provides further context for analysis of direct, indirect, and cumulative effects.

- 1. Maintain and restore the distribution, diversity and complexity of watershed and landscape-scale features to ensure protection to the aquatic systems to which species, populations and communities are uniquely adapted.*

The Proposed Action and all of the alternatives may be expected to maintain the distribution, diversity, and complexity of the Rough and Ready Creek watershed and landscape-scale features.

- 2. Maintain and restore spatial and temporal connectivity within and between watersheds. Lateral, longitudinal, and drainage network connections include floodplains, wetlands, upslope areas, headwater tributaries, and intact refugia. These network connections must provide chemically and physically unobstructed routes to areas critical for fulfilling life history requirements of aquatic and riparian-dependent species.*

Spatial and temporal connectivity would be degraded by road development and use between Crossings #3 and #4 in the Proposed Action and maintained in all other alternatives.

- 3. Maintain and restore the physical integrity of the aquatic system, including shorelines, banks, and bottom configurations.*

The physical integrity of the aquatic system as a whole is likely to be maintained, however shorelines and streambanks may be degraded at stream crossings in all action alternatives except 9. Alternatives that reduce the number of stream crossings (10, 11) better meet this objective.

- 4. Maintain and restore the water quality necessary to support healthy riparian, aquatic, and wetland ecosystems. Water quality must remain within the range that maintains the biological, physical, and chemical integrity of the system and benefits survival, growth, reproduction, and migration of individuals composing aquatic and riparian communities.*

Water quality may be degraded in all of the action alternatives except #9 (see physical science report). State water quality standards may be exceeded for short duration and distance downstream from the crossings, which leads to a degrade finding for sediment relative to the PETS fish analysis previously discussed.³³ The Proposed Action, with its low water fords and greatest amount of riparian disturbance, would have the greatest impact on water quality. The project is associated with a variety of risks, including potential for slope instability at Mine Site D, additional sediment delivery from road construction and reconstruction, increased nickel concentrations and hazardous substance spills at crossings.

³³Duration and distance downstream varies with the size of the storm event. Bedload movement on coarsely bedded stream channels has been shown to be chaotic, with material moving 10's to 100's of feet downstream following flows large enough to mobilize the bed material.

Unless there are high magnitude landslides, and/or serious hazardous material spills, the water quality would be expected to remain within the range that currently supports biological, physical, and chemical integrity.

5. Maintain and restore the sediment regime under which aquatic ecosystems evolved. Elements of the sediment regime include the timing, volume, rate, and character of sediment input, storage and transport.

Site-specific changes in timing (under low flow conditions), volume, rate, and character of sediment input, storage, and transport can be expected in the vicinity of the proposed vehicle crossings and along road segments very close to streams. Direct impacts to individual aquatic organisms are possible during road development activities and use. See sections on slope stability and erosion, and stream crossings for alternative comparisons. In general, the Proposed Action is associated with the greatest risk of increased sediment and Alternative 11 is associated with the least risk (except for No Action and Alternative 9, which have no road development in riparian reserves).

6. Maintain and restore in-stream flows sufficient to create and sustain riparian, aquatic, and wetland habitats and to retain patterns of sediment, nutrient, and wood routing. The timing, magnitude, duration, and spatial distribution of peak, high and low flows must be protected.

The Proposed Action and all of the alternatives are expected to maintain in-stream flows sufficient to create and sustain riparian and aquatic habitats. Water withdrawal of several thousand gallons per day may occur within the Proposed Action and Alternatives 6, 7, 8, 10, and 11, given a state water right. Wetland habitat associated with the "No Name Fan" would be degraded in the Proposed Action. Alternatives 6, 7, 8, 10, and 11 cross the fan, but avoids most of it. Wetland habitat also occurs near Crossing #6, the Proposed Action, and Alternatives 6 and 7 may impact this habitat. The use of the existing Alberg road may interfere with down wood routing in the Proposed Action.

Impacts to peak flows are not expected, due to low road density overall. While the risk is very low to non-existent any alternative, it is higher under those alternatives that reconstruct and use the greatest number of road miles.

7. Maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows and wetlands.

Road development within the Rough and Ready floodplain is not expected to affect the timing, variability, and duration of the floodplain inundation. Neither stockpile site lies within the federally mapped 100 year floodplain. However, the placement of the stockpile under the Proposed Action is adjacent to an overflow channel that is visible on air photographs.

Some impacts to small wetlands and fens may occur from road development near Crossings #1, #3, and #6. The effects to wetlands and springs varies by alternative. The wetland/spring complex near Crossing #3 would be particularly affected by the Proposed Action. Construction and reconstruction roads in this area would disrupt flow patterns; exact results can not be predicted, but it is likely that some wetland habitat would be displaced and some may be lost.

Other roads proposed for new construction do not cross known wet areas. The small wet area near

Crossing #6 may already be impacted by the existing road, through concentration and routing of water down the road. The Proposed Action and Alternatives 6 and 7 would maintain this road and could result in further down-cutting of the road surface and change surface and groundwater distributions in the vicinity of the wet area. Bedrock springs that are recharged by deep ground water sources are not expected to be influenced by this project.

8. *Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of woody debris sufficient to sustain physical complexity and stability.*

Some plant species within riparian areas may be affected by road construction, reconstruction and use within all of the action alternatives except Alternative 9 (see Sensitive Plant analysis). Rare species at risk include fen species such as darlingtonia and western bog violet, and riparian species such as Del Norte willow. Alternatives that reduce the amount of road development in riparian areas are associated with less risk. Structural diversity of plant communities, and maintenance of summer and winter thermal regulation are not likely to be directly affected by any alternative; however, indirect effects based on the introduction of POC root disease may, in the long run, reduce diversity and thermal regulation within Alberg Creek and the No Name Fan area. Noxious weed introduction could also indirectly impact species composition and structural diversity by out-competing native vegetation. Loss of vegetation is not likely to affect maintenance of nutrient filtering, and/or appropriate rates of surface erosion, and channel migration. Bank erosion may be accelerated by loss of vegetation at crossings (see physical science report for alternative comparison).

9. *Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species.*

The Proposed Action and all alternatives are expected to maintain habitat to support well-distributed populations of wildlife within the analysis area. No wildlife species would be extirpated or otherwise significantly affected by the project. Many sensitive plant species, however, may be adversely affected by the alternatives.

Riparian Reserve Standards and Guidelines

Roads Management

RF-1. Federal, state, and county agencies should cooperate to achieve consistency in road design, operation and maintenance necessary to attain Aquatic Conservation Strategy Objectives:

The Forest Service is working with the BLM and state agencies to achieve consistency in road design, maintenance and overall access.

RF-2. For each existing or planned road, meet ACS objectives by:

a. minimizing road and landing locations in Riparian Reserves

The Nicore project requires significant road development within Riparian Reserves. Figure 24 shows the amount of road development and new construction within Riparian Reserves, and numbers of major and tributary stream crossings. Those alternatives with the least road development within the reserves, and with the fewest stream crossings, would best meet this guideline. The Proposed Action does not minimize disturbance to Riparian Reserves.

	Alternatives						
	PA	6	7	8	9	10	11
Mi. New Road in Riparian Reserves (RR)	0.3	0	0.4	0.4	0	0.4	0
Mi. Haul in RR	4.6	2.4	3.1	1.8	0	1.4	1.1
No. Major Stream Crossings	7	3	4	2	0	1	1
No. Tributary Crossings	9	3	2	2	1	1	3

Figure 24. Road Development and Use Within Riparian Reserves

b. completing watershed analysis (including appropriate geotechnical analysis) prior to the construction of new roads or landings in Riparian Reserves.

The West Fork Illinois River Watershed Analysis was completed in 1997 and is incorporated into this EIS (the Watershed Analysis documents are available in the analysis files). Geotechnical analysis would occur prior to excavation. Further engineering analysis is needed at Mine Site D. Drainage at the mine sites and stockpile site would need further engineering design input. Roads have had detailed engineering input.

c. preparing road design criteria, elements and standards that govern construction and reconstruction

d. preparing operation and maintenance criteria that govern road operation, maintenance and management.

Project roads have specific design, operation and maintenance criterion based on engineering data and Best Management Practices. Road specifications are summarized in Chapter Two and detailed in the analysis files.

e. minimizing disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface flow.

Roads constructed or improved for this project would use Best Management Practices and other criteria to minimize disruption of natural hydrological flow paths. Some diversion of stream flow could occur at the crossings, especially under the Proposed Action. Surface and subsurface flow may also be interrupted in all alternatives except Alternative 9 and No Action. See previous discussions in Chapter Four, and in the Physical Science report (Appendix F).

f. restricting sidecasting as necessary to prevent the introduction of sediment to streams

All roads would be designed to minimize sediment delivery into streams. See previous discussions in Chapter Four, and in the Physical Science report (Appendix F).

g. avoiding wetlands entirely with new road construction.

The Proposed Action would improve roads that pass near or across some small wetlands. Alternatives 6, 7, 8, 10 and 11 avoid some of the wetlands, but may have indirect impacts to small wet areas. No Action and Alternative 9 do not include any road work within wetlands. See Aquatic Conservation Strategy and other previous discussions, and the Physical Science report (Appendix F).

RF-3. Determine the influence of each road on the Aquatic Conservation Strategy objectives through Watershed Analysis. Meet objectives by:

a. reconstructing roads and associated drainage features that pose a substantial risk

The Proposed Action would have the greatest impact by using the two routes with the greatest sediment potential (road to Site D, Alberg Route). Alternatives 6 and 7 do not use the Alberg route, but would use the road to Site D. The road to Site D would be improved through reconstruction. Alternatives 8, 9, 10 and 11 avoid the road to Site D and the Alberg Route.

b. prioritizing reconstruction based on current and potential impact to riparian resources and the ecological value of the riparian resources affected.

The West Fork Illinois River Watershed Analysis recommended and prioritized restoration activities, including road projects, within the watershed. Road management objectives also address potential risks. Areas that have current sediment risk were discussed previously in this Chapter.

c. closing and stabilizing roads based on ongoing and potential effects to Aquatic Conservation Strategy objectives and considering short and long term transportation needs.

Road management objectives would close many roads within Riparian Reserves in the analysis area. These roads would only be maintained for mining access; traffic that is not part of an approved operating plan would be discouraged or eliminated. Once the roads are no longer needed for mining, they would be closed and treated. For roads that are included in an approved Plan of Operations, funding for final closures or other treatments would be borne by the miner. For roads not included in a Plan of Operations, final closures or other treatments would be part of the Forest Service regular watershed restoration program. These would be treated according to priorities established for the entire district. Annual stormproofing of mining roads (funded by the miner) would be required in all action alternatives prior to the wet season.

RF-4. *New culverts, bridges, and other stream crossings shall be constructed, and existing culverts, bridges and other crossings determined to pose a substantial risk to riparian conditions will be improved, to accommodate at least the 100-year flood, including associated bedload and debris. Priority for upgrading will be based on the potential impact and ecological value of the riparian resources affected. Crossings will be constructed and maintained to prevent the diversion of streamflow out of the channel and down the road in the event of crossing failure.*

All stream crossings would be designed to prevent diversion from stream flow out of the channel and down the road. In all action alternatives, no culverts would remain in place over the winter. Reconstruction of the Alberg Route may not fully meet this guideline, especially during high water when bankfull flow is exceeded.

RF-5. *Minimize sediment delivery from roads. Outsloping of the roadway is preferred, except in cases where outsloping would increase sediment delivery to streams, or where outsloping unfeasible or unsafe. Route road drainage away from potentially unstable channels, fills, and hillslopes.*

Alternatives 6, 7, 8, 10, and 11 would outslope or improve drainage on roads to minimize risk of sediment delivery. POC is also considered in this decision.

RF-6. *Provide and maintain fish passage at all road crossings of existing and potential fish-bearing streams.*

The Proposed Action may retard the maintenance of fish passage during low flow conditions. All of the other alternatives are expected to maintain existing fish passage. The use of bridges (or avoiding stream crossings completely) would maintain fish passage during low flow conditions.

RF-7. *Develop and implement a Road Management Plan or a Transportation Management Plan to meet ACS objectives. At a minimum, the plan shall include provisions for the following activities:*

- a. inspections and maintenance during storm events*
- b. inspections and maintenance following storm events.*

All of the alternatives include stream crossings designed to withstand storms. Access will not be practical during the winter months in any alternative, except possibly under Alternative 11. Annual maintenance is required in the Proposed Action and Alternatives 6, 7, 8, 10 and 11. Road condition would be inspected prior to annual start-up for operations.

- c. road operations and maintenance, giving high priority to identifying and correcting road drainage problems that contribute to degrading riparian resources.*

Road construction, use, maintenance and improvement criteria has been established considering watershed conditions and hydrologic function. See previous discussions in this Chapter and in Chapter Two for details.

- d. traffic regulation during wet periods to prevent damage to riparian resources.*

All action alternatives would approve only dry season operation and road use.

e. establish the purpose of each road by developing Road Management Objectives.

Road Management Objectives have been developed for all roads (on National Forest) in the analysis area. Many of the roads would have objectives to close the road and eliminate traffic if they are not part of an approved mining Plan of Operations. Exceptions include the powerline road and the road to Mars swimming hole, that would likely remain open. The Road Management Objectives are part of the analysis files. Treatments needed to bring roads to their desired condition would occur under an approved operating plan or through the regular watershed analysis program.

Minerals Management

MM-1. *Require a reclamation plan, approved Plan of Operations, and reclamation bond for all minerals operations that include Riparian Reserves. Such plans and bonds must address the costs of removing facilities, equipment, and materials; recontouring disturbed areas to near pre-mining topography; isolating and neutralizing or removing toxic materials; salvage and replacement of topsoil; and seedbed preparation and revegetation to meet ACS objectives.*

A reclamation plan and bond would be required for the approved Plan of Operations (see Chapter Two). No mining would occur within Riparian Reserves.

MM-2. *Locate structures, support facilities, and roads outside Riparian Reserves. Where no alternative to siting facilities in Riparian Reserves exists, locate them in a way compatible with ACS objectives. Road construction will be kept to the minimum necessary for the approved mineral activity. Such roads will be constructed and maintained to meet roads management standards and to minimize damage to resources in the Riparian Reserve. When a road is no longer required for mineral or land management activities, it will be closed, obliterated, and stabilized.*

The Proposed Action and all of the action alternatives (except Alternative 9) include road development within Riparian Reserves. The impact of these roads on the Aquatic Conservation Strategy objectives is described elsewhere in this report. The Proposed Action would locate a stockpile site that is partially within the main stem Rough and Ready Creek Riparian Reserve. The other action alternatives would site this facility outside the Riparian Reserve.

Road development within Riparian Reserves is minimized in all action alternatives as compared to the Proposed Action (see chart under RF-2 above). The action alternatives would construct and maintain roads to meet roads management standards and minimize resource damage. The Proposed Action would clearly not meet this standard, because it includes several crossings and does not include specific design criteria to minimize resource damage. The Road Access Documentation Memo (available in the analysis file) describes criteria included for all action alternatives. Roads would be stormproofed annually under all action alternatives.

The roads would be closed to the public during mining operations in all action alternatives (the Proposed Action does not include provisions for road closures). When the mining operation is complete, many of the roads may be decommissioned, depending on whether they are required for future mining.

MM-3. *Prohibit solid and sanitary waste facilities within Riparian Reserves.*

Solid or sanitary waste facilities are not proposed within the Riparian Reserves.

MM-4. For leasable minerals, prohibit surface occupancy within Riparian Reserves...

Leasable mineral activities are not proposed in this project.

MM-5. Salable mineral activities such as sand and gravel mining and extraction from Riparian Reserves will only occur if Aquatic Conservation Strategy (ACS) objectives can be met.

Four potential rock sources exist within Rough and Ready Creek that may be suitable for road surfacing. Three of these sites are within Rough and Ready's Riparian Reserve on BLM lands. Removal of rock from these sites may require further analysis and would depend on the final selected alternative and the miner's preferences. Further analysis to assure that use of the rock would meet ACS objectives may be required. The Nicore IDT finds that use of the native rock would avoid introducing foreign material into the watershed and is likely better than using off-site rock. No rock sources have yet been proposed by the miner. Alternative 9 does not require this rock.

MM-6. Include inspection and monitoring requirements in minerals plans, leases or permits. Evaluate the results of inspection and monitoring to effect the modification of mineral plans as needed to eliminate impacts that retard or prevent meeting ACS objectives.

Environmental monitoring programs that meet the requirements of all permitting agencies would be implemented as part of any action alternative. Monitoring programs would be designed to quantify and measure environmental impacts accompanying construction, operation, reclamation and post-closure condition of the analysis area with reference to pre-operational data obtained during baseline monitoring. Impacts that result in violations of regulatory stipulations would require changes in the way the project is implemented, including additional mitigating measures. The proponent would be required to submit an annual report detailing monitoring data, interpretation and changes indicated by the monitoring results. However, if a regulatory threshold is exceeded, it must be brought to the attention of all appropriate agencies within 30-days (unless a shorter time frame is indicated through regulations, such as a hazardous substance spill). Monitoring would also be achieved through random or routine inspections by permitting agencies. Monitoring plans must be developed prior to final project approval and would be part of the final Plan of Operations. See Chapter Two for environmental elements that would require monitoring.

WILD AND SCENIC RIVER ELIGIBILITY - OUTSTANDINGLY REMARKABLE VALUES

The Outstandingly Remarkable Values (ORVs) associated with the main stem Rough and Ready Creek include Wildlife, and Geological/Hydrological, and Botanical/Ecological.

Wildlife - O'Brien Caddisfly

The O'brien Caddisfly (*Rhyacophila colonus*) is a Forest Service sensitive species and was considered an Outstandingly Remarkable Value within the lower reaches of Rough and Ready Creek. Available records reveal *R. colonus* to be known from a single type locality. Four adult males and four adult females were collected by the Canadian F. Schmidt during a visit to the Illinois Valley (the general

vicinity of O'Brien, Oregon - actual location unknown) in June of 1965. These specimens are presently located at the Institute of Entomology Research, Ministry of Agriculture in Ottawa, Canada. *R. colomus* has not been located in the area since.

In 1996, The Nature Conservancy attempted to collect *R. colomus* on the lower reaches of Rough and Ready Creek using black light traps. *R. colomus* was not found in the traps. Specific habitat associations for the species have yet to be identified (larva of this genus are most commonly found in small to mid-sized streams in forested montane areas of the Pacific Northwest). Continued sampling for the species is occurring. The Proposed Action and Alternatives 6, 7, 8, 10 and 11 are associated with a "May Impact" finding for this species. No Action and Alternative 9 would have "No Impact".

Geological/Hydrological

The unusual stream morphology (large substrate and wide alluvial fans) led to the identification of the Geological/Hydrological ORV on the main stem Rough and Ready Creek. The Proposed Action and all alternatives would protect this ORV.

Botanical/Ecological

The high number of rare plant species growing within one-quarter mile of the main stem Rough and Ready Creek led to the identification of the Botanical/Ecological ORV. The haul route in Sections 14 and 15 may disturb rare plants within the eligible creek corridor. Collaboration between the FS and the mine operator in road design and other possible mitigation would be necessary to adequately protect these plants. The Proposed Action and Alternatives 6 and 7 have the potential to degrade the Botanical ORV.

Scenic Classification

The maximum classification for Rough and Ready Creek in the vicinity of the creek crossings is *Scenic*. The multiple stream crossings under the Proposed Action and Alternative 7 may not maintain that classification. All of the other alternatives are likely to maintain that classification. Forest Service policy is to maintain the classification while a stream is studied for its Suitability as a Wild and Scenic River.

COSTS OF OPERATION

Operating cost estimates including road construction and reconstruction, crossing structures, costs of establishing and using a cable system, costs of helicopter sampling, dust abatement, gates, and ore haul via truck are disclosed below. The major components are fully described for each alternative in Chapter Two. A detailed spreadsheet listing costs for components of the Proposed Action and alternatives is in the analysis file. These costs do not reflect processing costs beyond getting ore to the stockpile site. These costs were used in the economic analysis that follows and the amount of ore that would be stockpiled varies between the alternatives. A summary of the data is presented in Figure 25.

	Alternatives								
	PA	NA	6	7	8	9	10	11	
Total Road Construction and Reconstruction Costs (Thousands)	\$683	0	\$722	\$693	\$580	\$43	\$770	\$700	
Cable Operation Initial Costs (Thousands)	0	0	0	0	0	0	\$1616	\$1616	
Dust Abatement Costs (Thousands over Ten Years)	\$310	0	\$149	\$222	\$222	\$1	\$363	\$149	
Gates (in Dollars)	0	0	\$2260	\$2260	\$2260	0	\$2260	\$2260	
Haul Costs (Thousands)	\$2080	0	\$2800	\$2236	\$2127	\$840	\$870	\$970	

Figure 25. Estimated Cost of Operation for Proposed Action and Alternatives

ECONOMIC VIABILITY

Substantial uncertainty exists relative to the economic viability of the proposed Plan of Operations. Two reports provided to the Forest Service examine the economics of the proposed Plan of Operations (Resource Strategies and Barrick). These reports state that the ore grades are at the extreme low end and the size of the ore body is far smaller than other similar ore bodies considered for commercial use. Barrick states that "There does not appear to be an economically attractive processing route to recover or market nickel products from the Oregon laterite ores...Oregon is an unsuitable location for downstream investment in stainless steel operations given its distance from both the product and scrap markets."

No processes feasible for the production of nickel are known to be economical on the small scale proposed. Nickel is considered to be a sophisticated metal, particularly with respect to the industrial processes needed to extract it from its ores. Unlike gold, which can be mined and sold by individual operators with rudimentary equipment, the production and marketing of nickel is complex and capital intensive, with the result that only a few large corporations have so far succeeded in becoming profitable producers (Reimann, et.al. 1998).

Some new processes are becoming available for processing lower grade ore, such as that found at Nicore. The miner has stated that the ore would be processed with new, low-cost technology. However, even with new technology, the grade and size of the reserves are low compared to competing resources. Technology favorable for reducing processing costs would generally make operations with larger reserves and higher ore percentages even more favorable over the smaller, lower percentage ore bodies such as Nicore.

A project analysis was prepared by the Forest Service to evaluate the economics of the Proposed Action and alternatives. The results of the analysis are summarized here. Several assumptions and estimates were used to arrive at these figures:

1. Under the proposed action, 3.5 acres per year for ten years would be mined to a depth of 12 feet of which 50% would be usable after screening. This amount of material would produce 380 tons of nickel per year.
2. Smelting costs of nickel and other elements are \$2.25 per lb. This cost would actually vary depending upon the process used and the grade of ore present (Barrick, 1998).
3. Processing Costs of raw material is \$25/ton (Barrick, 1998).
4. Extraction and Transportation Costs are listed in the process record for each alternative, but generally exceed \$6/ton. Transportation costs beyond the stockpile site are assumed to be part of the processing costs.³⁴
5. The value of nickel and associated metals at Nicore is \$2.27 per pound on the world market. It is assumed that the making of stainless steel with nickel can be accomplished with ores throughout the world.
6. An internal rate of return is 4%. (This assumption is also conservative and is suggested by the Forest Service Economic and Social Analysis Handbook 1909.17, section 15.42-1.)
7. Inflation affects both the price of metals and the costs of production equally.

The Proposed Action and all of the action alternatives are associated with negative Present Net Values, suggesting that the full development may not be prudent, particularly at this time. All four proposed sites individually have a negative present value. This is mainly due to the production costs associated with nickel. Major changes in the world situation for nickel or in the technology for producing nickel would have to occur to alter the relative economic status of the Nicore project.

The benefit to cost ratios for each alternative were calculated. The costs exceed the benefits in all action alternatives. The sampling option has the lowest benefit to cost ratio, because it uses a helicopter to haul the ore. All other ratios for action alternatives are between 0.5 and 0.6. The most economically efficient alternative, measured by a benefit/cost ratio, is Alternative 11. These ratios would change as assumptions of values and costs of production change. No Action has a benefit to cost ratio of 0, which does not factor in the cost of maintaining the claims nor the cost of preparing the EIS.

³⁴There is no indication where the ore would ultimately be processed, thus speculation on transportation costs beyond the stockpile site is not meaningful.

The breakeven point (the price at which costs equal revenue) for the price of nickel and associated minerals such as cobalt and iron varies for the different alternatives. The Proposed Action's costs would equal its revenue if the world market reaches \$3.75/pound for the price of nickel and associated minerals. In contrast, Alternative 7's breakeven point is at \$4.02 per pound. The proponent would receive a reasonable rate of return for the investment on all alternatives if the price for nickel and associated minerals would reach \$5.54/pound. The highest price for nickel within the last five years was \$3.73/pound in 1995. However, as noted above, the price has fallen significantly to \$1.95/pound in August, 1998 (lowest in a decade) and long term trends are not expected to exceed \$3.00 per pound (Anaconda Nickel Limited 1998).

When the cost of the Environmental Impact Statement is factored into the analysis, the Present Net Value of all alternatives is decreased by approximately \$300,000, with a decrease in the benefit to cost ratio. The Present Net Value and Benefit to Cost Ratio for Alternative 9 are for the sampling only and do not include the costs or benefits of any future development.

	PA	No Action	6	7	8	9	10	11
Present Net Value (Millions)	-\$10.1	0	-\$10.6	-\$10.2	-\$9.5	-0.97	-\$9.0	-\$7.5
Benefit to Cost Ratio	0.58	n/a	0.57	0.57	0.57	0.10	0.55	0.59

The value of other resources in the proposed project area include (but are not limited to) the undeveloped (roadless) character, the botanical resource, the potential wild and scenic river resource, the water quality of Rough and Ready Creek and the fisheries resource. These resources are becoming increasingly scarce in the United States and consequently are increasing in value.

Economics is a study in relative scarcity, which allows comparison of monetary and non-monetary values. Clearly, the environmental qualities associated with the analysis area are scarcer at this point in time than the potential nickel. There are numerous readily available sources of nickel exploitation which offer considerably better economic scenarios.

EFFECTS ON RESIDENTS

Personal Values

In general, the project area is known for quiet and solitude for residents. The Proposed Action and all action alternatives have the potential to disrupt the quiet and reduce the quality of life for the people who live closest to the operation. Some people say they chose to live in this area because of the existing low ambient noise levels and limited traffic.

People who live within 100 feet of the haul route would suffer the greatest impacts (there are 4 homes within 100 feet of the Rough and Ready Creek Road used in Alternatives 6 and 11, and 22 homes within 100 feet of the Wimer Road that would be used in Alternative 10). Sixteen homes are within one-quarter mile of the haul route in Alternatives 6 and 11. The operation would likely be noticeable to those living further away, as well.

All legal requirements related to air quality, dust, noise and safety would be met. Each of the access scenarios is associated with loss of solitude for people living within several miles of the operation. Alternative 9 is associated with a shorter term, but more intense impact as ore samples are hauled out by helicopter. Helicopters would be required to stay a minimum of 1000 feet vertical distance and 1000 feet horizontal distance from any building not associated with the mining operation (unless the FAA requires a greater separation).

Dust and Air Quality

None of the alternatives would have significant impacts on air quality. Dust abatement would be used where needed to provide for safety, aesthetics, and local air quality impacts. Paving of the private road, and increased surfacing at other heavily used segments would decrease dust near residences.

The No Action alternative would continue the current situation. Dust is a problem for residents living on dirt or graveled roads. While some dust is generated on BLM and FS lands, the primary dust problem for residences is on private roads. Residents already put up signs requesting people drive slowly to minimize dust.

Tom Peterson, Oregon Department of Environmental Quality (see air quality update in the analysis file) confirmed that dust from this operation is not expected to pose health hazards. If needed, the beds of haul vehicles would be covered to eliminate ore blowing away. Dust abatement would also be required at the stockpile site. No Class I airsheds or population centers would be affected.

Noise

Current ambient noise levels in the vicinity of the haul route is low, estimated as 25 to 35 dBA. Sounds from the mining operation and ore haul are likely to raise these levels. The state of Oregon regulates noise generated from industrial operations and motor vehicles (OAR 340-35-030 and 035). All of the Action Alternatives would be required to meet state standards and mitigation described in Chapter Two would be required.

Figure 26 shows the number of homes within 100 feet of the haul route. These homes are subject to existing traffic and are well screened by vegetation. Some haul routes are further than 400 feet from any home. The closest mine site to any residence is Site C, within 0.5 miles. Mine Site B is on the ridge one mile above the closest residents.

The 1000 foot minimum can be increased if monitoring indicates noise levels are outside of compliance with DEQ regulatory standards. Figure 26 displays the factors that contribute to the noise assessment. Those alternatives that route trucks past homes or use the helicopter are most likely affect residents. Alternatives 6, 9, 10 and 11 fall within those categories. The Proposed Action (PA) and Alternatives 7 and 8 are less likely to affect residents relative to noise concerns. Alternatives 6

and 10 use smaller vehicles, which would be less noisy, but increases the number of trips. For all alternatives, approximately 20% additional traffic may be expected from trips (personnel, administration, etc.) other than ore haul.

Alternative	Number of Houses within 100 feet of ore haul	Number of Round Trips	Helicopter Use
Proposed Action	0	3,390	No
6	4	5,700	No
7	0	3,390	No
8	0	3,150	No
9	0	670 for 120 hours flight time	Yes
10	22	3,100	No
11	4	1,940	No

Figure 26. Number of Homes within 100 feet of haul route, number of round trips, and helicopter use by Alternative.

Safety Issues

Safety issues would be greatest in the local area, particularly in O'Brien, where the haul route or flight path in all alternatives would come close to some residences. Current traffic is low and localized. Area youth frequent the swimming holes in the main stem of Rough and Ready Creek. Access to Mars swimming hole is near the haul route.

Helicopter operations also have inherent risks. A bucket of ore can break or spill. A person standing beneath the spill could be killed. Personnel working around helicopters are at greater risk than residents or the general public.

All of the action alternatives include mitigation to reduce user conflicts and safety hazards. Many regulations apply that reduce the risk of a tragic accident. Discouraging and restricting traffic and public use reduces some risk. Communications in ore haul vehicles (CB radios, for instance) would be desirable. The public would not be allowed within 1,000 feet of the flight path during helicopter operations. This is difficult to enforce and would require public cooperation.

Property Values

Assessed values of property are not expected to be significantly affected by the mine, despite the loss of personal value experienced by some people. The Josephine County Assessor's Office was consulted for information regarding property values (see Mendenhall Report in the analysis files). They agreed that the personal values of people who cherish solitude and living in a rural environment could be decreased by the mine site, but said that this shouldn't be confused with property values. Some people may move away because they do not like the effects of the mining, others may not buy property because of the mining operations, and others may not have strong preferences. The mining proposed for the next ten years would have the greatest effects on those living closest to the operations (see previous discussions about effects on residents, etc.).

Private road improvements contemplated in Alternatives 6 and 11 would likely lead to increased property values (see Mendenhall report), despite the loss of personal values (quiet, solitude) residents may experience.

A baseline for property values has been established through the Assessor's Office. For 1,101 parcels of land in T40S, R9 and R10W (excluding federal land), the average value for "vacant land" was \$19,999. The average value for the "improved land" was \$78,849. For 412 parcels in T40S, R9W, the average value for "vacant land" was \$19,495. The average value for the "improved land" was \$65,791. Values have tended to increase over recent years and that trend can be expected to continue, regardless of alternative chosen.

Trends in property values in neighboring Douglas County may provide relevant information regarding potential effects from Nicore (see Methany data, Mendenhall report). The actual property values for Riddle increased 10% just for 1997 (though, by the effect of a new law, they also decreased by nearly an equal amount). Overall property values in the Riddle area increased 60% from 1991 to 1996 (ibid.). Mining had been discontinued near Riddle, however the smelter there continued to operate.

Property values from 1982 through 1989, however, show a negative trend: values decreased 8% for residential properties smaller than 10 acres, and decreased 6% for properties larger than 10 acres but less than 40 (ibid.). Active mining occurred at Riddle during those years. The mine near Riddle is visible from Highway 5 and throughout the town.

Soda Springs, Idaho is another small town with an active mining operation. Preston Phelps of the Caribou County Assessor's Office stated that property values reflected an increasing trend over many years (ibid.), despite the presence of a mine. Between 1995 and 1999 property values increased 40% for seven residential properties priced from \$65,000 to \$125,000.

VISUAL QUALITY, RECREATION, and INTERPRETIVE DEVELOPMENT

Visual Quality

Visual quality would likely be reduced in the Proposed Action and all of the action alternatives. Road development and increased use would be evident to residents and visitors. Currently, the roads accessing the proposed mine sites are rarely used, and are generally not noticeable from the valley floor. Increased use would make the roads more visible, given dust plumes and noise drawing attention. Alternatives 7, 8, and 10 include new road construction that may be visible from several residences. The Bench Road included in these alternatives would be in the direct view of one or two residences. For FS lands, the Visual Quality Objective is modification. The level of development proposed in all action alternatives is consistent with this objective.

The location of the stockpile site would have a direct effect on visual quality. The Proposed Action includes a stockpile site that is near the highway and within the direct line of sight of an interpretive trail overlook proposed on the north side of Rough and Ready Creek. The site is within the ACEC where management activities may attract attention, but should not dominate the view of the casual observer (USDI 1995). The Proposed Action stockpile site would not meet this objective because it would tend to dominate the view from the interpretive trail.

The stockpile site proposed in Alternatives 6 through 11 would better meet this objective by locating the site away from the interpretive trail and the highway.

Recreation

Current use of the analysis area for recreation is generally low, except for the lower reaches of Rough and Ready Creek. The Botanical Wayside, ACEC, Mars Swimming Hole, Seats Dam, and the Siskiyou Meadows Youth Camp receive moderate use. Local residents enjoy horseback riding and hiking the existing roads. The No Action alternative would continue the current use. Development of the interpretive area is likely to increase users in the ACEC and Botanical Wayside.

The Proposed Action would increase motorized access on roads that are not currently driveable. Improving motorized access to currently inaccessible parts of the area would likely improve the recreational experience for some people and attract increased use.

Recreation traffic would likely increase, and with it, user conflicts. Road design criteria, including turn outs, would mitigate for some safety concerns given increased traffic. Increased traffic would be discouraged by placing gates at key locations in Alternatives 6 through 11. Hiking, biking, and horseback riding could still occur, and would result in some conflicts.

Alternative 10 would include access Mine Site B via the Wimer and Rock Creek Roads. The Wimer Road is a popular route that currently provides motorized access to the coast and dispersed recreation areas. The Rock Creek Road is not currently passable, but accesses the McGrew Trail, a driveable low-standard road. Increased conflicts are likely with use of this route. Road design would mitigate for safety concerns.

The estimated number of annual round trips with haul trucks is shown below. Approximately 20% additional traffic may be expected from incidental trips other than ore haul.

	PA	Alt 6	Alt 7	Alt 8	Alt 10	Alt 11
Annual Number Round Trips	3,390	5,700	3,390	3,150	3,100	1,940

Alternative 9 could impact a person's recreation experience while helicopter sampling was occurring. The area would be closed to public entry during operations as a safety precaution.

Interpretive Planning and Development

Highway 199 has been designated a Scenic Byway in Oregon and California. Both states include Rough and Ready Creek in its interpretive plans for the Byway. Mining and associated activities could degrade the views or experiences of travelers using the Byway. "Visitors who travel on Scenic Byways are looking for inspiration from natural wonders...a...mine may relay a poor image...and prompt visitors to continue on to portions of the Byway that express...preservation ethics" (Brandt Memo, February 1999). Members of the Illinois Valley Interpretive Planning Committee have expressed concern that the mine may threaten their efforts to attract tourism dollars (*ibid.*). Grant money available to develop interpretation of natural features on Scenic Byways could be lost if mining (and related traffic) were to degrade the experience of travelers (*ibid.*).

The Proposed Action stockpile site is also in direct view of an interpretive trail planned by the Oregon State Parks, BLM, Garden Club, Illinois Valley Community Response Team and other groups. The Alternative Stockpile Site (in Alternatives 6 through 11) would better screen the stockpile site, but ore haul and other activities may disturb users of the trail.

ROADLESS CHARACTER

All of the action alternatives (except 9) would improve roads and ore haul through the South Kalmiopsis Roadless Area and degrade the roadless character of the area (see Chapter Three for a description of Roadless Character). No Action and Alternative 9 would not increase access or the existing roadless character within the SK. The estimated amount of proposed road construction and miles of haul within the SK roadless area is displayed in Figure 27.

The maps in Chapter Two show the roadless area portion of the project. Currently several miles of low standard roads exist within the SK portion of the analysis area but access along the roads is limited by private land, road wash-outs and fallen logs, lack of road maintenance, and unmaintained creek crossings.

	NA	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Miles of Road Construction in SK	0	0.25	3.8	4.2	4.2	0	1.0	1.25
Estimated Miles Haul in SK	0	7.0	10.0	10.0	9.0	0	6.0	5.0

Figure 27. Road Construction and Miles of Haul within the SK portion of the analysis area.

The Proposed Action is associated with limited road construction in the SK but would not add road access to new areas. Road improvements would encourage increased traffic. Increased traffic would result in a loss of solitude and adverse effects such as noxious weed introduction, trash dumping, illegal activities, wildlife harassment, and other unintended consequences. Many people value to presence of a large roadless area near rural populations centers like Cave Junction. People have said they use the area for spiritual renewal and improving access or approving mining activities would harm their experience.

Alternatives 6, 7, and 8 would increase access along a ridge that currently is not accessible. Construction of four miles of road could lead to increased traffic and similar (or greater) effects as the Proposed Action. The ridge route is likely to remain part of the transportation network, at least until it is no longer needed for mining access. Some of the adverse effects would be mitigated by gating the area and restricting traffic to mining-related activities. The placement and strength of the gate are important factors in their effectiveness; people find ways to breach gates including physically removing the gate, breaking the lock, or finding an alternative path around the gate.

Alternative 10 improves access from the south and would result in potential effects to that part of the roadless area. Currently, the condition of the road limits access but there are no closures between the West Fork Illinois River and the top of the ridge (Mine Site B). The one mile route to the cable landing site (including in Alternative 10) would be closed following mining. Its effects could be minimized by mining Site D over a few seasons and then closing the road. Adverse effects would also be reduced by restricting the haul route to mining related traffic. As discussed previously, the effectiveness of gating roads varies.

Alternative 11 has less impact than the Proposed Action or Alternatives 6, 7, 8 and 10 because it only improves a portion of the existing inaccessible routes.

Some people have expressed concerns that the “wilderness potential” of the SK may be compromised by the Plan of Operations, that there may be “irretrievable and irreversible consequences of developing any of the proposed mine sites or putting one blade to any road in the RARE II area (paraphrased from public comment).” Congress may designate a Wilderness in any area they choose. Wilderness character could be restored by closing the area to motorized traffic (earthen berms and ripping the entry of roads) and allowing natural recovery of the roads and mine sites. The scale of the operation proposed is not expected to result in an irretrievable loss of roadless character in the SK as a whole, or the Rough and Ready portion of the SK.

The hand of humans would continue to be evident in the area regardless of alternative (including No Action). The visual character of the area would take longest to recover in full scale mining alternatives (PA, 6, 7, 8, 10, 11). The current trend toward recovery would continue under Alternative 9 and No Action.

Cumulative Effects

Past mineral exploration within the watershed likely had significant effects on the roadless character of the area. No other developments are currently being considered within the SK. If the rest of the laterite deposits were mined, significant effects to the roadless character of the area are possible. Increased traffic and an extended, improved road system would be likely outcomes. The more disturbed by mining and road access, the less likely the area would be considered appropriate for Wilderness designation. The scale of the operation could be ten times the scale proposed in this EIS, which could lead to a irreversible loss of roadless character.

OTHER EFFECTS

Cultural Resources

A cultural resource survey did not indicate any historic, prehistoric, or cultural sites that might be adversely affected by this project. Sites or artifacts discovered at any time during operations would be reported to the Forest Archeologist.

Wildlife

Hundreds of vertebrate and thousands of invertebrate species may occur within the Nicore analysis area. The distribution and abundance of wildlife Species of Concern was described in the West Fork Illinois River Watershed Analysis (available upon request in the analysis file). The Proposed Action nor any of its alternatives are likely to adversely affect any PETS wildlife species, or critical habitat. Impacts to riparian areas and rock outcrops could result in adverse effects on individuals or groups of individuals (vertebrate and invertebrate species). These impacts are not likely to be serious or affect overall habitat conditions (based on the scale of the operation relative to unaffected habitat in the analysis area). No known migration routes (for species other than fish) would be affected. Noise and other disturbances related to mining activities may adversely impact individual animals but no effects on populations are expected given the overall scope of the operation.

Vegetation conditions were also discussed in the West Fork Illinois River Watershed Analysis. Although the action alternatives would remove some native vegetation, it is not expected to significantly degrade any late-successional or other special habitat, except as noted previously in this chapter.

Habitat for BLM sensitive species *Rana boylii* (yellow-legged frog) exists within the analysis area. Direct impacts to individual frogs or habitat are probable at stream crossings and other development in riparian reserves. The Proposed Action would have the largest impact, Alternative 9 and No Action would have no impact on this species. No significant effects on this species are expected in any alternative.³⁵

Habitat for *Plethodon elongatus* (del Norte salamander), a FS R6 and Survey and Manage Strategy 2 species, also occurs within the analysis area, but not in any areas that may be affected by mining. No impact on this species is expected.

Macro-invertebrate sampling revealed that total taxa (numbers of species) is relatively high in Rough and Ready Creek, ranging from 15 to over 45 species at any one sample site. Of particular interest is a distributional record of the mayfly species *Cloeodes excogitatus*, the northernmost known record of this species and the first documented in Oregon. *Cleodoes* was found in tributaries to Rough and Ready Creek.

Management Indicator Species

Forest management efforts consider all native vertebrate species. Several groups of species have special management needs. These groups include: (1) species dependent on specialized habitat conditions, such as cavity-nesters; (2) species requiring early, mature, or old-growth forest conditions for optimum habitat; (3) popular game species; and (4) endangered, threatened, and sensitive species.

The Siskiyou National Forest list includes: Bald Eagle, Osprey, Spotted Owl, Pileated Woodpecker, Pine Marten, Woodpeckers, Black-tailed deer, and Roosevelt Elk. The Proposed Action and/or Action Alternatives are not likely to significantly impact any Siskiyou National Forest Wildlife Management Indicator Species.

Survey and Manage Species (Wildlife)

The Survey and Manage (Wildlife) Standard and Guideline is intended to provide benefits to amphibians, mammals, mollusks, and arthropods. The Standard and Guideline contains four components, and priorities differ among them. These include: 1) Manage known sites, 2) Survey prior to ground-disturbing activities, 3) Extensive surveys, and 4) General regional surveys.

Preferred Alternative 9 would be designed to avoid all Survey and Manage Wildlife habitat. Further surveys would be required prior to implementation of any other action alternative.

³⁵Significant effects are defined as measurable effects that could lead to a reduction in overall population size and/or species distribution within the area.

Acid Mine Drainage

Some people have raised a concern that sulfides in the project area may result in ‘acid mine drainage’. No sulfides are known to occur within the project area (sulfides are not associated with peridotite or serpentinite), thus acid mine drainage is not likely.

Asbestos

The presence of asbestos in the project area has been the subject of some concern. Tremolite is a form of asbestos associated with serpentine rocks. It is not known or likely to be in the watershed, but the potential exists. If serpentine rocks were crushed for road surfacing, a human health hazard could result. The alternatives would not approve use of serpentine rocks for road work to avoid this possibility. Peridotite is not associated with tremolite and can be used without risk in regards to asbestos.

Artificial Lights

Artificial lighting is not a part of the Proposed Action, nor any alternatives. Artificial lighting would not be approved without an amendment to the final Plan of Operations and appropriate further analysis.

Fire Hazard

Some people have suggested that the project may increase the fire hazard in the area because of increased traffic and use of equipment. The operation would be required to follow Industrial Fire Precaution Levels for federal lands. The increased access associated with the action alternatives would increase the risk of human-caused fires and is likely to improve suppression capabilities in the area for lightning and human-caused fires.

Impact on the Wild and Scenic Illinois River

The Wild and Scenic River is over 10 miles from the analysis area. Effects from this action would be so diluted by other inputs on the river, no impact is anticipated. Other thresholds would be far exceeded before downstream Wild and Scenic river values would be affected.

Survey Monuments

No survey monuments are at risk of destruction in any alternative.

ISSUES THAT COULD NOT BE ANALYZED IN THIS EIS

This Action Should Not Be Analyzed Without a Smelting Facility Identified

The Responsible Official decided to analyze the project without a facility identified, but would not approve the final Plan of Operations until a smelting facility is identified and any additional environmental analysis needed is completed.

The 1872 Mining Law is Outdated

This issue is beyond the scope of project analysis. Concerns about the law cannot be resolved in this EIS. Chapter Four includes a section about conflicts between laws, policies, and plans.

The EIS Must Consider the Effects of the 4,000 acre Patent Application

The patent application is beyond the scope of this EIS. Some people believe the high acreage in the patent application indicates that the miner wishes to develop a much larger mine than disclosed at this time. The miner has indicated that should this operation prove successful, development of hundreds of acres accessed from the existing roads may follow. Laterite deposits have been mapped in the project area and are the basis for cumulative effects analysis (see Figure 13).

Were the existing roads authorized? Is the claimant's residence on BLM lands appropriate?

These issues are beyond the scope of this analysis. Documents about the original road construction are not maintained on the Siskiyou National Forest. Mining roads were likely constructed with little FS oversight. No evidence that the roads were built illegally exists. The miner's residence is an issue that would be addressed separately by the BLM.

POTENTIAL CONFLICTS WITH PLANS AND POLICIES OF OTHER JURISDICTIONS

Mining within this area poses conflicts between the mining laws and policies related to resource protection. For instance, all sensitive plants cannot be protected while allowing mining, road improvement and continued road use. Likewise, all aspects of the Aquatic Conservation Strategy and Riparian Reserve Standards and Guidelines cannot be met while approving a full scale Plan of Operations within the project area.

The Department of Environmental Quality is responsible for setting standards related to the Clean Water Act. Some of the components of the different alternatives may exceed some standards (particularly water temperature and nickel concentrations). Thus, some alternatives may not be permitted by the state.

The State Watermaster is responsible for allocating water rights. Some alternatives assume use of Rough and Ready Creek water, which is subject to water rights. The water right may not be granted and an alternative water source would be needed.

SPECIFICALLY REQUIRED DISCLOSURES

Relationship Between Short Term Use and Long Term Productivity

The analysis area is considered a low-productivity area in terms of total biomass production. Road construction and improvement would reduce the long term productivity along the haul route. This reduction would continue as long as the roads are being used, and perhaps beyond (roads in the analysis area do not tend to "reclaim" themselves). The mine pits themselves may not be restored to full productivity for decades or longer.

Consumer and Civil Rights

The project is unlikely to have significant effects on consumers or impact civil rights.

Farmlands, Wetlands, and Floodplains

No farmlands would be affected by this project. Impacts to wetlands are discussed under the Aquatic Conservation Strategy discussion previous in this chapter. The Proposed Action stockpile site is adjacent to a Rough and Ready Creek overflow channel that is visible on air photographs. The site is partly within the Riparian Reserve for the creek. However, the area is not on the federally mapped 100-year floodplain.

Socio-Economic

All of the action alternatives would create some employment. The road development would create one-time employment. The excavation and hauling of ore would provide increased long-term employment. The mining operation would also contribute to the tax base.

The mining could also reduce employment through indirect effects related to quality of life. The Josephine County Homebuilders Association, for example, oppose the mine partly on the basis that it could reduce the number of new homes people decide to build in the area. Fire Mountain Gems also suggested that businesses might leave the area if people did not want to live or work around an active mine. The Josephine County Homebuilders Association and Fire Mountain Gems letters are in the analysis files. Statements made by others at public hearings share similar concerns about how the mine's effects on quality of life could make the area less attractive to professions (such as doctors).

The Illinois Valley Community Response Team, and other groups interested in economic development, have endeavored to create opportunities for diversified industries that maintain steady employment and contribute to Quality of Life goals. Market driven cycles in "boom-and-bust" industries like mining can adversely affect economies of small towns.

Retirees may also choose to live elsewhere if their quality of life is adversely affected by operations on National Forest. The loss of wealth from retiree's could be more significant than the jobs created by the mining.

Irreversible and Irrecoverable Commitment of Resources

Minerals are considered a non-renewable resource. Vegetation in the vicinity of the pits would not likely fully recover despite reclamation. Roads are not usually considered an irrecoverable commitment of resources, however, these roads are not likely to be reclaimed through usual means. The new bench and ridge roads, along with the existing routes, are likely to remain evident on the landscape for centuries to come.

Energy

The project, regardless of alternative, does not pose an unusual use of energy. The use of a helicopter for about 120 hours of operating time is not unusual to mining or other industries. The use of Jet A fuel is accepted under the laws of the nation.

CHAPTER FIVE

LIST OF PREPARERS

Mathew Craddock - Realty Specialist

Education: B.S. Forest Recreation
Experience: Bureau of Land Management - 17 years - Fire, Recreation, Forestry, Lands, and Minerals (Oregon)
Function: BLM Minerals Administration

Rochelle Desser - Planner

Education: A.S. Earth Science
Experience: Forest Service - 12 years - Environmental Analysis and Documentation, Interdisciplinary Team Leader, Forestry Technician; Forestry Contractor - 9 years - (Washington, California, Idaho, Montana, New Mexico, and Oregon)
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Linda Mazzu - Botanist

Education: B.S. Park Management, M.S. Natural Resources
Experience: National Park Service - 13 years; Bureau of Land Management - 3 years - Botany, Natural Resource Management (Arizona, California, Washington D.C., Oregon)
Function: BLM Botanical Assessment

Judith McHugh - Hydrologist

Education: B.A. Geology, M.S. Geology
Experience: Forest Service - 8 years - Hydrology (Idaho, California, and Oregon)
Function: Hydrology

Joel T. King - District Ranger

Education: B.S. Forestry Management, M.S. Soil Science
Experience: Forest Service - 20 years - Soil Scientist, Sale Administrator, Pre-Sale Forester, Economist, Forest Planner, District Ranger
Function: Economic Analysis, Manager

Don McLennan - Forester

Education: B.S. Forestry
Experience: Forest Service - 31 years - Recreation Management, Range Management, Mineral and Land Use Management (Arizona, New Mexico, and Oregon)
Function: Recreation

Roger Mendenhall - Forester

Education: B.S. Forestry
Experience: Forest Service - 33 years - Forest Management, NEPA, Appeals, Litigation (Washington, Montana, and Oregon)
Function: NEPA Consultant, Air Quality, Employment/Property Values

Linda Mullens - Forest Botanist

Education: B.S. Wildlife Management
Experience: Forest Service - 17 years - Botany, Wildlife & Fish Biology (Oregon)
Function: Sensitive Plant Analysis

John Nolan - Minerals Technician

Education: General Science
Experience: Forest Service - 22 years - Minerals, Timber, Special Uses (Oregon)
Function: Minerals Administration

Robert O'Leary - Assistant Forest Engineer

Education: B.S. Forest Management, B.S. Forest Engineering
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Function: Transportation System

Larry Pera - Forestry Technician

Education: A.S. Forestry
Experience: Forest Service - 20 years - Range Survey and Data Collection, Tree Improvement Coordinator, Timber Management, Port-Orford-Cedar Coordinator (Oregon)
Function: Port-Orford-Cedar Analysis

David Prince - Geographic Information Systems (GIS)
Experience: Forest Service - 17 years - Business Administration, Computer Specialist, GIS Coordinator
Function: Geographic Information Systems

Cindy Ricks - Resource Geologist
Education: B.S., M.S. Geology
Experience: Forest Service - 13 years, Redwood National Park - 2 years, Corps of Engineers - 2 years; geomorphology, landslide and erosion hazard assessments, sedimentation and channel effects, cumulative watershed effects, and engineering geology. (California and Oregon)
Function: Physical Sciences

Maria Ulloa-Cruz - Forest Botanist
Education: B.S. Agronomy
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Function: Botanical Assessment

Dave Vezie - Fish and Wildlife Biologist
Education: B.S. Wildlife Management, M.A. Environmental Education
Experience: Forest Service - 10 years; PSW Wildlife Research; National Park Service - 9 years, Redwood National Park Restoration Program
Function: Fish and Wildlife Specialist, Aquatic Conservation Strategy Lead

Numerous other managers, specialists and individuals assisted in preparing this EIS. Special mention should be made of Mike Cooley, former Lands and Minerals Staff Officer for the Siskiyou National Forest (now retired) for his guidance and expertise throughout the project. Mining specialists Jim Gauthier-Warriner and Kevin Johnson were also instrumental. Rita Dyer and Sharon Halshaw-Powell helped prepare this document for the internet; Jackie Ringulet and her staff provided copy services; Rick Butts, Don Bellville, Brad Clayton, Crystal Mullins and Susan Dibble were invaluable to the public comment analysis process. Finally, we thank the many biologists, botanists, volunteers and others who provided field data.

CHAPTER SIX
LIST OF AGENCIES, ORGANIZATIONS, AND INVIDIDUALS
WHO RECEIVED COPIES OF THE FINAL EIS

Federal Agencies

Advisory Council on Historic Preservation,
Western Office of Review

USDA, OPA Publication Stockroom

USDA, BBEP, EAD, Animal & Plant Health
Inspection Service

USDA, Office of Equal Opportunity

USDA, National Resource Conservation
Service

USDA, National Agricultural Library
Director, Ecology and Conservation Office

National Marine Fisheries Service

U.S. Army Engineers Division

Naval Oceanography Division

U.S. Department of Energy, Office of
Environmental Compliance

EPA, EIS Review Coordinator

Federal Aviation Administration, Advisor on
Environmental Quality

Federal Highway Administration, Region 10

Federal Railroad Administration, Office of
Transportation and Regulatory Affairs

General Services Administration

Bureau of Indian Affairs

U.S. Department of Housing & Urban
Development

USDI, Office of Environmental Affairs

Interstate Commerce Commission, Chief,
Energy and Environment

Northwest Power Planning Council

U.S. Department of Transportation, Assistant
Secretary for Policy

U.S. Coast Guard

USDA-Forest Service

USDI-Bureau of Indian Affairs

Oregon State Agencies

Department of Fish and Wildlife

Parks and Recreation Department

Water Resources Department

Division of State Lands

Department of Geology and Mineral Industries

Department of Environmental Quality

Department of Land Conservation and
Development

Economic Development Department

State Economist

Forestry Department

Governor's Forest Planning Team

Parks and Recreation Department

Water Resources Department

Organizations

2-B Forests

Amercian Rivers/Mineral Policy Center

American Rivers

Applegate Valley Garden Club

Blue Mt Biodeversity Project

California Democratic Council

California Native Plant Society

Camp Forest

Center For Enviromental Equity

Center For Science In Public Participation

Columbia Gorge Audubon Society

Concerned Citizens For Responsible Mining	Oregon Watersheds
Conservation And Education Committee	Rogue Group Sierra Club
Corvallis Area Forest Issues Group	San Bruno Mountain Watch
Deer Creek Valley Natural Resources Con. Assn.	Santa Cruz Rainforest Action Group
Department Of Botany, Osu	Sequoia Ranch
Ecology Center Of Southern California	Shasta Group Sierra Club
Escargot Sportswear	Sierra Club Harvey Boome Group
Fire Mountain Gems	Sierra Club Oregon Chapter
Franciscan Friars	Siskiyou Action Group
Friends Of Del Norte	Siskiyou Audubon Society
Headwaters	Siskiyou Regional Education Project
Hewlett Packard	Student Environmental Action Coalition
Home Builders Association Of Josephine County	Barrows
Homestead Construction	The Dome School
Illinois Valley Garden Club	The Learning Workshop
Iv Water Right Owners Assn	The Nature Conservancy
Kalmiopsis Audubon Society	Trout Unlimited
Klamath Siskiyou Wildlands Center	Wabash Resources & Consulting Inc
Lane County Audubon Society	Western Ancient Forest Campaign
Loyola Academy	Western Mining Action Project
Many Rivers Group Sierra Club	Wild Wilderness
Mineral Policy Cntr	
Native Forest Council	
Native Plant Society Of Oregon	
Natural Resources Defense Council	
Northcoast Environmental Ctr	
Northwest Enviromental Defense Center	
Northwest Habitat Institute	
Oregon Mycological Society	
Oregon Natural Resources Council	

Individuals

Abraham, Thayne	Barker, Jason
Acord, Jan	Bashaw, Michele
Adams, Chuck	Bates, Corrie E
Adams, David/Barb	Bayluss, Gwen
Adams, Robert	Beausoleil, Claudia
Adams, Ronald/Kathleen	Becking, Rudolf W
Albert, Martin P	Bell, Brenna
Alexander, Vincent & James	Benson, Joel
Alsobrooks, Carl	Bergman, Briana
Anacleto/Mike, Dorothy/Gordon	Berry, Sam & Mary
Anderson, Larry	Berthoin, Paola
Andres, Frederick	Bertrand, Wendy
Angenent, Tom & Virginia	Bianchi, Lisa
Applegate, Nancy	Biecher, Charles S
Armstrong, Arthur D	Birmingham, Michael
Auerhahn, Louise	Bishop, Carolyn & Walter & Rebecca
Austin, Gay	Blair, Mike
Bachem, Ginger	Blake, Richard
Bachmann, Eleanor	Blank, Steve & Family
Bachmen, Frtiz & Ginger	Blankenbaker, Eugene C
Bailey, Mark	Blaskovich, Emily A
Baker, Craig	Blumenthal, C
Baker, Diane E	Boatman, Gail
Baker, Eldon & Cleo	Boddie, Bill/Kathy
Baker, Julia S	Bodner, Steve
Baldwin, Michael	Boehm, William
Baluss, Gwen	Boice, Mary Lou
Banton, B	Bond, Monica Louise
Barclay, Rick	Bonneau, Bonnie
Barker, Elaine M	Bosworth, Mary C
	Bosworth-Salisbury, Susan

Boucher-Colbert, Marc	Bueker, Greg And Catherine
Boulanger, Aimee	Bullard, Clark
Bove, Clifford	Burke, Debra
Bowne, Jim	Burkhart, David
Boyd, Margaret E	Butler, Steven P
Boyer, Jr, Edward S	Caldwell, Jean E
Boyer, Jeremy	Calkins, Christina
Boyer, Ned	Callaghan, James C
Brady, Victoria	Campbell, Bruce
Brandon, Joan	Campbell, John R
Brandov-Ysrael, Hesid	Campbell, Lynne C
Brapp, Katherine	Cardella, Richard G
Brenden, Jase	Carroll, Lisa
Bretko, Liz	Cass, Janet
Brister, Bob	Catton, Steve
Brooks, Tim	Cegelnik, Norm & Dixie
Brosteck, Gary	Cerino, Katherine
Brown Jr, William H	Chaffee, Veolan
Brown, Alex	Cheney, Keenan
Brown, Gary W	Churchill, John
Brown, Geoffrey	Clarke, Gary
Brown, Jennifer	Coats, Barbara
Brown, Kimberly	Cobb, Carolyn
Brown, Shay Marie	Colasurdo, Christine
Brown, Shirley L	Cole, Glen
Brown, Wes	Coleman, Dr Robert G
Bruner, Howard And Deanne	Colwell, Jorie
Bruns-Hall, Nancy	Connally, Dave
Buchanan, K K	Conradi/Braun, Diane/Stephen
Buchanan, Pat/Duncan	Cooke, Willoughby And Emily
Buckmaster, Robert/Aimee	Coons, James K

Cooper, Eileen	Davison, Mike
Cooperrider, Verne	Day, Mark
Corkran,	De Santos-Fenocchi, Victoria
Cornett, Bill	Del Ponte, Brenda
Cornwell, Lynn	Delhrist, Elias
Corrigan, D W	Delles, Susan
Cortrecht, Doug	Dennis, Duane & Joan
Cosner, Lane & Nancy	Deyoung, Dave
Costello, Joe/Jan	Dick, Idelene And Lenox
Cowie, Nancy	Dillon, David/Rosamary A
Cox, Susan E	Dillon, Lorraine
Crae, Jemma	Dixon, John
Ranor, Randal	Doerfler, Winifred
Creed, Joyce S	Dolan, Robert/Lila W
Crisfield, Susan K	Donnerey, Michael
Crookshank, Tara	Dooley, Tevis
Cross, Laurie	Doran, Nicole
Crowell, Lynn	Doriz, David
Cuets, J	Dougherty, Jim
Cunningham, N	Douglas, Rebecca
Cusson, Dannette	Drake, Malcolm
D'Aquila, Christy	Dudman, Barbara
Dabbracci, Naomi	Dunalov, Joseph
Dale, Bob	Dunham, William & Cathy
Dalegowski, Daniel/Patty	Duning, Richard
Dallas, Barbara	Dunn, Chris
Davies, Donna And Eric	Dunn, Christy
Davis, David	Dunn, Harry V
Davis, Jim/ Dianne	Dunn, Tom E
Davis, Phyllis	Duvernet, Dean H
Davis, Zef	Dwinga, Antoinette

Earthington, Francis	Fisher, Erik
Eckert, Nanette	Fisher-Smith, Dot
Edmondson-Collins, Eleanor	Fitz, Herm
Egger, Jeanette R	Fitzpatrick, Wayne D
Eicher, Annie	Flann, Nicholas S
Ellis, Merald & Bernadette	Fletcher, Cortlandt J
Ellis-Sugai,	Flinn, Brian
Emrich, Matt	Flores, Tessa
Engels, Tracy E	Fontenot, Donald/Kim
Englert, Mike	Forsythe, John W
Erskine, Karen	Foster, R
Ersson, Ole	Foulke, Chris C
Erwin, Myra/Alan	Foust, Jeremy/Michael
Esser, Jennifer	Fox Sanderson, Lisa
Etherington, Chandra	Fox, Tim
Eubank, Kelly	Frankel, Allen D
Eubanks, Wallace	Frashure, Dorothy A
Evans, Bill	Freedman, Stuart And Chris
Evans, Gail	Fuller, James
Evans, Martha C	Furgang, Stephen
Faller, Robert & Jane	Furst, Shawn
Falletta, Cathy	Fyfer, Jean
Fallow, David	Galloway, Daniel
	Garcia, Emile
Farris, J	Garcia, Geoffrey
Favier, Victor	Gardellis, Ken
Feehely, Erros W	Garoutte, Patricia
Feldman, Nancy	Gary Buck
Feltzin, Joyce	Gawlowski, Paul T
Fereday, Jamie	Geiser, Joan/ Albert
Ferman, Dennis	Geisler, Dorothy

Gensberg, Alexis	Hall, Edward
Gerlock, Judy	Hall, James D
Gibbon, Donald L	Hall, Verna
Gilbert, Joan	Ham, Jay
Gill, Lois & Kent	Hanley, Laurel
Gillyatt, Joann	Hanna, Rodney
Givel, Michael	Hanschka, Mark
Glasgow, Ken H	Hansen, Terry
Glidden, Keith E	Harding, Scott
Goff, Richard And Maxine	Hardy, Douglas
Goforth, Dwain	Harling, Will
Gold, David & Judy	Harlowe, Anna
Gold, Gerard G	Harper, Marilin
Goldenberg, Doug	Harrington, Richard
Goode, Isabel	Harris, Sara
Goodman, Rachel	Harrison, Allen/Audrey F
Goodwin, Ron	Hartman, Randall E
Gordon, Mrs	Hartzell, Karl
Gosenski, Michael P	Harvey, Robert L
Gould, Kate	Haumeder, Jon
Graham, John L	Hawksley, Elisa
Graves, Patricia	Haymond, Pamela
Greenman, Linda	Haytasingh, Linda
Greenwood, Charles S	Head, David
Greve, James	Hedgepeth, Don
Grey, Cleve	Heger, Kenneth H
Grier, Rene & Randy	Heiken, Doug
Grierson, Ian B	Heinen, Edward R
Gritzka, Thomas L	Heller & Prowne,
Grunbaum, Jon B	Heller, Richard A
Haines, Eldon	Hellor, Lila

Chapter Six - List Of Agencies, Organizations, And Individuals Who Received Copies Of The Final EIS

Helms, Nancy	Hunter, Brian
Henn, Carl	Imper, David K
Heon, Shelly	Ingelson, Carol M
Herner, Helen	Ingram, Dick/ Robyn
Hess, Megan	Inouye, Lauren
Hiebert, Steven	Jackson, Elizabeth R
Hightower, Duncan	Jacobs, Charles/Elizabeth
Hill & Slennana,	Jacobsen, Mr. & Mrs.
Hill, Mary	Jacobsen, Paul
Hines, David J	Jarboe, Dan
Hinman, Gary	Jean, Lucky & Calvin
Hixson, Harvey	Jenkins, Carolyn
Hocher, Dave	Jenson, Leroy And Connie
Hocker, Dave & Kathy	Jessup, Dr. Steven
Hoffer, David	Johnson, Mansur
Hoffmans,	Jones, Mary Ann
Holleberger, C B	Jones, Robert
Holliday, Pe, Bill P	Jones, Stephen A
Hook, Gregory W	Kahn, Jeff
Horton, Michael L	Kalvelage, Joan
Hoskins, Mary E	Kambak, James
Howard, Helon	Kamil, Jeremy
Howell, Joseph C	Keale, Marie N
Howell, Marybeth	Kee, Loren & Janisse
Hrenko, Darryl	Keith, David & Isabelle
Hughes, Phyllis	Keith, Dawn
Hugo, Michael	Keller, Deanne
Huller, Randy	Kelley, Douglas D
Hungerford, Edward A	Kellogg, Marjorie M
Hunt, Susan A	Kellogg, Patricia
	Kellum, David B

Kelly, Barbara	Ladd, Kristy
Kelz, Mark M	Laden, Thomas C
Kempfer, Wesley E	Laird, Andrew
Kemple, Megan	Lamborn, Celia
Kendall, Dave	Lamebear, Jane
Kennell, David & Wilma	Larson, Ron
Kenny, Gail	Latimer, Shane
Kent, Sherrill	Lauzon, Matt
Kerstetter, Ted	Lawrence & Richardson, Nathan & Molly
Kesterson, Todd	Leamy, Claire
Kice, Nathan	Ledges, John
Kiilsgaard, Chris	Lee & Heller
King, Jim	Lee, Terry W
Kirkwood/Weaver, Karen/Dean	Lehman, Tim
Kittredge, Kimberly S	Lehman, Timothy And Jewel
Klebe, Cathlene	Lenmark, Bruce C
Knopf, Clay	Leppig, Gordon
Koch, Craig	Lester, Isa
Koenig, John And Deborah O	Levin, Elinor
Koenig, Robert L	Levine, Jackie/Juliana/Paul
Kondor, Rachel	Lewin, Philip
Krack, Carl R	Lewis, Ann
Krauss, Kathleen	Lily, Sue
Kregiel, Cheryl	Lindley, Conny & Walter
Kristine, Susan	Lininger, Jane
Kroun, P R	Lininger, Jay
Krug, Jeanne M	Linnemeyer, Art/Heather/Barbara/Marklan
Kruckeberg, Dr Art R	Lippert, Jennifer
Kuehn, Jr., Joe	Lipscomb, Leigh A
Kuipers, James R	Little, Carolyn/Leroy
Lacy, Angeline Or Robin	Little, Virginia

Livingston, John	Mattox, Elouise
Lodewick, Kenneth & Robin	Maurer, Carroll
Lombardo, Kathlen Y	Mauxet, Nettie
London, Robert J	Mayrsohn, Cheshire
Longnecker, Jo/Gary/Sam	Mc Clers, Angela
Lonsdale, Connie	Mccann-Sayles, Alan
Lonsdale, Sandy	Mccormick, Chris
Lord, Cynthia D	Mcgall & O'Neal
Lospalluto, Frank	Mcgranahan, Kay
Love, Dr Rhonda & Dr Glen	Mcintosh, E R
Lowe, David	Mckay, Tim
Lowrey, Joe	Mckenna, Steve
Lyford, Nancy/Gordon	Mckneill, Steve
Lynch, L Blake	Mcloy, Robert R
Lynch, Susan	Mcmanigal, John & Lenore
	Mcrae, John
Mackin, John	Meehan, Roger
Mackler, S	Meinen, Robert L
Maddux, Tom	Menning, R Kurt
Malcolmson, Rose	Mersman, Patricia
Malley, Pam	Meyer, Diana/ Bill
Maloney, Ken And Julie	Meyer, Reuel
Mapolski, Sue E	Michalson, Lee
Marie, Ruth	Mienrich, Brenda
Marks, Kim	Millard, Homer C
Marks, Richard L	Miller, Heather
Martin, Dennis	Miller, Jane E
Mason, Arne	Miller, Maria
Mason, Cora E	Miller, Marion E
Mathis, Leah B	Miller, Norman
Matthews, Chris	Mills, Ann C

Minto, John E	Niswander, M Ruth
Mitchell And Tucker, Chuck And Clare	Noda, Robin
Moore, Laura	Nolan, Janet
Moore, Markell	Nolan, Jim & Carol
Morrison, Lisa	Noleroth, Gary/Joyce
Morrow, Jack L	Nordquist, Sherman & Elaine
Mosel, Kimberly	Noren, Margie
Moss, Ken	Nutall, Jocelin
Moss, Paul	O'Byrne, Ernie & Marietta
Mossen, Gregg	O'Connor, Jillian E
Mullins, Jim	O'Hara, Beth
Mulreaman, James	Occhiuto, Julie
Muluski, John T	Oles, Ed & Vickie & Matt & Hillary
Mumblo, Barbara	Olins, Andris
Munirh, Navoab	Oliver, Leon
Murphy, Deborah	Oliveria, Robert
Murphy, Judi	Orahood, Donald J
Murphy, Owen	Orr, Elizabeth & William
Murray, Harold E	Osborne, John/Winifred W
Murray, Jerry	Oswald, Christine
Nahan, Matthew	Otting, Nick
Neal/Hartnett, Cheryl/Michael	Ouellette, Kathaleen
Neeley, Cheryl	Oxley, Barry
Neidlinger, Mr & Mrs Howard	Padgett, Judy
Neidlinger, Violet D	Parchim, Barbara & Eldon
Neioby, Bea	Paris, Stephanie
Nevling, Tom	Park, Shannane
Newberry, Florence G	Parker, Corky
Nichols, Nancy	Parker, Delbert & Shirley
Nilsen, R & Bj	Parsons, Annette
	Patrick, Richard J

Patterson, Jean	Price, Edwin
Pearce, Chad	Prokos, Jennifer
Pedone, Robert	Prouty & Holman, Laurie & Kerry
Pelechaty, Orest V	Purber/Ortega/Crandall, Madonna
Penley, Alexander	Purves, Margaret
Perala, Myra/Nestor	Quellette, K
Perala, N Christine	Raleigh, Daniel P
Perry, Dianne	Raleigh, Wm And Gertrude
Peters, Beth	Ramo, Russel
Peterson, Everett & Gail	Ramp, Rudy
Peterson, Michael E	Rancher, John
Peterson, Milton & Mary	Rasch, Annette
Peterson, Ron	Rauch, Geoff
Peugh, Darielle	Ray, Duanne
Pham, Huy	Raymer, Terry
Philbrick, Clay	Rayne, Steven T
Piccadilly, Gloria	Reamer, Raymond & Mary
Pickrell, Julie	Reed, Lois
Pigati, Eric	Reeder, Erich
Pio, Ron	Reinhardt, Chuck
Pioli, Donna	Render, Byron
Pittman, Carol	Rensmeyer, Kirk M
Plaisance, Elaine	Reynolds, Stephanie
Plato, James E	Rhodes, Doris A
Poese, David	Ribe, Tom
Pogorzelski, Stacey M	Rice, Jan
Pomeroy, Judith M	Rich, Ken
Porto, Carol	Richland, Carolyn
Potts, Paul & Jane	Riley, Debbi A
Powne, Bob	Rilling, Hans
	Rittenhouse, William D

Ritter, Carroll D	Sanford, Mallory L
Riverbird, Asante	Sargent, Ed C
Roach, John/Lorraine/Steven E	Sauer, David A
Robbins, Jacob	Savarctn, John
Robinson, Anne	Sayavedra, Melinda
Rocha, Deborah	Sayles, Doris
Roether, Evelyn	Sayre, Gordon
Rondeau, J. Hawkeye	Schaefer, Natalie
Rosen, Glenn W	Schaffer, Rene
Rosenstein, David	Scharlack, Meyer
	Scheuerman, R F
Ross, Michael/Keith/Kelvin/Diane/Alex	Schmidt, Irene
Rosso, Abbey	Schmidt, Laura M
Rouhselange, V J	Schmidt, Scott
Rowland, Ruth	Schumaker, Mathew
Royal, Steve	Schwartz, Michael
Ruben, Barbara	Schwarzenberg, Carl/Faioa H
Ruether, Kristin	Schwindt/Foster
Ruggles, Bill	Scott, Steven
Rummel, Mike/Vicky	Searles, Zane E
Rurge, Chris	Seidell/You, Howard/Frank
Rushter, Kate	Shapiro, Natalie
Rusich, Michael	Sharp, Tamara
Ryan, Lynn	Shelly, Timothy
Sackman, Sheryl	Sherman/ Kollock, Arthur/Kathleen
Sacks, Vale & Lynn	Sherton, Corinne C
Sacks, Yaale	Shook, George
Saemann, John	Shore, Teri
Sageser, Mark	Shryock, David
Salys, Penny	Simonson/Higinbotham, Annette/Alan
Sanders, Carl	Simpson, Walter

Sims, Patricia	Stevenson, Frances W
Sjogren, Karen J	Stone, Dave
Skach, Arthur R	Storm/Myers, Jack/Joyce T
Slanger, Rhoda	Stout, Kindler
Sledge & Martin, Nance & Barry	Strafford, Nigel
Slessler, Larry	Strauss, Arthur E
Slider, Francis D	Strauss, Evelyn J
Smiley, Seth D	Streib, Darol
Smith, Eric	Stunk, Kevin
Smith, Harold	Sund, Bruce R
Smith, Harriet Rex	Supton, Liz
Smith, Heather E	Swanson, Carl M M
Smith, Jeffery	Swanson, John R
Smith, Randy	Sweetwine, Kevin
Smith, Sam/Kathy	Swenson, Judy
Snell, Thomas	Symens-Bucher & Galvin & Gibbons
Snitkin, Barry	Taft, Cindy L
Sohl, Helena	Tascher, Haiti
Sommer, Arwed K	Taudvin, Diane
Southworth, Darlene	Taylor, Jack C
Spencer, Jan	Taylor, Rhea
Spotts, Richard	Tennyson, Eugene H
Sprengel, Mark	Thatcher, Ron
Springer, Paul	Thies, Dave
St. John, Alan D	Thomas, Grace
Stansell, Veva	Thornton, James
Stasny, Jawea	Thornton, John
Steele, William K	Throop, Allen H
Steltz, Elizibeth A	Toeppen, David And Rachel
Stephenson, Michele	Totores, Lynette
	Toubman, Sara

Toy, Liz	Walls, Jess
Tozer, Jr., Al A	Walsh, Donald J
Trachsel, Karen	Walter, Greg
Trachsel, Walter	Walther, M
Trna, Tim	Ward, Rayner
Turigliatto, Jo Ellen	Warnock, Darrel
	Warner, Keith
Tuttle, Larry	Warrick, Theodore D
Ullian, Barbara	Watterson, Patricia
Ulloth, John	Wattez, Robert And Julie
Vaillancourt, Mary	Weaver, Randall J
Van Fleet, Cindy	Weber, Rosalind A
Vansyoc, Omer C	Weih, Jeff
Vassilakidis, Marie S	Weir, Willow Mae
Vautier, Wayne/ Suzanne R	Weiss, Sophia
Vejtasa, Stan And Kathy	Welker, Marylin And Bob
Vida, Christine	Welker, Renata
Vingerhart, Debarah	Wells, Christopher R
Volk, Douglas A	Werley, Will
Volk, Jeffery	Westcott, Richard L
Vorobik, Linda Ann	Wiemann, Tom/Gloria
Wade, Jessica L	Wilcox, Mary Ann
Wagster, Melissa	Wilke, Margaret
Wald, Johanna H	Williams, Jr, Harold P
Walden, Greg	Wilson, Elizabeth V
Walker, Isaac	Wilson, Laurie
Walker, Loretta	Wilson, Shannon
Walker, Nell	Wilt, Luther/Janice
Walker, Stephen P	Wiltfong, Dorothy C
Walker, Thomas C	Winston, Carla
Wallace, David R	Winters Hawkes, Marianne

Wirtz, Nancy

Wise, Ron & Mimsi

Wisnenski, Lisa M

Wisznia, Nanci

Woith, Aaron

Wood/Mondale, Elaine/William S

Wood, Lea

Wright, Christina

Wulfson, Ian

Wyckoff, John

Wynn, T. Carter

Yorczyk, Rick

York, Joy

Yost, Beth

Young, Don

Zablocki, Sarah/James/Elane

Ziller, Robert & Gloria

Zobel, Don B

Zulliger, Tom

APPENDIX A
LITERATURE CITED
LIST OF ANALYSIS FILES

LITERATURE CITED

- AME Mineral Economics. 1998. Strategic Studies of Nickel; the Challenge of New Supply. available on the Internet.
- Anaconda Nickel Limited. 1990. Nickel to Enter Period of Sustained Low Prices. Media release, July 17, 1990. Available on the Internet.
- Barrick, J. 1998. Preliminary Evaluation of the Economics for Various Processing Options Associated with the Recovery and Use of Nickel Recovered from Oregon Laterite Ore Deposits. Available on the Internet.
- Bates, R.L., and Jackson J.A. 1980. Glossary of Geology. Second edition. American Geophysical Institute. Falls Church, Virginia. 749 pp.
- Borgias, D. 1994. Oregon Plants, Oregon Places: Rough and Ready Creek in the Kalmiopsis. Journal of the Native Plant Society of Oregon. 6 pp.
- Hotz, P.E. 1964. Nickeliferous Laterites in Southwestern Oregon and Northwestern California. Economic Geology. 59: pp. 355-396.
- Kuck, P. 1999. Nickel Mineral Commodity Summaries. U. S. Geological Survey. Available on the Internet.
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- Ramp, L. 1978. Investigations of Nickel in Oregon. Oregon Department of Geology and Minerals Industries. Miscellaneous Paper, 20. 68 pp.
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- Resource Strategy Incorporated. 1998. Economics of the Nicore Project. Resource Strategies. Exton, Pennsylvania.
- Russell, D. 1997. Grade is King: the Case for Higher Grade New Caledonian Ore Processing. Paper presented by the Calliope Metals Corporation. Kalgoorlie, Australia. Available on the Internet.
- USDA, Forest Service and USDI, Bureau of Land Management. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the range of the Northern Spotted Owl. Forest Service and Bureau of Land Management. April, 1994.
- USDA, Forest Service. 1988. Forest Service Handbook. Economic and Social Analysis. FSH: 1909.17.

USDA, Forest Service. 1989. Land and Resource Management Plan for the Siskiyou National Forest. Siskiyou National Forest, Grants Pass, Oregon.

USDA, Forest Service. 1991. Forest Service Manual: Wildlife, Fish, and Sensitive Plant Management (Section 2670), WO Amendment 2600-91-3. effective 5/13/91.

USDA, Forest Service. 1994. Forest Service Manual: Minerals and Geology. Section 2800.

USDA, Forest Service. 1997. West Fork Illinois River Watershed Analysis. Illinois Valley Ranger District, Cave Junction, Oregon.

USDA, Forest Service. 1998. Coho Salmon presence on Rough and Ready Creek on June 1, 1998. Memorandum on file. Illinois Valley Ranger District, Cave Junction, Oregon.

USDA, Soil Conservation Service. 1981. Soil Survey of Josephine County, Oregon.

USDI, Bureau of Land Management. 1995. District Management Plan

LIST OF ANALYSIS FILES

<u>Date</u>	<u>Subject</u>	<u>Author</u>
3/16/92	Plan of Operations	Miner
12/17/92	Plan of Operations	Miner
5/6/93	Initial Scoping Letter	Zuschlag
8/10/93	Rough and Ready W&S River Study and Findings	Lunn
11/19/93	POO modifications	Miner
11/29/93	Letter acknowledging POO modifications	Zuschlag
7/21/94	Letter from Miner's Attorney-how to avoid EIS	Stephens
7/29/94	Appeal Response	Lunn
8/12/94	Appeal of decision to do EIS	Stephens
9/13/94	Letter to Stephens-no guarantee to avoid EIS	Zuschlag
11/20/94	RO Appeal decision	Ferraro
5/6/96	FOIA letter to Zuschlag	Ullian
6/10/96	Letter from miner-NOI	Miner
6/18/96	Letter to miner-receipt of NOI	Zuschlag
8/9/96	Letter from Stephens-status of POO	Stephens
8/14/96	Letter to Stephens-SUD completion date	Zuschlag
10/9/96	FOIA Available Surface Use Determination	Gauthier
10/16/96	US Agency EIS Mailing List	Desser
10/17/96	SUD for OGC Review	Levin
11/15/96	Letter from Stephens-what other POOs	Stephens
11/19/96	Property and owners near Rough and Ready Road	O'Leary
11/21/96	Letter to miner- more/better info. needed	Gauthier-Warriner
11/21/96	Letter about W&S River Assessments & LRMPs	Risburdt
12/18/96	Letter to Stephens status of SUD	Lunn
1/6/97	Letter to Stephens-forwarded SUD	Gauthier-Warriner
1/23/97	Letter to miner-more/better info. needed	Zuschlag
1/27/97	Letter to Nature Conservancy	Gauthier-Warriner
1/31/97	Letter documenting Miner/FS POO meeting	Nolan
2/10/97	Letter from miner-clarifies 3 items	Miner
2/10/97	Letter from Stephens-will provide info.	Stephens
2/19/97	BLM Letter to miner-need POO	Korfhage
3/3/97	Letter to Stephens-need amended POO	Zuschlag
3/12/97	More info on size & location of sites	Miner
3/13/97	BLM Dear Concerned Citizen letter	Korfhage
3/19/97	Agreement that PA is reasonably accurate	Miner
3/19/97	Letter from miner-provides info to BLM	Miner
3/21/97	Letter from Stephens-phase 1 & 2 clarified	Stephens
3/25/97	NOI for Federal Register	Agpaoa
3/27/97	Letter forwarding NOI to Federal Register	Carkin
Spring 97	Voice of Wild Siskiyou article	Ullian
4/2/97	Federal Register NOI	-
4/3/97	BLM letter-receipt of POO	Korfhage
4/4/97	FOIA letter to Zuschlag	Ullian
4/7/97	BLM FOIA Letter to Ullian	Jones

4/8/97	Letter to Landowners about info. meeting	Zuschlag
4/8/97	Forest Plan Consistency Report	Randall
4/9/97	Illinois Valley News article	-
4/14/97	Release of Names/addresses under FOIA	Williams
4/17/97	FOIA letter to Ullian	Zuschlag
4/17/97	Private Road Access Question to OCG	Levin
4/21/97	Scoping letter	Zuschlag
4/23/97	Scoping News Release	Zuschlag
5/13/97	Landowner meeting notes	McLennan
6/5/97	Letter from Stephens-what is status of EIS	Stephens
6/16/97	Letter to Stephens-proceeding with EIS	Zuschlag
6/25/97	Open House	-
6/26/97	Miners NOI	Miner
6/97	West Fork Illinois River Watershed Analysis-1.0	Zuschlag
6/97	POC Containment Strategy	-
7/11/97	W&S River Suitability	Lunn
7/14/97	FOIA letter to Mittleman	Zuschlag
7/14/97	Road Logs of Access Routes	O'Leary
7/17/97	Botanical Surveys	Seda
7/24/97	Ullian FOIA	King
8/18/97	Letter to Natural Heritage-siting forms	Zuschlag
9/9/97	Dear Interested Citizen letter	Zuschlag
9/17/97	Project Initiation Memo	Zuschlag
9/25/97	Stockpile location alternatives	Nolan
9/97	Health Questions About Nickel	ATSDR
10/1/97	Possible Conditions and Constraints	-
10/1/97	Mining Activities	Nolan
10/2/97	Letter to Powne	Zuschlag
10/6/97	Forest Plan Consistency	Mullens
10/8/97	Macroinvertebrate sample	Perez
10/8/97	Stockpile visual and botanical effects	Mazzu
10/17/97	S&G 7-1	Mendenhall
10/23/97	Air Quality Assessment	Mendenhall
10/23/97	Physical Science Report	Ricks
10/23/97	Comparison of Alternatives	O'Leary
10/31/97	Cost Estimates	O'Leary
11/3/97	Employment and Property Values Assessment	Mendenhall
11/6/97	Letter to Stephens-more/better info needed	Zuschlag
11/6/97	Effects on Residents, Visuals, Recreation	McLennan
11/6/97	Concerns with protecting W&S River ORVs	Zuschlag
11/13/97	Sampling Sites-Macroinvertebrate sample	Perez
11/13/97	FOIA letter to Lyford	Zuschlag
12/1/97	Requirement for all other permits	Cooley
12/9/97	Laterite Ore Processing	Russell
12/10/97	Letter regarding more information	Stephens
12/10/97	Letter from RO to Fontenot	Bown
12/11/97	DEIS mailing list	-
12/97	Communication Plan	-

Winter 97	Clementine publication	-
1997	Cascadia Times Article	Ullian
1997	Mailing Lists for Scoping	-
1997	Letters resulting from Scoping	-
1997	Preliminary Flora of Rough and Ready Creek	Siskiyou Project
1997	Possible stipulations	Craddock (Matt)
1997	Visual effects ACEC	Klein
1997	DEIS	-
1/5/98	Press Release DEIS available	-
1/6/98	Employment and Property Values	Mendenhall
1/7/98	Best Management Practices	Cruz
1/7/98	Conservation Strategy	Vezie
1/16/98	Medford Mail Tribune article	-
1/16/98	Grants Pass Courier article	-
1/19/98	The Oregonian article	-
1/20/98	Illinois Valley News article	Wertz
1/21/98	Request to extend DEIS Comment Period	Ullian
1/26/98	Biological Evaluation	Ulloa-Cruz
1/26/98	SREP letter to document SREP video	Ullian
1/26/98	Ullian FOIA	Zuschlag
1/27/98	DEIS is available letter	Zuschlag
1/28/98	Letter to Ullian-DEIS comment period	Lunn
1/30/98	Obrien Community Meeting	Desser
1/30/98	FOIA Request	Stephens
2/5/98	Grants Pass Courier article	-
2/8/98	Need neighborhood meeting letter	Lyford/Longnecker
2/9/98	Thank you for public meeting letter	Cosner
2/11/98	Illinois Valley News articles/letters	-
2/13/98	Do not like public meeting location letter	Cooper
2/15/98	Do not like public meeting location letter	Pio
2/15/98	Do not like public meeting location letter	Goodman
2/18/98	Grants Pass Courier article	-
2/19/98	Letter to Editor	-
2/24/98	FOIA letter to Borgais	Zuschlag
2/24/98	FOIA letter to Downing	Zuschlag
2/24/98	Stephens FOIA for list of POOs	Lunn
3/3/98	FOIA letter to Campbell	Zuschlag
3/3/98	Letter extending DEIS comment timeline	Lunn
3/3/98	FOIA letter to Nahan	Zuschlag
3/9/98	Letter to EPA extending comment period	Carkin
3/16/98	Stephens FOIA	Zuschlag
3/20/98	Holliday telecon record	O'Leary
3/20/98	Other access routes	O'Leary
3/24/98	FOIA letter to Campbell	Zuschlag
3/24/98	FOIA (98-19) complaint	Lunn
3/25/98	Illinois Valley News article	-
3/25/98	Comparison of Alternatives	O'Leary
3/25/98	Alternative Component Cost Estimates	O'Leary

3/27/98	Amended Federal Register Notice	
4/1/98	Maps of Special Use Permit-spring development	Cooley
4/6/98	Lyford FOIA	Zuschlag
4/8/98	Analysis of Access Alternatives	O'Leary
4/8/98	Document noting visit with Freeman	-
4/10/98	D.C. memo about NICORE	Joslin
4/21/98	The Oregonian article	-
4/22/98	Grants Pass Courier article	-
4/24/98	Federal Register Notice of EPA Comments	-
4/28/98	Letter to State BLM	Cooley
4/30/98	Letter to BLM regarding ACEC	Cassidy
5/1/98	Letter to PacifiCorp about powerline roads	O'Leary
5/5/98	Congressional Referral	Lunn
5/5/98	Congressional Referral	Lunn
5/7/98	Letter to Landowners	King
5/7/98	Video of private-hosted Meeting	-
5/8/98	Economics of the Nicore Project	RSIC
5/9/98	Grants Pass Courier article	-
5/11/98	Siskiyou Project news release	-
5/11/98	Siskiyou Project letter to Glickman/Babbitt	Numerous
5/13/98	BLM letter to Zillers	Zielinski
5/14/98	Preliminary Evaluation of the Economics....	Barrick
5/14/98	Letter/video of May 7 public meeting	Cosner
5/17/98	Medford Mail Tribune articles	-
5/20/98	Letter to Dombeck regarding NICORE	Wyden, eta
5/20/98	Illinois Valley News article	-
5/21/98	Grants Pass Courier article	-
5/28/98	Letter requesting review of Freeman occupancy	Marsden
6/3/98	Road Logs	O'Leary
6/9/98	Document discussing rock sources	Craddock
6/23/98	The Oregonian article	-
6/30/98	Meeting notes with Miner	-
7/8/98	Cable Yarding Feasibility	Marrs
7/21/98	Letter to Stephens-need for SDEIS	King
7/28/98	NOI for Supplemental DEIS	Ettner
7/29/98	Noise Analysis	Cooley
8/11/98	Air Quality Update	Mendenhall
8/11/98	Federal Register Notice of Supplemental DEIS	-
8/98	POC Containment Strategy	Pera
9/2/98	Letter to people on SDEIS mail list & list	Lunn
9/2/98	Letter to people on "other" mail list & list	Lunn
9/12/98	11/17/98 Physical Science Report Revision	McHugh
9/16/98	Illinois Valley News article	-
9/18/98	Conservation Strategy	Vezie
9/18/98	SREP meeting with Forest Service	-
9/24/98	Tuttle FOIA	Desser
9/28/98	Route Nodes	O'Leary
9/98	DEIS Talking Points	-

10/1/98	Lyford FOIA	King
10/8/98	SREP request for Economic Report	Ullian
10/12/98	Western Roundup article	-
10/16/98	Comparison of Route Alternatives	O'Leary
10/19/98	Nicore Economics	King
1/18/98	Illinois Valley News article	-
11/24/98	Letter forwarding SDEIS to EPA	Carkin
11/27/98	Conservation Strategy	Vezie
11/30/98	Congressional Inquiry	Wenker
11/98	Grants Pass Courier article	-
12/3/98	SREP FOIA	Lunn
12/4/98	Federal Register notice of SDEIS	-
12/11/98	Medford Mail Tribune article	-
12/15/98	Audio tape of 12/15/98 meeting	-
12/30/98	Acid Generation Potential	Parker
12/98	Public Health Statement	ATSDR
1998	Geochemical Baselines For Surface Water	USGS
1/4/99	Grants Pass Courier article	-
1/4/99	Letter about 12/15/98 meeting	Freeman
1/5/99	Illinois Valley High School Hearing	Savord
1/5/99	IGC Internet article	Berman
1/6/99	Grants Pass Courier article	-
1/13/99	Cost Estimates of Route Alternatives	O'Leary
1/12/99	Stephens FOIA	Stephens
1/15/99	SREP FOIA	Ullian
1/20/99	Letter about 1/5/99 meeting	Freeman
1/20/99	Campbell FOIA	King
1/29/99	SDEIS Comments	Stephen
1/99	Updated Air Quality	Mendenhall
1/99	Nickel	Kuck
2/27/99	Economic Impacts	Brandt
3/3/99	Illinois Valley News article	-
3/19/99	National Geodetic Survey (NGS) data sheet	-
4/1/99	Letter expressing need to finish EIS	Stephens
4/6/99	Letter to Stephens about EIS timelines	King
4/9/99	Cost Estimates of Route Alternatives	O'Leary
4/12/99	Effects of Access Alternatives	O'Leary
4/14/99	Update Citizens Letter	King
5/3/99	Road Management Objectives	O'Leary
5/12/99	Proposed Nicore Stockpile Site	Showalter
5/13/99	Fact sheet on Nickel	Hughes
5/18/99	Noise Analysis Update	Cooley
5/18/99	Drinking Water Standards	Kauffman
5/19/99	Drinking water standards for nickel	Kauffman
5/20/99	Smelting and processing of laterite ore	Johnson
5/28/99	Rough and Ready ACEC Management Plan Decisoin	Korfhage
5/29/99	Letter from PacifiCorp	Burch
5/99	Alternative 9 POC Strategy	Pera

5/99	Chemistry and Ground Water Effects	King
6/1/99	Final Conservation Strategy	Vezie
6/1/99	Updated Employment and Property Values	Mendenhall
6/6/99	Updated Economics Report	King
6/16/99	National Geodetic Survey (NGS) data sheet	
-	Nickel Laterites-An Increasingly Economic Resource	
6/99	Updated Economics Report	Reimann, et al King/Desser

Maps and Photos

APPENDIX B

PUBLIC COMMENTS AND RESPONSES
LETTERS FROM ELECTED OFFICIALS
AND AGENCIES

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APPENDIX B

PUBLIC COMMENTS AND RESPONSES and LETTERS FROM ELECTED OFFICIALS AND AGENCIES

INTRODUCTION

This section of the EIS is required under NEPA. It lists all the substantive¹ public comments and the Agency response to those comments. It is organized categorically, in an order similar to discussions within the Draft and Supplement Draft EIS. The comments that you see here are actual quotes; little editing and almost no paraphrasing has occurred. However, when many comments reflected the same general concern, idea, question, or statement, one comment was selected to represent them all. Comments are displayed in *italics*, responses are **bold**. Sometimes the same response applies to more than one comment; in that case, comments are listed sequentially, with a single response following. All letters received by the Forest Service and BLM were reviewed for substantive comments. Records regarding the comment content analysis are in the analysis files.

This Appendix is organized first by comments received on the DEIS, then comments received on the SDEIS. Some SDEIS comments are exact duplicates or very similar to comments received on the DEIS, but such duplication was not edited so that you may see the full range of comments received on both documents.

About 3800 letters were received regarding the DEIS, 500 on the SDEIS. Many other people signed petitions or indicated that they concurred with comments from environmental groups (for instance, the World Wildlife Fund sent the names of about 1600 people who requested No Action on the project). *Letters received from elected officials and other agencies are printed following the comments and responses.*

DEIS COMMENTS AND RESPONSES

LAWS AND POLICIES

Comment: NEPA Regulations require that in determining the intensity of the action agencies consider whether the actions threaten a violation of Federal, State or local law. The DEIS vaguely address this issue stating, "Mining Laws appear to conflict with policies of the FS and BLM aimed at protecting surface resources. None of the action alternatives meet all the standards and guidelines in the Northwest Forest Plan." This statement addresses only a few of many inconsistencies with the federal laws such as the CWA, ESA, MUSYA, NFMA, the Wild and Scenic River Act, and the Wilderness Act. Under NEPA all of the federal laws the proposed project would violate must be addressed and considered. In what way would the proposed alternatives be inconsistent with relevant statutory and regulatory laws such as Forest Service and BLM regulations. What is the statutory or other legal basis for the apparent belief that the proposed mining activities do not need to be consistent with these laws?

¹A substantive comment is one regarding the merits of the alternatives or the adequacy of the Environmental Impact Statement.

Comment: Page 4-26 of the DEIS, the preparer acknowledge the conflict between laws and policies and plans. These conflicts should be resolved before the Forest Service approves any action.

Comment: The Forest Service and the BLM are showing a bias towards mineral extraction over environmental protection by attempting to meet the requirements of mining law over the requirements of environmental law, the Northwest Forest Plan, and many instances of current public policy. The Lead Agencies do not have the authority to be arbitrary and capricious in the determination of which law to uphold.

Comment: The proposed action would construct approximately 0.5 miles of new road in Riparian Reserves, which would violate the intent of the aquatic Conservation Strategy and the Riparian Reserve Standards and Guidelines in the President's Forest Plan. Pages 4-18 to 4-21 in the DEIS acknowledges this point. EPA strongly encourages the Forest Service to re-think this approach and exercise as much deference as possible toward the goals of the Aquatic Conservation Strategy.

Response: Throughout the EIS, examples of potential conflicts between laws, policies and plans are cited. The Purpose and Need section of the EIS lists some of the laws, regulations, policies and plans that apply to this project. The nation's laws provide the fundamental principle upon which the regulations, policies and plans are based. Where conflicts between laws and policies or plans occur, laws and regulations take precedence. For instance, the Northwest Forest Plan states that "None of these Standards and Guidelines apply where they would be contrary to existing law or regulation (page C-1)." The selected alternative (see ROD) will adhere to laws first and foremost, and will reflect the Agencies' attempt to meet all applicable standards and guidelines.

Comment: The DEIS's paraphrasing of the Mining & Minerals Policy Act of 1970, 30 USC, 21(a), misleads the public into thinking that the Forest Service is required to foster and encourage any mining operation.

Response: The statement in the EIS is accurate and reflects the policy of the federal government in relation to minerals management. The Forest Service is not required to foster and encourage any mining operation, but the policy in relation to minerals management is to foster and encourage the "*private enterprise in the orderly and economic development of domestic mineral resources.*"

Comment: Work out a plan that will protect our natural resources, while still allowing the mineral extraction by NICORE per the 1872 Act.

Response: This comment reflects the purpose and need for action and is the intention of all action alternatives.

Comment: The BLM Area of Critical Environmental Concern which is included in NICORE's claim should be immediately withdrawn from mineral entry and all things non-native should be removed.

Response: The withdrawal issue is addressed in the Rough and Ready ACEC Management Plan (withdrawal was found to be inconsistent with the Medford Resource Area Management Plan. ‘Things’ non native will be removed from the ACEC if they are not authorized.

Comment: The DEIS doses not discuss or disclose impacts of the mining claimant's residential and commercial occupancy of public lands on the Rough & Ready ACEC.

Response: Page 88 of the SDEIS states that the miner's residence is an issue that will be addressed separately by the BLM. The FEIS explicitly notes that a residence and shop structure currently exist at the location of the proposed stockpile and that the operator plans to continue to utilize those structures during the implementation of the proposed action. The BLM will address the needs of the operator to use and occupy the claims in relation to the specific mining alternative approved in the ROD. All mining claim uses and occupancies must be reasonably incidental to mining.

Comment: I particularly object to the plan to stockpile nickel ore on a BLM designated "Area of Critical Environmental Concern (ACEC)."

Comment: NICORE could buy the junkyard property close to airport site as a stockpile site.

Response: Requiring the stockpile site to be located outside the ACEC or off public lands was considered but eliminated from detailed study because the alternative stockpile site effectively resolves issues related to the proposed stockpile site. There are unpatented mining claims located on the lands administered by the BLM at the ACEC. The stockpile is an acceptable use of the mining claims at this location.

Comment: The DEIS does not list the Wild & Scenic Rivers Act, Clean Water Act, and the Endangered Species Act which also apply to the Nicore Project. A discussion of the implications of these laws and their implementing regulations and the agencies' obligation under these laws should be included in this section.

Response: These laws have been included in the FEIS. FS and BLM regulations include laws, regulations, and policies related to mining administration and environmental protection.

Comment: The Laws, Regulations, Policies & Plans section of the DEIS (1-3) misleads the public into thinking that the Forest Service & BLM decision makers do not have the option of selecting the No Action or other alternatives that would protect the public's interests.

Response: The Laws, Regulations, Policies and Plans section of the EIS is intended to characterize and summarize the laws regarding this mining plan. Mining is considered non-discretionary. The original plan of operations may be rejected on the basis that it is not appropriate for the current stage of development, but the miner must be given the right to perfect his discovery.

Comment: The purpose of this proposal should be reworded. It should say 'to determine if mining in the proposed project area is feasible with regard to other area resources'.

Comment: The purpose and need for action is superseded by the following stipulations. 1. The applicant has determined that the mineral deposit is a valuable mineral deposit. 2. The purpose of the applicant is to make a profit from the mining and milling of the mineral deposit, and 3. society needs and demands those mineral deposits for a purpose.

Response: The purpose and need as currently written is consistent with existing laws of the United States of America; the rephrasing suggested here may not be consistent with existing laws and policies.

Comment: The DEIS should include a discussion of State rules and regulations to which the proposed Nicore Project must comply.

Response: This is the intention of the section on permits required from the state in Chapter Two. The miner will be responsible to meet all laws whether or not they are listed in the EIS.

Comment: I am given to understand the Forest Service, using the public's tax dollars, has financed the EIS for the project proponent. How is it that the public is made to pay for analysis?

Response: In accordance with the locatable minerals regulations at 36 CFR part 228, subpart A, the Forest Service must process proposed plans of operation within the framework of these regulations. Completion of the EIS process with full public involvement and disclosure is the best way to deal with the issues raised by this proposal. This is the responsibility of the federal agencies involved. A mining proponent may volunteer to expedite environmental analysis by paying part or all of the costs involved but the Forest Service cannot require the proponent to pay.

PLAN OF OPERATIONS

Comment: The U.S. Forest Service has, in the opinion of most observers, prematurely prepared a DEIS. Little if any scientific data was presented in the original DEIS. NICORE has revealed only a sketchy plan of operation that disclosed nothing of how the mining operation would work.

Comment: The degree of detail and indication of the completeness of the applications information, as provided in the NICORE DEIS and other information, is seriously deficient.

Comment: The refusal by the applicant to provide the necessary information for a complete and thorough evaluation prevents the Forest Service from conducting an adequate EIS.

Comment: The miner has failed to provide a detailed and complete plan of operation; including a reclamation plan, financial analysis proving the viability of his claims, dust and noise control, non-native plant control, and a plan for smelting the ore.

Comment: *The DEIS fails to accurately describe the size, technology and abundance of the NICORE POO and other potential mining in the analysis area.*

Comment: *Despite repeated requests by the SNF and adequate opportunity during the past six years to do so, the applicant has not provided detailed information on the plan of operation under NEPA. This is an absolute requirement so that the full impacts of the proposed action can be analyzed by the agencies and public provided with an opportunity to comment on the mining plan and its impacts.*

Response: Many people have commented that the Nicore Plan of Operations does not completely describe many aspects of the mining operation. As discussed in the EIS, the decisionmakers for the government (BLM and FS) decided that sufficient information was included in the Plan of Operations to complete this EIS analysis. Alternative 9 was developed to address the issue of unanswered questions about the operation. We do not agree that "little, if any, scientific data was presented in the original DEIS." Many details about the mining operation, economic analysis, objectives for the reclamation plan, dust/noise, and non-native plant control measures are all addressed in the EIS.

Uncertainties about the plan of operations are also disclosed as appropriate in the EIS.

Comment: *If the dried ore is not smelted on the site then it will have to be reloaded and transported to whatever processing facility is identified. The loading and transportation of dried ore will also have impacts such as dust, noise, and increased traffic. These must be addressed in the revised DEIS.*

Response: The BLM will do any needed analysis for this part of the operation once the processing facility is identified, depending on the selected alternative. No Plan of Operations will be approved prior to completion of needed analysis.

Comment: *The reclamation plan for the proposed action (2-2) does not comply with the requirement of 36 CFR, 228.8(g) and 43 CFR Part 3809.*

Response: The EIS discusses reclamation for all alternatives, including the Proposed Action, in Chapter Two. Any approved Plan of Operations will include a Reclamation Plan that meets legal requirements.

Comment: *The proposed plan of operations states that the deposits are located in sections 22, 8, 11, and 16, yet the maps provided show no deposit site in 11, but one instead in 14.*

Response: This inconsistency was addressed in the development of the Proposed Action. The maps shown in the EIS accurately depict the Plan of Operations.

Comment: *No where do I see mentioned how long this ore might be stockpiled.*

Response: The Proposed Plan of Operations would cover a ten year period, throughout which time, up to 40,000 tons of ore could be stockpiled at the site. The Preferred Alternative 9 would allow stockpiling up to 5,000 tons of ore for up to 5 years.

Comment: *The plan evaluated in the Draft EIS fails to identify the means to beneficiate the ore.*

Response: The claimant has expressed that the beneficiation process is proprietary. The Plan of Operations does not include ore processing beyond screening at the mine sites and transport to the stockpile site. The ROD will address this uncertainty.

Comment: *The forest should request that the claimant provide a plan to address the volume and quality of the slag produced.*

Response: Slag, by definition, is a product of the smelting process and is not addressed in this analysis.

Comment: *There seems to be a contradiction in DEIS about how much mining will occur if this project proves successful.*

Response: This EIS analysis covers the current plan of operations to mine 35 acres. Should this prove successful, the miner has indicated he would propose another Plan of Operations accessed from the same road system (see 10/97 Nolan memo). Future mining is not a foregone conclusion, especially given the economic conditions discussed in the EIS. However, cumulative effects analysis is based on 512 acres of nickel laterites mapped by Ramp (see Figure 13 in the FEIS).

Comment: *Could all 35 acres be mined in one year upon approval of an amended plan subsequent to the approval of the plan?*

Response: An alternative that would require all ore to be removed in one year was considered but eliminated from detailed study because it would require a larger stockpile site and may not be reasonable from an operations standpoint. The proposed (and alternative) stockpile sites would be designed to accommodate one-tenth (or less) of the total amount of ore. Changes to any plan could be considered subsequent to approval, however, they would be subject to any required analysis.

Comment: *In a December 10, 1998 letter from Groen & Stephens to Mary Zuschlag, Mr. Freeman's attorney states that "[t]he Plan of Operations, which is awaiting approval and which is subject to the EIS, is the one submitted in 1992". However the plan the DEIS describes at (2-1 & 2) as the plan of operations proposed by the mine claimant, does not resemble the 1992 plan in extent or scope.*

Response: The project history section describes changes made to the Plan of Operations since it was originally submitted.

Comment: The DEIS appears to treat the "mining operation", the "haul route", the "ore stockpiling", "reclamation", and "mitigation measures" as separate actions (1-1 through 1-5) when in fact they are all part of the proposed Nicore mining operation (36 CFR & 228.3) and must be considered as a whole in the Nicore DEIS (including the "processing/smelting"). Instead, the Forest Service and BLM attempt to put off disclosure and analysis of many significant aspects of mining operation such as mitigation, reclamation, monitoring and processing by assigning them to, among other things, a later or separated analysis (1-30, the approval of a final plan of operations (post NEPA) (2-2 - 5, 4-25), or collaboration between the land managing agencies and Mr. Freeman (post NEPA) (4-7). These proposals, mitigation measures and their impacts must be fully discussed and analyzed in the revised DEIS for the Nicore "mining plan of operation".

Response: All of these are connected actions. Most of these processes are discussed throughout the EIS, and guidelines, thresholds, objectives and other requirements are described. Potential effects related to smelting has not been analyzed. The level of detail included in the EIS process is sufficient to select one of the alternatives, but no Plan of Operations would be approved until all processes (including smelting) are considered.

Comment: The DEIS also fails to disclose reasonably foreseeable future mining operations both by Mr. Freeman and by other mining companies. For instance, in a letter to Mr. Steve Marsden, the BLM notes that "Mr. Freeman has also been discussing additional mining operations adjacent to his residence within the Rough & Ready and Woodcock Bog areas of critical environmental concern." (Letter to Mr. Steve Marsden from Robert Korfhage, Grants Pass Area Manager, dated November 29, 1995). Mr. Korfhage states that "Mr. Freeman's activities at the location of his residence and outbuildings are reasonably incidental to mining" and goes on to describe the "additional mining operations".

Response: Mr. Freeman's existing residence is being dealt with outside this process. The EIS finds that temporary quarters for security personnel would be appropriate at the stockpile site. Mr. Freeman has not submitted any additional Plans of Operations beyond those considered in the FEIS.

Comment: Another indication of the full extent of Mr. Freeman's undisclosed mining plans is the fact that he has filed for mineral patent. In doing so Mr. Freeman has signed a sworn statement that on each of the claims he's applied for ownership on he has discovered valuable mineral in amounts sufficient for a person of ordinary prudence to be justified in further expenditure of labor and means with a prospect of successfully developing a valuable mine. Thus, the DEIS's statement that "no evidence exists to substantiate this concern (that expanded mining operations are reasonably foreseeable)" 4-26, is directly refuted by the applicant's own sworn statement. The DEIS also states that the miner has indicated that should this operation prove successful, development of hundreds of acres accessed by the haul routes may follow.

Comment: In the draft EIS on page 4-26 there is reference to a 4,000 acre patent application submitted by the applicant. It would appear, based on the miner's intent, that indeed there is evidence to substantiate a concern here. A patent, if issued, would create the potential for a large cumulative impact related to this project.

Response: This section was rewritten for the SDEIS and FEIS. The Forest Service is aware of the patent application, however, no work has been done to determine whether Mr. Freeman has discovered a valuable mineral on all the claims included in the patent application. The 4,000 acre patent application does not match the mapping of similar laterite deposits as shown in Chapter Three (Ramp's map). Nor does it match the statements made by the miner that he would likely continue mining the deposits accessed by the same road system. The analysis uses Ramp's mapping of nickel laterites (see Map in Chapter Three) as the basis for reasonably foreseeable future mining (however, given the economic outlook, future mining is not a forgone conclusion).

ROAD DESIGN

Comment: *The DEIS states, "Where feasible, water bars and/or cross ditches would be 'built in' for grades greater than 10%. Some annual maintenance would also be required." What is "Feasible", and how much is "some"?*

Response: The statement is on Page 15 of the SDEIS. Some areas naturally lend themselves to building in waterbars. These areas would have the waterbars built in. Other waterbars and cross ditches would be added at the end of each season along with ditches and riprap, as needed, to reduce erosion and preserve the road over the winter.

Comment: *In the DEIS about 15 miles of roads are planned. According to the patent application the roads will be 30 feet wide. That equates to 55 acres of roads to access 35 acres of strip mines. The total disturbance area is then 90 acres, not 35 acres.*

Response: The road specifications are discussed in the EIS and analysis files. The roads would be about 12 feet wide. The patent application is not the basis for this analysis, rather the plan of operations submitted by the miner (as characterized in the Proposed Action in the EIS).

Comment: *It is imperative that the USFS consult with experts in the field of road building and consultants from various ore truck manufacturers in order to find out what the actual specification for mining roads would really need to be.*

Response: The ore truck planned for use has been stipulated as a Terex 25 ton articulated dump truck by the proponent. The specifications used come from the Caterpillar Performance Handbook, Edition 27. The 12 foot running surface for the road is adequate for this vehicle, which has a 9 ft. operating width.

Comment: *As part of Alternate Route 1 plan, I understand that the USFS would require NICORE to pave the road.*

Response: SDEIS and FEIS alternatives 6 and 11 would utilize the Rough and Ready Creek road as it passes through private land. Nicore would be required to pursue right-of-way from the private landowners if either of those alternatives were chosen (but if the landowners did not agree to provide right-of-way, the Forest Service would have to choose another alternative). Under Alternatives 6 and 11, the assumption that the private road would be paved is made to help disclose impacts. The Interdisciplinary Team believes that paving the road would reduce the impact of its use for ore haul. However, the decision about how to treat the private road would be up to the landowners.

***Comment:** I recommend a permanent surfacing of all haul roads with chip seal. This will reduce erosion and give the road a chance of surviving past the days of the mining if it is maintained by the mining operator as part of their reclamation plan.*

Response: Permanent surfacing with asphalt or concrete products is not desirable given the long term management goals for most of the analysis area. Once the mining operation is finished, the roads would be closed and stormproofed.

***Comment:** Elements that could be incorporated in alternatives include:*

- A. Ore removal by smaller vehicles.*
- B. Transport vehicles limited to five miles per hour to reduce dust, rather than pump and spray water on the roads.*
- C. The roads could be more like trails. The use of small transport vehicles can reduce the size needed for the access road.*

Response: Road specifications that apply to Alternatives 6, 7, 8, 9, 10 and 11 are the minimum necessary for safe ore haul. Speed limits would be established in the final plan, however, dust abatement would likely still be necessary for safety, visual quality, and air quality. The use of smaller vehicles is considered in Alternatives 6 and 10.

***Comment:** Roads developed on steeper side slopes can use "cut only" techniques so the fill material does not impact the downhill side.*

Response: Full bench roads are used where slopes are greater than about 55 to 60 percent, in order to avoid long fill slopes.

***Comment:** Where would rock to rebuild the crossings each year come from?*

***Comment:** The SDEIS fails to disclose where the rock [for road surfacing] will come from, and what is defined as rock surfacing. The rock pit or gravel mine area must be included in the calculation of the area of disturbance.*

Response: Rock is expected to come from one of the four previously used crushing sites on the Rough & Ready Creek fan (3 on BLM, 1 on private land). If the new road is built to Site A, there would also be rock sites along that route. Rock surfacing is generally expected to be 3"-, except for portions of Alternatives 6 and 11, and the road between Highway 199 and the stockpile site in all alternatives which would use 3/4 "- or 1 ½" -.

The miner has not yet proposed a rock source. Any source proposed would be subject to Forest Service/BLM approval, and would need to be similar to the native rock, and from a source free of POC root disease and noxious weeds. Any analysis required would be completed once a rock source is proposed.

Comment: The DEIS statement that "mitigation to reduce the risk of rock fall into the creek from bedrock blasting could be employed" is completely unsubstantiated.

Response: Several methods may be used to reduce rock fall into the creek. Examples include rock blankets to reduce airborne fragments during blasting, log cribs to catch rock fall, and special drilling and loading of powder to reduce overall movement and airborne fragments. These methods have been used successfully on other road building projects.

MERITS OF THE ALTERNATIVES

Comment: We are opposed to the installation and removal of temporary bridges because of the high probability that our water supply will become contaminated.

Response: Effects of temporary bridge installation and removal are discussed in the EIS. Sedimentation is likely during these operations; downstream surface water sources may need filtering.

Comment: From mine site "D" 280 major stream crossings per day is unacceptable.

Response: Your comments have been considered and the rationale for the decision will be in the ROD. Several alternatives have been developed to reduce the number of crossings, including a cable ore hauling system to avoid crossings, and elimination of mine site D altogether.

Comment: A new alternative should stay completely out of Rough and Ready Creek and away from any POC. Any roads leading to POC should be gated.

Response: No Action and Alternative 9 satisfy this suggestion. Currently, access to the area is limited by private ownership, creek crossings, wash-outs, and the low-standard nature of the roads. The Forest Service recognizes that the current condition of the roads do not fully meet the Aquatic Conservation Strategy objectives, and should be closed and stormproofed. Under the No Action Alternative, and Alternative 9, the Forest Service will consider road treatments in a future analysis. Under the other alternatives, Nicore would improve and gate the roads approved for mining access.

Comment: Because POC root disease has not been found in the area, it is extremely important to keep vehicles out. None of the alternatives in this DEIS would keep vehicles out of the watershed.

Response: Currently, vehicles can access the headwaters and lower reaches of the watershed. All of the alternatives would close the area to public traffic during operations, and two alternatives (No Action and Alternative 9) would not approve ore haul with trucks. An alternative that reduces current access is beyond the scope of this analysis (see alternatives considered but eliminated from detailed study).

Comment: River crossings perhaps need to all be bridged to prevent the forever loss of fish runs.

Response: Bridges are a feature of Alternatives 6, 7, 8, 10 and 11. Effects on fish are discussed in Chapter Four of the EIS. No alternative would lead to the "forever loss of fish runs."

Comment: Parker Creek is without roads seen from Highways or trails. There should be no mining on Parker Creek side of divide.

Response: No mining is proposed in the Parker Creek watershed.

Comment: A ridge top road bordering the now uninfected Parker Creek drainage seems completely irresponsible since it would be impossible to keep vehicles off this road in the dangerous winter months. Access to this proposed road can be achieved easily through several pieces of private property.

Response: Gate closures can be effective. Placement and strength of gates are important factors in their effectiveness. Road closures require considerable attention to ensure that they are not broached. The difficulties associated with keeping traffic away from the ridge road are discussed in the EIS.

Comment: Despite the legal loopholes in the 1872 mining law, the Rough and Ready Area of Critical Environmental Concern (ACEC) and South Kalmiopsis Roadless Area are too fragile to withstand the impacts of the mining, road construction and operation of a smelter.

Response: Your comments have been considered. The rationale for the decision will be in the Record of Decision. Please understand that no smelter has been proposed on federal lands.

Comment: Mining is inconsistent with the botanical and geological values of this area; this inconsistency exists because of the antiquated 1872 mining law.

Response: Your comments have been considered. The rationale for the decision will be in the Record of Decision. However, concerns about the mining law are outside the scope of this EIS.

Comment: In the DEIS you clearly show that with all of the action alternatives listed there are too many risks involved, with too little assurance of completing the ten year operation without significantly damaging the sensitive ecosystem.

Response: Some significant effects are expected for all the full scale mining alternatives. These effects are considered in the decision-making process.

Comment: I believe that economics should play a part in this decision to allow the proposal to proceed.

Response: The SDEIS and FEIS address the economics and the rationale for the decision will display the logic of the decision maker.

Comment: I whole-heartedly support this enterprise for the local economy.

Response: Your opinion is noted. The rationale for the decision is in the Record of Decision.

Comment: The consequences of this mining operation, if it is allowed, will be a terrible devastation to the environment and local the economy. The economy is currently tourism and retirement based. It is my firm belief that this mine, if allowed would have a negative net employment factor on the Illinois Valley and could, indeed create an out-migration.

Response: Your opinion is noted. The effects of implementation on recreation, visuals, and interpretative development are displayed in Chapter Four of the SDEIS and FEIS.

MITIGATION, MONITORING AND RECLAMATION

Comment: The DEIS states that one of the "non significant effects" is reclamation effectiveness (page 4-25). This is a much more important issue than is indicated.

Response: The SDEIS omitted this reference to non-significant effects. The effectiveness of all recommended mitigation, including the reclamation objectives, is discussed in the FEIS.

Comment: How can any evaluation of effectiveness be made when no one knows exactly what the proposed reclamation measures will be?

Comment: While the extent of the environmental degradation potentially caused by mining activities is quite apparent from the Draft DEIS, it is unclear how these affects are to be ameliorated by FS and the mining applicant.

Response: The FEIS includes estimates of the effectiveness of proposed mitigation measures.

Comment: There are multiple problems with the vague listing of mitigation measures for the actions alternatives in the DEIS at pages 2-3 to 2-5. The proposed mitigation measure for Port-Orford cedar root disease is aimed only at "reducing the risk of introduction and not preventing the introduction of the root diseases. In order for the term "reducing" to have any meaning the DEIS should address by what magnitude the proposed mitigation measures would reduce the risk of introduction . Mitigation #9, for example, states that motorized access to the North side of Rough and Ready Creek would be restricted from September 15 to June 15th "unless otherwise authorized by the Forest Service." Under what circumstances would access be authorized and at what frequency would the Service expect to allow access between September 15 and June 15th? Similarly, mitigation measures aimed to protect sensitive plants and animals is only required "To the extent possible." But does not define to all what would qualify as "possible" or impossible. The statement that "Several methods of dust abatement may be approved," lacks specificity. Mitigation measure #14 is similarly flawed because it sites that "The mine operator would be responsible for some ongoing monitoring guidelines are followed." Without giving any indications to the extent, nature or duration of these measures or how such monitoring would be enforced.

Response: The section on mitigation has been expanded in the FEIS to address many of your concerns.

Comment: Stringent runoff control and sediment containment measures should be required so the sediment does not enter the surface waters.

Response: Many mitigation measures will be employed to avoid sediment from entering streams, waterbars, road template design, road location and erosion control prior to the wet season. These are incorporated via Best Management Practices, as discussed in the EIS.

Comment: All roads should be restored to natural condition after the proposed mining is completed.

Response: The roads would be stormproofed and closed following proposed mining. They may not be fully restored to a natural condition, but would be treated to assure hydrological function (proper drainage).

Comment: Reclamation is not ONLY revegetation. In this ecosystem, reclamation necessarily includes re-establishment of native species and reestablishment of proper soil hydrological function and chemical balance.

Response: The FEIS provides further information about reclamation. Reclamation is not expected to restore all vegetation or soil function in the short term. Chemical equilibrium will always be present.

Comment: How long, specified date, for final reclamation?

Response: Reclamation would occur concurrently as operations progress. Final reclamation would occur once operations were completed, or as soon as practical if operations ceased for 12 consecutive months.

Comment: *There is no mention of what agency will oversee the mitigation plan, nor what fines will be imposed if the plans are not followed. Who will patrol the area daily to monitor compliance?*

Response: Ultimately, the operator is responsible for assuring that stipulations in the final Plan of Operations are followed. The Forest Service and BLM will also conduct site visits to assure that stipulations are being followed. Other state and federal agencies would also provide some ongoing monitoring. The Agencies could shut down the operation, require changes, or assess fines if the miner is found in non-compliance.

Comment: *The only restoration/reclamation work that I see Nicore promise to do is to not let more than 5 acres of mining be an open pit at any given time. With the planned 3.1 acres to be mined a year, that means if mining starts on June 15th of one year, then no reclamation would be expected on a mining site until about August of the next year.*

Response: Reclamation would occur prior to annual shut-down (see Proposed Action, Reclamation). The estimate of 3.1 acres per year mined is an average; potentially up to 5 acres could be disturbed at any one time and would need to be reclaimed before annual and final shut-down.

Comment: *The EIS should require specific and continuous monitoring of applicant compliance. A clear process for halting or revising the mining operation should be established in case the applicant fails to meet the requirements of condition of any of the permitting or approving agencies.*

Response: Monitoring is discussed in Chapter Two. Each agency involved in permitting mining has a process for ensuring compliance and shutting down operations that do not comply. Adaptation to monitoring results is expected. Changes to the Plan of Operations would always be considered relative to potential effects and the need for analysis or documentation under the National Environmental Policy Act.

Comment: *Erosion and sediment control measures should involve both project design elements and performance standards.*

Response: Best Management Practices (listed in Chapter Two of the FEIS, see Analysis Files for more detail) would be required to address these concerns.

Comment: *Another undisclosed aspect of restoration is whether seeds and bulbs will be collected from proposed roads, pits and stockpiles before construction of each site can begin. Who will provide the expertise for disturbing these species so rare?*

Response: Native seed and bulb collection is discussed in Chapter Two and Appendix G. The Forest Service and BLM botanists are qualified to determine how and when to collect seed or bulbs.

Comment: *It has not been disclosed how the 5 foot deep pits, left after a back filling of the deep pits, will drain.*

Response: Observations of previously mined areas nearby revealed that infiltration occurs, but that the infiltration rate may be exceeded during times of heavy precipitation. An armored overflow or underground pipe may be required and would be designed by a Certified Engineer (see the FEIS pit drainage discussion in Chapter Two in the section on Mitigation).

Comment: *I am skeptical that the USFS and other agencies are sufficiently staffed to successfully inspect and enforce regulations pertaining to the mining operation.*

Response: The USFS has the responsibility to adequately administer active mining claims.

Comment: *Will organisms in the soil responsible for fixing nitrogen, phosphorus and sulfur for the vegetation perish or will they be maintained? If not, how will they be restored to the soil? How is vegetation to be replanted?*

Response: See reclamation discussion in Chapter Two of the EIS. Collecting local seeds and seeding an area is usually the best method for re-establishing herbaceous plants. Shrubs and trees are best when planted from 1-2 year grown stock.

Comment: *Will drainage, soil percolation, and evaporation be affected when the reclaimed soil is returned after being sifted? Will the slope of all areas be returned to the original percolation and drainage? Will additional soil be brought into the area to replace removed aggregate? If so, where will the brought in aggregate come from? Will the soil be compacted to the original state to avoid further erosion?*

Response: The reclamation discussion in Chapter Two addresses the anticipated topography of the pits following mining. The soils at the sites will be different in terms of chemistry, physical characteristics and slope than the conditions that existed prior to disturbance. No additional soil would be brought in.

Comment: *A detailed Monitoring Plan should be included for the Fish and Wildlife Service (FWS) and other interested agencies. The Department requests that the FWS be provided an opportunity to review the plan of operations prior to issuance of the permit.*

Response: Monitoring is discussed in the FEIS Chapter Two.

Comment: *Page 2-3 indicates that the refuse would be regularly removed and the work area kept clean. You need to be very quantitative and specific on the measurements you want done and on the level of cleanliness required of any operator in the woods.*

Response: The Plan of Operations would specifically address work site cleanliness as a condition of an approved operation. Minerals administration would identify any deficiencies early-on and they would need to be corrected.

Comment: With mining depressions averaging 12 feet in the ground it appears that some depressions will be at least 24 feet deep. The replacement of the boulders and topsoil will not allow the sites to return to preexisting conditions. How will the ponds affect the groundwater?

Response: The pits will not return to pre-existing conditions. The effect on groundwater is discussed in the SDEIS and FEIS. A reclamation objective would be adequate drainage so that ponds are not created.

Comment: On page 4-15, it states that "native plants tolerant to disturbance are expected to be reestablished over time". What species does this include? What is the time period?

Comment: The EIS needs an evaluation of the feasibility of revegetation of laterite mining pits.

Response: There are several native species that colonize disturbed serpentine areas. These species vary depending on the site. The reclamation plan includes native seed collection to maintain genetic integrity. The seed will be used to revegetate the sites. The rate that plants will become established over the mined sites will depend on many factors and cannot be predicted. Plants are growing in previously disturbed sites throughout the analysis area. The EIS discloses that revegetation is likely to take longer in serpentine habitats than more typical habitats on the Siskiyou National Forest. Even if revegetation does not occur within the foreseeable future, the direct impacts would be limited to the 35 acres of mine pits under full mining alternatives. The cumulative impacts of 500+ acres of mining if all known, similar laterite deposits could be significant.

Comment: Studies by RF Smith and LK Burgess show that serpentine reclamation is not possible unless non serpentine soil is used as new topsoil. That is not reclamation.

Response: This is not an accurate reading of the Smith and Burgess report (which has not been cited or used in this analysis). Any topsoil or other fill material to be used in reclamation in this project would come from the project area. No non-native soils are contemplated (see EIS Alternatives considered but not developed).

Comment: From reading various documents including the DEIS, I do not recall any mention about reclamation/restoration work planned for the hauling roads.

Response: The section on mitigation applied to all action alternatives in Chapter Two describes stormproofing and erosion control along the haul route.

Comment: The DEIS stated, "Roads are not usually considered an irretrievable commitment of resources, however, these roads are not likely to be reclaimed through usual means". Roads should be considered an irretrievable commitment.

Response: The SDEIS addressed roads as an irretrievable commitment of resources (see EIS section on irretrievable and irreversible resource commitments).

Comment: The proposed road in DEIS Alternative 4 from the bench, southeast, should quickly distance itself from the creek to preserve some isolation enjoyed by the creek's users.

Response: Alternatives 7, 8, and 10 in the FEIS include the bench section (Alternative 4 has been eliminated in the FEIS). Approximately 0.2 miles of this route can be varied somewhat in the elevation on the hillside, but would still be in sight from the residences on the creek. The route enters the timber and goes around the hill as quickly as practicable.

Comment: The DEIS's treatment of mitigation measures (pages 2-3 thru 5) is inadequate under NEPA. Environmental Impact Statements must analyze mitigation measures in detail and explain the effectiveness of the measures.

Response: The effectiveness of the mitigation measures are discussed in the FEIS.

Comment: The reclamation proposal in the Proposed Action does not address: source of replacement soils; how to prevent introduction of weeds; whether the below grade reclamation of pits would retain water creating a different habitat; sources of native plant materials; and experience with feasibility of re-establishing a serpentine habitat.

Response: As stated in the EIS: soils will not be brought in from other areas to avoid contamination of POC and the introduction of noxious weeds. Native plants material will be collected from areas adjacent to the disturbed areas. The Agencies recognize that re-establishment of serpentine habitat is difficult and may not be practical or possible in the short term.

Comment: The amount of the bond required by the applicant needs to be stated in the DEIS. If the applicant, the FS, and the BLM do not have enough information yet to determine the bond amount then this DEIS should be withdrawn because it was drafted without sufficient information.

Comment: The mining company should have to put up a \$5 million bond that will pay for post closure maintenance of the roads. It is impossible to review the impact of a mining operation if you don't know what the reclamation plan will contain. The reclamation plan must be considered as part of the overall project act and therefore the existing document is totally inadequate.

Comment: Mandate that a large sum financial bond be placed by the mining company to protect any and all damage.

Response: Any Plan of Operation approved would include a reclamation plan and bond. The reclamation plan will be used to calculate the bond amount. The amount is based on multiple factors and calculated by the Oregon Department of Geology and Mineral Industries, the BLM, and the Forest Service. The bond can be changed during operations if need be. Whenever a bond furnished under an approved plan of operations is found to be unsatisfactory, a new bond would be furnished within 15 days. The bond was estimated for all action alternatives as about \$50,000 (subject to change given depending on final approved plan).

Comment: *If NICORE declares bankruptcy or defaults on obligations, who would be responsible for completing the restoration, both physically and financially?*

Response: The Forest Service (using the required bond) or a bonding company, would hire contractors to reclaim the site.

Comment: *The DEIS states that the applicant will be required to submit a mitigation plan and obtain the necessary permits before commencing operations. There is not, however, sufficient information provided in the DEIS to enable those reviewing it to make informed judgements on the sufficiency of the proposed mitigation requirements.*

Response: The section on mitigation has been improved for the FEIS.

Comment: *Mitigation measures must include decommissioning and restoring all roads used for the mining operation.*

Response: The FEIS discloses that the current condition of the roads does not fully meet Aquatic Conservation Strategy objectives, and that the Forest Service objective for much of the proposed haul route is “level 1 - closed.” Mitigation for all full mining alternatives includes annual and final stormproofing and closure. Under No Action and Alternative 9, the roads may be closed and stormproofed by the Forest Service, as part of the regular watershed restoration program.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Comment: *The DEIS should contain a Preservation/Restoration alternative, and a Mining Other Claims Without Creek Crossing Alternative.*

Response: These alternatives are discussed in Chapter Two, Alternatives Considered but Eliminated From Detailed Study. The Restoration Alternative is not an appropriate response to the miner’s Plan of Operations. A Mining Other Claims Alternative is not appropriate, since the miner has not indicated interest in mining any other claims.

Comment: *I would also recommend that the mining plan evaluate an alternate transport system using trams instead of haul roads.*

Comment: I offer an additional alternative: Transportation by aerial tram of the ore to a central location in Section 14.

Response: Alternatives 10 and 11 include an aerial cable system for ore haul from Mine Site D. The cable system is more expensive, but feasible. It would require some road development to implement.

Comment: The DEIS does not contain real alternatives, just slight variations of the unacceptable and invalid Proposed Action of the miner.

Response: The range of alternatives was expanded in the SDEIS (and FEIS) to respond to this comment.

Comment: The section entitled 'Alternatives Considered but Eliminated from Detailed Study' provides no justification of why the seemingly viable alternatives discussed there in are eliminated.

Response: The reasons each alternative is eliminated from detailed study is explained.

Comment: I suggest an alternative haul route with the fewest possible stream crossings with bridges rather than fords or culverts.

Response: Your comments have been considered and the rationale for the decision will be in the Record of Decision. Bridges are a part of Alternatives 6, 7, 8, 10 and 11.

Comment: The DEIS also eliminates an alternative that would withdraw parts of the Rough and Ready Creek Watershed from mineral entry from detailed study. This decision is based on the assumption that withdrawal would fail to meet the purpose and need and would be outside the project analysis (2-17). However, Forest Service erred in this determination. A withdrawal alternative is a reasonable measure "to protect resources on BLM and National Forest system lands" (1-2).

Comment: Siskiyou National Forest (SNF) S & G 10-2 says that areas with mineral potential should be recommended for withdrawal from mineral entry only when mitigation measures would not adequately protect other resource values which are of greater public interest. We urge you to adhere to S & G and initiate the process of withdrawing these claims so this area can be managed in a manner consistent with it's special values.

Response: Withdrawal from mineral entry is an alternative considered, but eliminated from detailed study. Withdrawal is not an appropriate response to a Plan of Operations in an area currently open to mineral entry. Withdrawal could be considered in a separate analysis.

Comment: Please include a Designated Special Research Area alternative.

Comment: Rough and Ready Creek should become the Redrock Rainforest National Monument.

Comment: Rough and Ready Creek and the South Kalmiopsis Roadless Area should become a National Conservation Area.

Response: These alternatives were considered, but eliminated from detailed study because they are outside the scope and would not meet the purpose and need (see FEIS Chapter Two).

Comment: Given the sensitivity of the area, I do not see why an alternative that included both bridges and a ridge route was not studied. I believe that such an alternative is warranted.

Response: The SDEIS and FEIS include alternatives that utilize bridges and the ridge route.

Comment: I have read the 5 alternative plans for the project, and I have a 6th. Landfills across the nation are being re-opened and mined. I suggest a land swap. Mr. Freeman could trade his claims for the closed Kerby landfill. He could get rights to all metal found, have methane rights and bulldoze to his heart's content.

Response: Mr. Freeman does not own the lands where the claims are located, thus the land swap you propose cannot be accomplished.

Comment: The Forest Service must develop an alternative or alternatives that would limit the scope of the mining operation and that would require the ore to be transported by helicopter.

Response: The SDEIS and FEIS responded to this comment and expanded the range of alternatives, including Preferred Alternative 9, which both limits the scope and requires ore transport by helicopter.

Comment: The Forest should request that the claimant demonstrate the validity of the process at commercial scale.

Comment: Page 2-17 discusses alternatives eliminated from detailed study. In the second paragraph, the DEIS stated that "A withdrawal would not affect valid, existing claims. A mineral discovery is assumed valid until otherwise proven." What is the definition of a "Valid" claim? Again, it is my understanding that economic viability is among the validity criteria. What does it take to prove a claim otherwise?

Comment: The EIS states "a mineral discovery is assumed valid until otherwise proven". Has the effort been made to prove otherwise?

Comment: The option of completing a validity exam is discretionary. This option should be explored in some of FEIS alternatives.

Comment: We believe that the NICORE DEIS is severely flawed because the proposed NICORE mining plan in the Rough and Ready Creek watershed was never measured against an established mineral validity examination.

Response: A mining claim (not mineral discovery, that language has been corrected in the EIS) is assumed valid until proven otherwise. Agencies (BLM, Forest Service) initiate the expensive validity examination when a locator chooses to exert their rights, under the mining law, to gain title to a claim (patent) or they propose to conduct mining operations in areas that have been withdrawn from mineral entry. This area is not withdrawn from mineral entry, and the patent application process has been stalled through a moratorium imposed by the United States Congress. Alternative 9 is designed to resolve some of the operational and economic questions associated with the project.

Comment: The DEIS develops only a narrow range of alternatives to the proposed action. The DEIS eliminates from further consideration helicopter access, the only alternative method of transporting ore that minimizes the impacts to the environment because it would be extremely expensive to Nicore (see DEIS page 2-18).

Comment: The DEIS concludes that it did not consider helicopter access because it "would be extremely expensive to implement and would tantamount to denial of access." It seems that to make this determination the Forest Service must have information relating to the potential value of the mineral to be extracted as well as the costs of extraction. On the basis of what economic information was the determination of the economic feasibility of alternatives access requirements made? This information is necessary to understand how the FS and BLM came to its conclusion that helicopter access would not be economically feasible.

Response: Full scale helicopter mining was not fully developed because each ton of ore would cost about 24 times more to transport by helicopter than truck (using haul costs for Alternative 9 versus haul costs for Alternative 7). It would have an extremely low cost to benefit ratio (see Economic Analysis in Chapter Four for details). The limited amount of helicopter use contemplated in Alternative 9 may be reasonable, given the potential adverse effects of constructing, upgrading and using roads to conduct the sample and the economic and operational uncertainties discussed in the EIS.

Comment: Since the miners plan indicates that only about 3.1 acres will be mined per year, it would be reasonable to limit mining and road construction activities to one site until such a time as that site is spent.

Comment: Other alternatives that could be considered but were not, would be a scaled back proposal such as to allow mining in one pit (for example pit B) and see how the reclamation efforts go before allowing more pits to be developed.

Response: The miner has stated that ore must be taken from all sites because "ore needs to removed from all sites and mixed...The various sites have ore composed of different percentages of nickel." (See Stephens Feb 10 1997 correspondence). The Agencies recognize that completion of each site prior to entering the next site could be the most cost effective and environmentally preferred method. The Proposed Plan of Operations and all action alternatives would require that reclamation occur in disturbed areas each year, and that roads be annually stormproofed.

***Comment:** One way to resolve this as a win/win is for the US Government to buy back these claims at a reasonable and substantial price and then give to FS and prohibit further resource extraction.*

Response: The United States maintains ownership of lands within mining claims and cannot "buy back" an interest that it has never relinquished.

PHYSICAL SETTING - ROCK, SOILS AND WATER

***Comment:** The DEIS states that "mine site D is on a hillslope above the south fork of Rough and Ready Creek. Ponding of water in the mine pit may lead to changes in subsurface drainage and instability." Is there a possibility that the hillslope at Mine Site D would become so unstable as to landslide?*

Response: Stability analysis and design prior to operations is recommended in all action alternatives to avoid potential instability and landslides.

***Comment:** A complete chemical analysis of randomly located statistically significant number of surface soil samples and pit bottom samples should be presented in the SDEIS.*

Response: The EIS utilizes information found in the Josephine County survey, as well as geologic reports. The EIS lists the soil types and their characteristics.

***Comment:** Will the alluvial fan at the mouth of Rough and Ready Creek be destroyed by sediment caused by erosion in excavations?*

Response: No. Expected effects of the alternatives relative to erosion are discussed at length in Chapter Four of the EIS.

***Comment:** With regard to sediment, it should be stated that a NO ACTION alternative would pose no risk, not "little" risk as stated on page 4-3.*

Response: The existing condition contains roads which are currently delivering some sediment to the system. There are localized sites that currently do not fully meet Aquatic Conservation Strategy Objectives. The watershed as a whole is considered "optimum" in terms of sediment impact to fish habitat.

Comment: What erosion and sediment control measures will be taken to prevent offsite movement of sediment from the stockpile site during wet weather?

Response: The stockpile site will be designed for grade and drainage control. The piles will be covered during the wet season.

Comment: The SDEIS needs to review the complete water needs of the NICORE project. How much water is required and at what times? Where is the water source? How will the water be used and at what rate? What water right permits would be needed?

Response: The SDEIS and FEIS contain specific discussions about the water needs for the project. Water would be needed primarily for dust abatement and in road improvement/construction activities. The FEIS stipulates that for all alternatives, the Forest Service and BLM would consider the water source proposed by the miner and decide whether to approve that particular source. The Forest Service and BLM cannot decide whether to allow the miner to take water from Rough and Ready Creek, but the analysis displays the effects on Rough and Ready Creek if water was taken from that source (a water right would be required and the state is responsible for determining whether to approve a request for Rough and Ready Creek water). Other dust abatement options exist and may be approved (subsequent analysis would be documented in an appropriate manner if water is not the final method chosen).

Comment: At a minimum, the failure of the DEIS to determine the specific temperature change for all alternatives fatally flaws the entire process. The DEIS conclusion that 'Road development is not expected to significantly affect [temperature related] processes' is not supported by any detailed review.

Response: Temperature impacts are more fully addressed in the FEIS and SDEIS under the Stream Flow and Water Temperature issue.

Comment: The DEIS fails to: A) consider the effects of mineral mining and mineral structures, diversions and discharges on fish, other aquatic life and water quality. B) identify the analysis effects of mineral mining on aquatic systems despite the widely known and documented impacts and the difficulty of restoring aquatic systems. C) discuss and measure use of water for drinking water and other household and agricultural purposes.

Response: These concerns are addressed in the EIS and associated documents.

Comment: The DEIS fails to estimate the impacts of mineral mining on the supply and quality of water and soil for agricultural purposes.

Response: Effects on the water supply are discussed. Soil used for agricultural purposes would not be affected.

Comment: On DEIS page 3-1 the second paragraph gives fleeting mention of soils, but the information presented is incorrect. First, the language in paragraph 2 keeps referring to the soils as "deposits". These soils are NOT deposits, but rather residuum. Second, it states that the, "deposits that would be mined...are shown in the Alternative Maps in Chapter Two." There is no such map.

Response: Discussions in the SDEIS and FEIS resolve this confusion. A map of the nickel-bearing laterite soils is now in Chapter Three. The word "deposits" is used colloquially to refer to the minerals that have concentrated within these soils. The soils are a combination of colluvial material and residual soils developed from weathering of the peridotite parent material.

Comment: The primary default issue with the EIS was that the Plan failed to delineate those activities required to insure groundwater quality would be protected. In particular: 1) The five acres set aside for ore drying will require enhanced institutional controls to prevent spills, an impermeable surface pad, leachate collection and treatment, and groundwater monitoring to assure and confirm no adverse impacts at these locations. 2) Those areas designated for ore and overburden removal require hydro-geologic characterizations to evaluate potential adverse impacts to groundwater quality due infiltration and seepage. 3) The delicate balance between groundwater recharge from streams, as well as discharge to streams along select areas was not investigated. 4) The proposed seasonal method of operation and the annual bridge and culvert installation and removal activities imply the surface water quality could be aggravated by this methodology, as opposed to more permanent structures.

Response: 1) The ore would be stored on a terrace of Rough and Ready. The ore would contain soils that have been in contact with atmospheric oxygen for millennia. There is no reason to believe that simple transport of this ore to a new location would result in ore toxicity. The ore storage site would provide for adequate drainage, and the ore would be covered to limit erosion during the winter months.

2) See above

3) True. Groundwater interactions with streams were discussed only to the extent that cold springs and seeps near the proposed road crossings were identified and impacts assessed. A complete study of the groundwater system is not necessary to compare alternatives.

4) Tradeoffs in sediment delivery between permanent and temporary bridges was discussed in the physical science report and the SDEIS.

Comment: Nickel and its associated minerals are highly soluble and toxic and will directly impact soil habitats. Toxic metals leaching into the surrounding surface soils from mining operations and road surfaces will change the PH of the already sensitive serpentine soil, possibly lowering the PH and creating highly unstable and sterile soil conditions.

Response: The potential effects of nickel and associated minerals that may be delivered to the watershed from the project were analyzed. Nickel concentrations are not expected to be measurably increased; water quality will be monitored in all action alternatives.

Comment: "The ore is not expected to contain toxic materials." I do not believe that this statement can be made without any evidence to back it up.

Response: Chemical analysis provided by the USGS provides adequate evidence to support this statement.

Comment: The Draft EIS indicated on page 4-3 that the amount of sediment introduced into the Rough and Ready watershed is not known, yet in the same paragraph and on the table on page 3-3, the amount of sediment in the creek is considered optimum. The final EIS should clarify the confusing point.

Response: The assertion that sediment levels are optimum is based on stream surveys, field observation and professional judgement, despite the absence of a sediment budget for the system. Beneficial uses (with regard to sediment) are met under current conditions.

Comment: No one has addressed the issue of the rare and endangered soils.

Response: There is no category in the regulatory framework for 'rare and endangered soils'. The soils have been discussed in the SDEIS.

Comment: Rough and Ready Creek is on the Oregon 303 (d) list of impaired water bodies due to temperatures that exceed State water quality standards. The EIS should not assume increases in sediment yield will not affect stream temperature (page 4-5, figure 15); it is possible that sediment delivery will further degrade water quality. The EIS must state that the mining operation will comply with the TMDL for Rough and Ready Creek when it is completed by the Department of Environmental Quality (DEQ). Further, the EIS must demonstrate that the mining operation will not exacerbate the existing temperature problem in the creek.

Response: The SDEIS disclosed that water temperatures would likely be increased in alternatives that use Rough and Ready water for dust abatement on the haul route; the Forest Service recognizes this is incompatible with the DEQ TMDL process. Low-water crossings are likely not compatible with the DEQ standards. The FEIS refines the discussion by adding that NO MEASURABLE temperature increases are likely, but decreased flow would TREND the watershed toward degradation.

Comment: There are no estimates given here as to the amount of sediment such actions would deliver in the stream channels. Rather there is a table, (fig. 13), in which "the relative risk rating compares the alternatives to each other, and has no absolute value. The Proposed Action was given an arbitrary value of 100, and all alternatives are compared to that value." Which means of course that the values mean nothing except to point out that the alternatives to the Proposal are relatively preferable. Preferable to what, is another question? What the level of sediments introduced in the streambeds, (though initial construction, maintenance and inevitable erosion) by the Proposed action is not known or even guessed at. All put together this is too much conjecture to satisfy anyone with real concerns about sediment delivery into stream channels through Road Development.

Response: The SDEIS and FEIS includes estimates of sediment volume, rather than a relative risk rating.

Comment: Will the impact of travel over these crossings by 25-ton articulated dump trucks, service vehicles and other heavy equipment, and the subsequent weekly/monthly upkeep of the crossings, supposedly by more coarse sediment integrated into the bedload, was taken into account. The figures given also have no allowance for the amount of fine sediment delivered through airborne particulates such as dust that will further compound this problem.

Response: These issues are addressed in the FEIS and SDEIS, in Chapter Four.

Comment: Figure 9A: This needs to be explained so people know what the water will look like. How does one compare a sediment delivery of 600 cubic yards to one of 1100 cubic yards, for example? This is not clearly explained later in Chapter Four either.

Response: The affect of sediment on the appearance of the water is related to the proportion of fines in the delivered material. The sediment numbers above reflect volumes of material associated with in channel crossing fills, the majority of which will be large rock that will travel as bedload. Nonetheless, turbidity will be associated with those fills as the material will break down with use. Only the Proposed Action proposes to use in channel crossings, as is discussed in the SDEIS and FEIS - all remaining in channel crossings have been modified to bridges in the action alternatives.

Comment: We are specifically concerned about the impacts from increased sedimentation, altered dissolved oxygen and water temperature, and concentrated heavy metals as a result of this mining operation. On Page 2-5, the DEIS indicates baseline water quality would be analyzed by the U. S. Geological Survey and the collected data would be correlated with aquatic insect and Macro-invertebrate sampling data. The FEIS should describe the type of biotic sampling and the sampling schedule in greater detail.

Response: This is discussed in the FEIS and SDEIS. The report by the USGS, Miller, 1998 is available as are the results of the macro-invertebrate sampling. Two types of data were collected: 1) Water samples were collected and analyzed for selected variables by the USGS Water Resources Division in Denver Colorado, and 2) substrate particle size was measured and benthic macro-invertebrates were collected by the Forest Service and enumerated by a private contractor for community composition. Total taxa is relatively high for all sample sites, ranging from 15 to over 45 depending on the site. Samples on the West Fork Illinois River and mouth of Rough and Ready Creek had the highest densities while upstream areas had the lowest. Of particular interest is the distributional record of Cloeodes excogitatus (mayfly species). This is a northern most record and the first found in Oregon. Cloeodes was found only in the tributary samples.

Comment: On page 3-4, the DEIS states: "...the Proposed Action and all action alternatives may result in fine sediment delivery that could degrade summer rearing and/or fall spawning habitat...". In addition, water quality overall could be degraded for the aquatic biota. Thus, the FEIS should require implementation of a water quality monitoring program for the duration of this mining project.

Response: Water quality monitoring is required in all action alternative.

Comment: The contribution of Rough and Ready Creek to water volume in West Fork of Illinois is not mentioned.

Response: Rough and Ready Creek contributes about 30 percent of the volume of the West Fork Illinois River. This has been added to the Physical Environment discussion in the FEIS.

Comment: My neighbors and I have been increasing the efficiency of our water use in order to return more water to Rough and Ready Creek. We do not look favorably on the prospect that our saved water will be used by NICORE in dust abatement.

Response: The effects of water withdrawal are discussed in the EIS. Ultimately, water use allocations are determined by the Oregon Department of Water Resources.

Comment: Pollution originating at the mine site directly threatens my family's health and that of my livestock through contamination of my water rights off Rough and Ready Creek.

Response: Contamination of surface waters is not likely under the action alternatives. The possible occurrence of a hazardous material spill is discussed in the EIS.

Comment: I have reason to believe there is a definite risk of undesirable toxicity from airborne nickel particulates and from possible drinking water infiltration.

Response: The EIS discusses dust and air quality. Tom Peterson from the Oregon Department of Environmental Quality has confirmed that dust from this operation is not expected to pose health hazards. Dust abatement would minimize adverse effects from dust.

Comment: *A fuel spill into Rough and Ready Creek would make the water undrinkable and would also ruin our filters.*

Response: This may be true depending on the location of the spill, the volume of the spill, and the proximity of the withdrawal point to the spill. Hazardous substances are discussed in the EIS.

Comment: *Since the USFS and Mr Freeman can not guarantee our drinking water will not become contaminated, we insist that a well be dug for us.*

Response: There is no evidence that a well is needed or required as mitigation.

Comment: *Overburden can clog streams, and if it contains sulfur compounds it could react with rainwater to form sulfuric acid which may contaminate local soils and streams.*

Response: No sulfur compounds are present in laterite soils in concentrations that would affect water quality. Additionally, overburden will not be stored adjacent to streams and runoff from the storage site will be controlled through grade and runoff design.

Comment: *DEIS has not addressed soil chemistry change and possible effects on acidification of waters in Rough and Ready Creek.*

Response: Acidification is not an issue in these well buffered waters (Miller, 1998).

Comment: *Prior to earth disturbance, all water sources downstream need to be tested for quantity and quality.*

Response: Specific sites have been tested and will be monitored should an action alternative be chosen. Not all waters downstream of the project would be impacted by a project of this size, intensity and duration.

Comment: *The effects of using crushed rock for stream crossings were poorly considered. These will slow the stream and prolong the annual period of high stream temperatures.*

Response: The effects of using crushed rock at the crossings is discussed more thoroughly in the SDEIS and FEIS, including potential effects on water temperature. Bridges would eliminate these impacts.

Comment: *I believe that any additional water removal from Rough and Ready for dust control or material processing will have a small but real effect on the water level and water temperature of Rough and Ready during the sensitive summer months.*

Response: These impacts are disclosed in the FEIS and SDEIS.

Comment: *What will the cumulative effects of water withdrawal be year after year on downstream habitats?*

Response: Water withdrawal could increase water temperatures during the summer months. The cumulative effects of annual water removal is the same as the direct effects. Neither are expected to be measurable.

Comment: *The DEIS at 4-26 concludes that the impacts of removing water for "dust abatement" would not have adverse effects on stream flow. Because the DEIS acknowledges that downstream for the project area R&RC "almost runs dry during the summer and early fall." This assertion seems difficult to justify. How will the withdrawal of water from R&RC or its tributaries affect the existing shortage of water in the river noted on p.2-3? Are any downstream sections of R&RC listed as water quality limited for flow? If not, why not? If downstream area are listed then how can further withdrawals be consistent with CWA requirements?*

Response: The FEIS provides a corrected estimate for potential water removal from Rough and Ready Creek and also discloses potential effects of that withdrawal. However, as disclosed in the EIS, a water right would have to be obtained through the State. Mitigation listed in Chapter Two also stipulates that any dust abatement method proposed in the Final Plan of Operations would be subject to Forest Service approval.

Comment: *The SDEIS should study all domestic water sources in the O'Brien and Airport Drive areas.*

Response: Potential effects on domestic water sources are discussed in the EIS; there remains no need to "study all water sources." The section in the FEIS on Hazardous Material Spills discloses that if a spill were to occur, at least one drinking water source could be affected. However, filtering through the groundwater net and porous spaces in the soils make it far less likely that any wells or springs would be contaminated. A Spill Plan will be required as a part of the Final Plan of Operations to contain any potential spills.

Comment: *The Forest Service has not collected base-line data about turbidity, suspended sediment, streambed stability or fish densities (juvenile or adult fish/mile). Without this data, it will be difficult to determine empirically if the predictions in the DEIS are valid.*

Response: Several cross-sections along Rough and Ready Creek were surveyed in the summer of 1997 and can be re-surveyed to assess channel bed and bank conditions over time. Level two fisheries surveys has been completed for the North and South Forks and mainstem of Rough and Ready Creek. Not all parameters mentioned in the comment have numerical baselines, however, this does not preclude making predictions based on field observations and professional judgement. The monitoring plan includes water quality parameters.

Comment: While recognizing that Rough and Ready Creek is listed as Water Quality limited by the State of Oregon, the EIS does not discuss the existing conditions in project area tributaries that will be impacted by the proposed project. Descriptions should include streams characteristics such as amount of down woody debris, pool frequency, temperature, a description of all water quality limited stream, the aquatic species present including mollusks, and other relevant information.

Response: Level two fisheries surveys have been completed for Rough and Ready Creek, including portions of the North and South Forks. Information related to these streams are displayed in the West Fork Watershed Analysis, which is incorporated by reference into this EIS. Other tributaries were not deemed as significant in terms of fish habitat and were not surveyed. Impacts to resources were assessed based on field observations of potentially affected areas.

Comment: The DEIS (4-2) does not quantify the impacts from any of the alternatives in terms of amounts of sediment delivered to the stream channel or the mode of delivery. It does not explain what is meant by the Relative Sediment Risk Rating, and does not address the cumulative effect of sediment from road development, stream crossings and mine sites. The DEIS fails to state that volumes of sediment from road and mine sites are potentially much greater than those from stream crossing.

Response: The FEIS and SDEIS include estimates of sediment delivery (in cubic yards) for road development, mine sites, and stream crossings.

Comment: The EIS should also describe in detail the impact of the culvert and washed rock removal and installation.

Response: The impacts of culvert and washed rock removal and replacement are discussed in the SDEIS and FEIS in Chapter Four.

Comment: The DEIS acknowledges that Rough and Ready Creek is listed as a Water Quality Limited under section 303(d) of the Clean Water Act because temperatures in excess of 80 degrees have been measured within the analysis area. The DEIS, however, failed to consider in any detail how the proposed plan will exacerbate these temperature violations.

Response: This is addressed in the SDEIS and FEIS in Chapter Four.

Comment: The DEIS acknowledges briefly the "The Alberg Road currently is an active source of sediment," but fails to describe any details about this ongoing impact or how the Alberg Road impacting water quality and aquatic resources? How many miles of road currently exist in the analysis area and do those roads contribute sediment to Rough and Ready Creek and its tributaries? Have any surveys or monitoring been specifically performed to evaluate the sediment impacts from existing roads in the analysis area on aquatic organisms?

Response: These issues are addressed in Chapter Four of the FEIS and SDEIS. The analysis is based on formal surveys, extensive and varied field observations, air photo review, and professional judgement. The FEIS discloses that the Alberg Road does not currently meet Aquatic Conservation Strategy Objectives, however, overall, sediment is considered to be at optimum levels for fish habitat in the watershed.

Comment: *We have a spring about a quarter of a mile, could be even closer, to where Walt will be digging his holes for his low-grade nickel. I do request at this time that, from the Forest Service, that water analysis be done on our property.*

Response: Several springs on National Forest (but under permit for use by residents with proper water rights) were sampled prior and resulting data is included in the analysis files and summarized in the EIS. Concentrations of nickel in the springs are higher than Department of Environmental Quality standards, however, the amount of nickel in the water does not pose any human health risk (based on correspondence with the Oregon Department of Health). Alternative 9 and No Action would not lead to increases in nickel concentrations and slight increases are predicted for the other alternatives.

Comment: *The West Fork Watershed Analysis identifies data gaps (p.3&4) that must be filled and the information included in the revised DEIS, For example the Watershed Analysis state that complete biological information is lacking for most plant and animal species. How can the DEIS analyze the impacts of the mining operation on the plant and animal species without the missing information being gathered first? The Watershed Analysis recommended that the depth to ground water and ground and surface water interactions be determined. Not only has the FS and BLM failed to fill the data gaps identified in the Watershed Analysis, there are critical information gaps not identified in the Watershed Analysis. For instance the Watershed Analysis recommends that West Fork watershed satellite imagery interpretation be completed for fens and then to use geo-hydro-solids input to delineate groundwater influence around fens but the FS and BLM in the Watershed Analysis and the DEIS have failed to map or otherwise identify the location of wetlands in the area that may be affected by the Nicore proposal and to disclose these to the public.*

Response: There is no requirement that all data gaps be completed prior to initiating an action. Analysis of effects occurred using best professional judgement, data gathered from the area, observations from the area and similar conditions, and the scientific literature. The wetlands have been also been mapped using satellite imagery. Localized impacts to wetlands, especially wetlands that are adjacent to roads, is possible, as is disclosed in the EIS (Chapter Four).

Comment: *There is no comprehensive discussion of impacts to wetlands (direct or indirect) or an analysis of wetland alternatives that would avoid or minimize wetland impacts.*

Response: Impacts to wetlands are discussed in the EIS. Several alternatives were developed to minimize or avoid impacts.

Comment: Mitigation included in Alternatives to the Proposed Action should read: Oregon Water Resources Permit or Limited Licenses to withdraw water from Rough and Reedy Creek. (for use in dust abatement and other road activities). On Page 3-2, Water quantity, Our Department has made a number of streamflow measurements during 1997 and will be doing the same this year.

Response: This change has been made in the SDEIS and FEIS. The data collected by the Oregon Department of Water Resources has been referenced and used.

Comment: There has been no effort to map the springs and bogs of the area and the waterways that feed them. Undoubtedly digging large pits and use of water by miners will change the underground flow of the area.

Response: Springs and bogs located along potential mine pits and haul routes have been observed and discussed in the EIS. Pit construction will likely change the local groundwater infiltration and the shallow water table, but is unlikely to affect the deep groundwater paths. Springs and bogs have been mapped in a variety of ways (domestic water sources, rare plant habitats, riparian reserves).

Comment: A study is needed to show the effects of soil and rock disturbance on the rate of metal/trace element release into the watershed.

Response: The FEIS discloses that small increases in dissolved elements are possible, but are not likely to be measurable. This finding is supported by USGS analysis (Miller 1998).

Comment: The DEIS should have a complete chemical analysis of creek, spring and ground water samples gathered during all four seasons.

Response: Comparison between the alternatives was accomplished without this data set. Summer samples were taken and analyzed by the US Geologic Survey. Summer flows are sampled because those flows are likeliest to contain the highest concentrations of elements.

Comment: Forest Service "opinion" that water supplies of residents would not be affected is not scientifically defensible.

Response: The Forest Service opinion is based on calculations, professional judgement and observations of the area, considering the scale of the operation. The distance between the mine sites, and groundwater and surface water flow paths were considered in making this finding. Monitoring will be included to test this finding.

Comment: I request that the FS proceed with chemical analysis of all water supplies from point of diversion with high and low flow tested on a quarterly basis thereafter.

Response: The information requested is not needed in order to compare the alternatives, or monitor the impacts.

Comment: The DEIS should have described the past, present, and reasonably foreseeable future activities that negatively affect water quality. What activities occur in the analysis area that could negatively affect water quality? What is an estimate of the current amount of the sediment that existing roads in the project area input into Rough and Ready Creek and its tributaries? Approximately by what percentage would this level of sediment input be increasers? What is the potential for other mining claims in the Rough and Ready watershed to be developed and how would development of these mines affect water quality and aquatic resources in conjunction with the currently proposed mine?

Response: Activities such as road development, ore stockpiling, road use and pit development would all contribute sediment to the stream system, as is disclosed in the EIS. Additional information regarding the potentially foreseeable effects of implementing mining on the full 512 acres has been included in the FEIS.

Comment: Soil structure of Site B is barely capable of supporting a load on roads and could start landslides.

Response: The road to Site B has been in place for decades and has supported several types of heavy equipment. There could be spots that will require rocking to help support equipment. Spot rocking is included and costed for all alternatives.

Comment: The estimate that 600 cubic yards of fine sediment will be released annually is low. The continued operation of industrial equipment over the course of a decade would have cumulative impact upon the areas over which such equipment would be opened. The dust abatement procedures to which the DEIS alludes (page 2-5) seem to indicate that water will be used for dust suppression. Thereby substituting one form of erosion for another. I see no evidence that this was taken into account in either the calculation of 600 cubic yard figure or the enigmatic "index" calculations.

Response: Estimates of sediment supply to the channel were recalculated in the SDEIS and FEIS, including contributions from dust. Water application for dust abatement is not likely to result in erosion of the road surface.

Comment: I believe the final EIS must address the following: 1) available database of temperature information 2) how the proposed actions meets the goals and objectives of the Oregon Water Quality Management Plan (WQMP) 3) establish who the claimant is responsible to in actions effecting water quality in the watershed. 4) how the actions of the claimant will be monitored and their effects evaluated.

Response: All water temperature information collected by the US Forest Service and Cooperators is available upon request at the Illinois Valley RD. Water withdrawals in Rough and Ready Creek may not be in compliance with standards for water temperature, even though temperature changes are not expected to be measurable. The claimant is responsible to obey all state and federal water quality laws. Water quality would be monitored (see Chapter Two).

Comment: *The Plan of Operations and action alternatives of such a mine will violate the Clean Water Act.*

Response: Full scale mining may not meet all aspects of the Clean Water Act. Rough and Ready is currently listed as water quality limited with regard to temperature, thus, no increases (or trends toward increases) would meet the intent Clean Water Act. This is discussed in the FEIS. The Preferred Alternative 9 would meet all aspects of the Clean Water Act.

Comment: *Under the Clean Water Act, federal agencies are required to comply with state water quality standards. The DEIS does not discuss the applicable water quality standards, and consequently does not address whether the project will in fact comply with these requirements.*

Response: The FEIS includes appropriate discussions about existing water quality standards and potential effects of implementation.

Comment: *The DEIS does not address the numerous seep and springs that form sensitive contact sports such as swimming. Nor does the DEIS address the aesthetic values of Rough and Ready Creek's exceptional water clarity.*

Response: The values associated with excellent water clarity are addressed in the EIS and associated documents such as the West Fork Watershed Analysis and the Rough and Ready Creek Wild and Scenic River Eligibility Study. The numerous springs and seeps are also discussed. The beneficial use of primary contact recreation (swimming) is not likely to be negatively impacted by the action alternatives.

Comment: *At a minimum, the failure of the DEIS to determine the specific temperature change for all alternatives fatally flaws the entire process. The DEIS conclusion that 'Road development is not expected to significantly affect [temperature related] processes' is not supported by any detailed review.*

Response: The SDEIS and FEIS include specific discussions about water temperature. Specific temperature changes are not expected to be measurable, except possibly under the Proposed Action.

Comment: *The DEIS does not adequately describe the uniqueness and quality of the water in the Rough and Ready Creek system. It notes that fine sediment added to streams can increase turbidity (3-1) but provides no baseline against which to measure turbidity.*

Response: The baseline used is that beneficial uses are currently being met; the beneficial uses are salmonids, water uses (domestic, industrial, stock, irrigation) and primary contact recreation.

Comment: *The issue of pollution originating at the mine site potentially contaminating both surface and subsurface water was not addressed.*

Response: No pollution is expected to originate at the mine sites.

Comment: The DEIS states that "some impacts to small wetlands and fens may occur from road development near Crossings 1-4." The EIS does not give any detail as to the impacts.

Response: The EIS states that the existing road system is re-routing water, altering the relationship between surface and sub-surface water, and moving road sediment during storm events. Changes over time from the original road construction are unknown. Road treatments would be designed to maintain the hydrological integrity of the riparian zone as intended by the Aquatic Conservation Strategy.

Comment: On p.4-16 and 4-17 the DEIS has no mention of water quality under EFFECTS ON RESIDENTS, while on p. 4-1 and 4-19 it stated that water quality may be degraded in all of the action alternatives. State water quality standards may be exceeded for short duration and distance downstream for the crossing. The SDEIS should quantify what constitutes a short duration and a short distance.

Response: Water quality is discussed elsewhere, but any adverse effects on water quality would also affect residents. The estimates of distance downstream and duration will vary with the size of the storm event. Bedload movement on coarsely bedded stream channels has been shown to be chaotic, with material moving 10's to 100's of feet downstream following flows large enough to mobilize the bed material.

Comment: The DEIS states on p.4-3 that three of the four mine sites are not prone to erosion and for mine site D, ponding of water may lead to changes in surface drainage and instability. According to the USDA SCS (NRCS) "Soil Survey of Josephine County, Oregon", mine sites A and B are located on soils that are.. "subject to landslides and slumping because it is underlain by highly fractured bedrock and is very plastic" and mine sites C and D are located on soils where, "runoff is very rapid and the hazard of water erosion is very high." The Forest Service needs to discuss this in the SDEIS and how it will affect sediment delivery to Rough and Ready Creek.

Response: These issues are addressed in the EIS and analysis file documents. Site D is considered at the highest risk of failure due to a steeper slope. Gentle slopes at sites A, B, and C are less susceptible to failure.

Comment: Contaminated streams may need to be piped to a source clean up by complex but capable equipment owned and operated by the U.S. Government.

Response: It is not anticipated that streams will be contaminated in any alternative.

Comment: The life expectancy of the mine is ten years. Water quality analysis should encompass a breakdown of the effects on the water for each of the mines in ten years.

Response: The effects of the mine operations over the ten year period are not expected to vary significantly from year to year, given the restrictions on haul period and the volume of ore planned for removal. Thus, direct, indirect and cumulative effects to water quality are not expected to vary on an annual basis.

HAZARDOUS MATERIALS

Comment: *Risks of Hazardous Fluid Spills-hazardous fluids that may be spilled include oil, gas and hydraulic fluid." "The risk of a serious spill is low, however the consequences could be significant." What is not mentioned is the probable occurrence of frequent incidental spills which cumulatively could have significant impact. Nowhere in the DEIS is this addressed, I assume because such leakage is considered to be minor and a matter of course. Also, is the question of the tailings that will be left in the mining pits and their potential to leach heavy metals into the creek during periods of rain.*

Response: Cumulative impacts in terms of multiple spills and leached metals are discussed in the FEIS.

Comment: *The probable amount of petroleum products such as grease, oil, hydraulic fluid, gasoline, and diesel that will be released into the watershed due to the mining operations should be estimated in the SDEIS.*

Response: Discussions under the Risk of Hazardous Substance Spill issue disclose that some of these substances are likely to leak into the soil or water. Amounts are expected to be low overall, given the scale and scope of the operation, with a low risk of an equipment failure that results in a spill at a stream crossing. The EIS discloses that one family drinks directly from the creek, and the consequences of a spill could be significant.

Comment: *On p.4-4 the DEIS states that the ore is not expected to contain toxic materials, the SDEIS need to disclose that nickel and chromium are toxic.*

Response: The EIS provides detailed discussion about these substances in response to concerns. Nickel is in elevated concentrations in water within Rough and Ready Creek, and currently exceeds ambient water quality standards. This is to be expected given the rock types in the watershed. However, the mining and associated activities are not expected to significantly affect these concentrations, nor are they toxic or do they present any short or long term health risks at current or expected levels (more information from the State of Oregon and the federal Environmental Protection Agency is in the analysis files).

Comment: *The DEIS does not mention the presence of arsenic or heavy metals that will become dangerous to water sources via runoff from exposed tailing piles.*

Response: Analysis and professional judgement, supported by USGS analysis (Miller 1998), concludes that ground water quality would remain safe in all alternatives.

Comment: The DEIS does not disclose how much ore would be stockpiled at a given time and what the effects of this and other activities at the stockpile area might be on surface and ground water and the ecological processes of the ACEC and surrounding area. EPA's 1995 Toxic Release Inventory found that Glenbrook Nickel ranked 4th for toxic emissions to the land in the State of Oregon. The revised DEIS must address the effects of these toxic releases into surface and subsurface flows and the water table.

Response: The EIS describes two options for ore stockpiling and the amount of ore the sites would be designed to accommodate. The stockpile site would be designed to accommodate up to 40,000 tons of ore (the miner told the BLM that the site would accommodate 25,000 tons of ore, and later told the FS that the site would accommodate 40,000 tons). The ore is not considered to be toxic, drainage will be routed away from the pile, the pile will be covered during the wet season to avoid leaching and erosion.

FISH AND WILDLIFE

Comment: The DEIS does not contain a cumulative effects analysis for steelhead trout, coho and Chinook salmon and cutthroat and rainbow trout.

Response: The cumulative effects analysis displayed in the EIS is based on the known nickel laterite deposits mapped by Ramp (see Chapter Three, Physical Environment). Cumulative effects analysis is addressed within section on fish.

Comment: The DEIS states that National Marine Fisheries Service (NMFS) was asked for consultation. The results of this consultation should have been included in the DEIS for public review.

Response: The Forest Service (FS) and NMFS discontinued consultation on this project. NMFS has requested that the FS consult on only the preferred alternative and not the entire range of alternatives. The finding for the Preferred Alternative 9 is No Effect (on any listed species or critical habitat); therefore, consultation is not required.

Comment: Page 3-3 presents a table of fish habitat condition in lower Rough and Ready Creek. The heading states that the definition of "optimum," "marginal," and "outside optimum range" have not been adapted to serpentine environments. This is an important factor and needs to be considered.

Response: The West Fork Watershed Analysis addressed the differences between serpentine habitat and more typical fish habitat, and explains that the lack of optimum conditions (for instance, water temperature) may be inherent to serpentine habitat. The findings in the Matrix of Factors and Indicators are based on standards set for all projects within Southwestern Oregon and provides comparative data across watershed and project analyses.

Comment: The DEIS's assessment of the "relative sediment risk" from each alternative gives little information about what the actual on the ground affect of the project would be. DEIS at 3-4 while such an analysis may show one alternative to be preferable to another in regards to fish protection, it does not show the impacts of even the least damaging action alternative and gives little guidance as to whether such an alternative is consistent with statutory and regulatory requirements. The EIS should in much greater detail address how salmon and steel head population will be affected by the proposed project.

Response: The SDEIS and FEIS uses actual volumes to estimates impacts. Page 65, the table identifies sediment as 'further degraded' for the PA. The discussion on page 66 further discusses these impacts, specifically impacts to spawning salmon, and to intra-gravel fines.

Comment: I take exception to the BE summary on page 4-6. The claim that the alteration of the Rough and Ready watershed is not likely to "cause a loss of viability to the population or species" it is a dubious claim.

Response: The Preferred Alternative is not expected to have significant adverse impacts on any fish species. The finding that all alternatives "will not likely contribute to a trend toward a federal listing or cause a loss of viability to the population or species" USFS Region 6 sensitive species (steelhead and cutthroat trout) is based on a professional evaluation the Matrix of Factors and Indicators. This judgement is based collaboration with several Forest Service biologists and informal conferencing with NMFS biologists. The extent and severity of the impacts is not expected to jeopardize the continued existence of any species; this finding is associated with some uncertainty that would be resolved through monitoring (see the Monitoring section of Chapter Two).

Comment: The SDEIS needs to substantially study the effects the mining proposal will have on wildlife within the analysis area. The discussion on wildlife on p.4-24 of the DEIS is inadequate.

Response: Based on the existing information, the West Fork Illinois River Watershed Analysis documents what is known about wildlife distribution and relative abundance within the watershed, including a list of species known or likely to occur. Given the scale of the operations and the amount of habitat that would NOT be affected, and mitigation (such as road closures) included in all alternatives, potential effects on wildlife are not considered to be significant.

Comment: Stating that the north and south forks are likely more significant spawning and rearing sites than the main stream is an opinion. I would like to know what surveys have been performed, when they have been performed, and their results.

Response: USFS Region 6 Level II Stream Surveys were conducted on Rough and Ready Creek in 1991 and 1994. The Main stem and the South Fork were surveyed in 1991 and the North Fork was surveyed in 1994. The results, documented in the survey reports, is the basis for the opinion that the north fork and south fork are more significant spawning and rearing sites for most anadromous fish. Key fisheries attributes, such as pool/riffle ratios, large wood, stream shade/water temperature are in relatively higher abundance in the south fork and north fork than the main stem of Rough and Ready Creek. The relative abundance of older age classes of juvenile anadromous fish, found to be present, was greater in the two tributaries than the main channel.

***Comment:** All alternatives except no action will hurt salmonids. Rough and Ready Creek already has a high existing temperature problem, increased sediment mixed with high water temperature can cause infection in fish.*

Response: Water temperature increases would degrade fish habitat, as disclosed in the EIS. However, water temperature would not be measurably increased in any alternatives. Alternative 9 would not result in any increase in temperature.

***Comment:** The DEIS fails to provide data about existing fish densities and distribution and also fails to provide quantitative or qualitative estimates as to impacts to fish populations.*

Response: Existing fish densities and distribution are documented in both the Rough and Ready Creek Level II Stream Surveys and West Fork Watershed Analysis, incorporated by reference into Chapter Three of the EIS.

***Comment:** The Forest Service has not collected base-line data about turbidity, suspended sediment, streambed stability or fish densities (juvenile or adult fish/mile). Without this data, it will be difficult to determine empirically if the predictions in the DEIS are valid.*

Response: The existing Level II Stream Surveys serve as the base-line data for fish densities/distribution. In addition, stream cross sections were established by the Forest Service.

***Comment:** The DEIS does not address the potential uniqueness and importance of the native fish populations.*

Response: The potential uniqueness and importance of native fish populations within Rough and Ready Creek is uncertain. Recent collection of specimens by NMFS in association with classifications of winter run steelhead trout within the Klamath Mountains, has not documented significant differences between Illinois River steelhead trout and Klamath River steelhead trout.

***Comment:** The DEIS (93-2 & 3) does not address non-salmonid aquatic life, such as yellow legged frogs, Olympic salamanders, crayfish and macro-invertebrates, to name a few.*

Response: Many aquatic species were not directly mentioned by name in the EIS, however, the aquatic system as a whole is discussed. Effects on Yellow-legged Frogs was specifically identified in the DEIS on page 4-24. Macro-invertebrate surveys were accomplished and discussed in the EIS.

NOXIOUS WEEDS

Comment: *The DEIS is clear on the topic of introduced species: "the proposed action is associated with the greatest risk of spread of noxious weeds. It increases access throughout the watershed. It also includes a stockpile site very near the known star thistle population."*

Response: Measures will be taken not to disturb the star thistle population and attempts will be made to eliminate all non-native species introduced to the public lands at the stockpile locations.

Comment: *The SDEIS should fully explain the plans to control the introduction of noxious weeds into the area.*

Comment: *Weed prevention is weak for all but the NO ACTION alternative.*

Comment: *The DEIS does not adequately address how the introduction of exotic weeds will impact the analysis area. The remarkable lack of exotic weeds throughout most of the analysis area should be recognized in the EIS.*

Response: The EIS discusses noxious weeds as a significant issue. Mitigation includes vehicle washing, use of native rock in road work, and ongoing monitoring. Should monitoring show that noxious weeds are being introduced or spread along the haul route, stockpile site, or mine sites, they will be physically eradicated. The No Action alternative is also associated with some risk.

Comment: *The Forest Service does not have the manpower for effective control of noxious weeds. How would they be able to meet the threat of noxious weeds that have been so far kept along the 199 corridor, being brought deep within the Rough and Ready Watershed by mining equipment? Who will visit all the sites and recommend ways to identify noxious weeds? Who will eradicate any outbreaks discovered.*

Comment: *If mining is approved, the area would have to be inspected for noxious weeds several times a year.*

Response: The EIS discusses mitigation and monitoring related to noxious weeds.

Comment: *Increased traffic could also introduce non-native, invasive plants that could eventually out-compete the rare native botanicals found.*

Response: Monitoring for presence and subsequent removal of non-native species will be part of the approved plan of operations.

POR-T-ORFORD-CEDAR ROOT DISEASE

Comment: *The DEIS discusses the degree of risk of root disease introduction (4-7 & 8) but not the actual ecological impacts of disease introduction.*

Comment: *The DEIS fails to discuss the importance of the ecological role that Port Orford cedar plays in its sensitive riparian/wetland habitat.*

Response: The SDEIS, FEIS, and the analysis files discuss the ecological impacts of disease introduction.

Comment: *The DEIS states that POC grows on dry sites. This should be qualified or referenced because it would be highly unusual to find Port Orford cedar growing on dry sites without subsurface flows or high atmospheric moisture.*

Response: The FEIS has been edited to omit the reference to dry site Port-Orford-cedar. POC within the project area grows both within and outside Riparian Reserves.

Comment: *The DEIS can not defer the development of the specifics of the Port-Orford-cedar disease control strategy to the final plan of operation, after the completion of the NEPA process.*

Response: A Port-Orford-cedar disease control strategy is discussed for all action alternatives in Chapters Two and Four. An example of a detailed root disease strategy for the preferred alternative is in Appendix J.

Comment: *There are no studies offered in DEIS that present a plan to prevent the spread of POC root disease. The suggested washing of vehicles is not specific enough because it does not discuss frequency.*

Response: A “Range Wide Study” is due to be published June 1999 and will discuss the overall plan for reducing the spread of the disease. Equipment washing would occur prior to operations starting each year and any time vehicles or equipment enter the area or leave and then return.

Comment: *Using dust abatement methods by wetting roads would assist development of the root rot disease as wet soil facilitates the spread of the organism.*

Response: Dust abatement would not assist the spread of root disease because application rates are low, the water would be free of root disease spores, and the area has no known existing infestations.

Comment: *One of my concerns is importing POC root disease into the Rough and Ready watershed. With 15-20 round trips per day, it seems unlikely that the FS or BLM can monitor the cleaning of vehicles and equipment as stated on pg 2-4.*

Response: Vehicles would not have to be washed between the stockpile site and the mine sites. Washing needs to be done to any vehicle entering the area or when conditions may warrant. Periodic inspections would occur to ensure compliance with control measures.

Comment: POC root disease is a serious threat to the POC in Rough and Ready Creek watershed. Sanitation of trees within 15 feet of haul route is not practical solution to potential problem. Only viable solution is No Action and close all roads.

Response: No Action is considered in the EIS. Closing of the roads would not occur in conjunction with No Action, but the existing condition of the roads does not meet all standards and guidelines for Aquatic Conservation.

Comment: Elsewhere on page 4-7 the FS seems to take a passive attitude toward introduction of the root disease into the area: residential traffic is likely to impact the disease in the foreseeable future. Residents could employ disease control measures such as roadside sanitation to reduce risk. Another potential introduction site is "MARS" swimming hole.

Response: Humans are responsible for most of the spread of POC root disease. The disease is present along the West Fork Illinois River and the area is traveled and used frequently by local residents. Cooperation between federal agencies and the public is a challenge and can increase effectiveness of any strategy.

Comment: The Forest Service Port-Orford-Cedar strategy is poorly designed. No indication is given of how many washing stations, where they will be located, etc.

Response: The FEIS includes this information. No wash stations would be required for the Preferred Alternative 9.

Comment: Streamside Port Orford cedar will be lost through the irreversible introduction of Port Orford cedar root disease.

Response: There are no known areas where POC has been extirpated by root disease. Local effects are discussed in Chapter Four of the EIS.

Comments: With the increased concern about Port Orford cedar root disease, would it be best to leave this area free of roads, or at least discourage road travel?

Response: The lowest risk of introduction of the disease is exclusion of human activities, but even that would not eliminate the risk altogether. All of the action alternatives include mitigation to reduce the risk of disease introduction.

Comment: There are multiple problems with the vague listing of mitigation measures for the actions alternatives in the DEIS at pages 2-3 to 2-5. The proposed mitigation measure for Port-Orford cedar (POC) root disease is aimed only at "reducing the risk of introduction" and not preventing the introduction of the root diseases. In order for the term "reducing" to have any meaning the DEIS should address by what magnitude the proposed mitigation would reduce the risk of introduction.

Comment: Merely stating that all the action alternatives would increase the risk of root disease is not the same as defining what the impacts would be if the root disease was established. To understand the risk that this project presents for the Port-Orford cedar and the species dependent of them the public and decision makers should understand both the likelihood that the root disease will be introduced and the consequences if the root disease is introduced. What is the approximate likelihood that over the expected 10 year life of the proposed mining that Port-Orford cedar root disease will be introduced into the analysis area in light of the proposed activities? By what magnitude does the proposed project increase the risk of root disease introduction? What studies or scientific evidence is relied onto support these findings? How would the aquatic and terrestrial environment and associated species within the analysis area be affected.

Comment: The Port Orford cedar issue must additionally be put into a range-wide context, in the DEIS.

Response: There are a number of techniques being employed in the management of POC which involve reducing the risk of introduction. Currently there are no restrictions on use in the area by the public. Even total human exclusion would not eliminate risk of introduction because animals have been known to spread the disease. The FEIS includes comparative discussions about the risk and prevention of the spread of POC root disease, and a more detailed POC Containment Strategy for the Preferred Alternative. The effectiveness of the proposed treatments is not precisely known and is being studied across the range of POC. A Range Wide Assessment is due to be published in June of 1999.

Comment: The SDEIS should disclose sanitation means cutting and removing all POC trees.

Response: Silvicultural texts define sanitation as “the elimination of trees that have been attacked or appear in imminent danger of attack by damaging insects or pathogens in order to prevent these agents from spreading to other trees” (Smith 1962, Daniel et al 1979).

Comment: The DEIS fails to fully address the impact Port-Orford cedar root disease would have on loss of shading for understory vegetation.

Response: The EIS discusses specific analysis area locations where Port-Orford-cedar root disease could have significant local impacts.

Comment: What would be the impacts to the aquatic resources in Rough and Ready Creek and its tributaries if Port Orford cedar root disease was introduced?

Response: If Port-Orford-cedar root disease was introduced the direct impacts to aquatic resources would be a loss of both structural diversity within portions of the Riparian Reserve, and a loss of large wood recruitment within the aquatic environment. Large living trees and large wood (in-channel) play significant roles in overall habitat complexity and thus carrying capacity of the aquatic environment. The EIS discloses the specific locations where the effects of root disease introduction are most significant.

Comment: The ten perennial tributary crossings must have a workable plan to effectively mitigate the risk of root disease spread.

Response: The EIS and Port-Orford-cedar Containment Strategy include mitigation for the spread of root disease.

BOTANICAL DIVERSITY AND SENSITIVE PLANTS

Comment: The DEIS cites Standard and Guideline MA4-10 for botanical areas- "Every effort should be made to protect botanical resources, especially sensitive plant species." But the DEIS only proposes mitigation such as road design, minimizing road development within the Botanical Area, replanting affected species and monitoring. The DEIS provides no indication that these mitigation measures will be implemented or if implemented, their effectiveness.

Response: The EIS compares the effects of alternatives with the expectation that mitigation measures are implemented (mitigation will be specifically addressed in the ROD). There is uncertainty about how well plants can be avoided, given road development and use, pit development, crossing construction and use, etc. Mitigation would include avoiding plants, however, due to the uncertainty, the analysis discloses the numbers of plant sites at risk even with the mitigation.

Comment: DEIS Page 4-12 discusses some sensitive plant species. The first paragraph refers to Arabis macdonaldiana, and mention that the Mendocino population is currently listed, but that "the populations further north are not currently considered endangered". How much degradation does it take to consider a population endangered?

Response: The Fish and Wildlife Service decides which plant species and areas are listed. As discussed in the EIS, Arabis macdonaldiana was listed as endangered in Oregon since the release of the DEIS.

Comment: The SDEIS should consider what effect the dust deposits would have on the plant populations.

Response: Impacts from dust are considered in the FEIS. Dust is not considered a significant impact, based on observations of roadside vegetation in the Rough and Ready Creek watershed and along the Wimer Road, which do not adverse effects on individual plants or habitat. Dust abatement would be required on haul routes, mine sites and the stockpile site.

Comment: Lichen communities would suffer direct and indirect impacts from this mining project. Direct effects would include the local destruction of habitat, the potential destruction of rare lichen sites, changes in local lichen communities, and impacts to local biodiversity.

Response: Rare lichens and Survey and Manage species will be avoided through project design.

Comment: Dust created by project operations, road construction, and ongoing traffic is likely to adversely affect lichen communities.

Response: Dust abatement is a required part of the plan of operations.

Comment: I do not believe the Draft EIS addressed the protection of plant associations.

Response: Plant associations are discussed in the West Fork Watershed Analysis. The EIS discloses that some habitats may be degraded in the road development and mining operations, but that no late-successional habitat would be disturbed. No plant associations would be eliminated in the project.

Comment: We believe that the NICORE mining project would have significant negative impacts on lichens communities in the Rough & Ready watershed. We think it is likely that additional rare lichen sites or undescribed species may be negatively impacted or lost as a result of the proposed mining operation.

Response: The scale of the operation is very small in relationship to lichen habitats that occur throughout the watershed, therefore it is unlikely that significant negative impacts would occur. Surveys have been conducted for the Preferred Alternative, and “Survey and Manage” lichens will not be adversely affected.

Comment: Will habitat be restored for the existing species or will the ponds introduce new species?

Response: Reclamation objectives include designing mine pits so that they do not create ponds (the pits may contain water during some times of the year). However, the presence, abundance and distribution of species that would colonize the pits is likely to be different than species that currently occupy the sites.

Comment: There are many more rare plants not listed in your DEIS because they are not sensitive. The numbers and names of these species should also be listed in this analysis and not just be kept in the Analysis File.

Response: Information most pertinent to the decision is in the EIS, with supporting documentation available in the analysis file for those who request it. The PETS plant species are those that must be addressed, based on laws and policies of the federal government. Additional information exists but is not considered necessary to be published in the EIS.

Comment: The rare endemic plants depend on the undisturbed condition.

Response: Some rare plant species actually need disturbance to thrive. For instance, herbaceous plants in this watershed are likely fire dependent. These plants need fire to compete against shrubs. Other plants are pioneers that colonize a site once it is disturbed, for example, the plants that inhabit road cuts.

Comment: What documents/research do you have that shows that Calochortus howellii can be dug up and replanted?

Response: This mitigation measure was suggested by Dr. Frank Lang, as an experiment to gather information for the future. This was in case any bulbs of Calochortus howellii were destroyed by road upgrade. This species has invaded low grade road beds and other slightly disturbed areas, so it is thought that transplanting could be successful.

Comment: DEIS statements indicate surveys or inventories on threatened, endangered, and sensitive species have not been completed for the entire analysis area. Therefore your analysis is inadequate for addressing additional impacts or the magnitude of impacted sensitive species or other rare and sensitive species found during subsequent surveys.

Comment: On page 3-5 it states that the bench road and new construction on the route to mine site "B" have not been surveyed for rare plants. Your analysis is not complete without this survey.

Comment: The DEIS is inadequate with respect to data provided about sensitive species within the area and is unclear as to whether mitigation will adequately protect botanical resources within the area. The DEIS states that the action alternatives will contribute to a trend towards Federal listing or loss of viability of Calochortis howellii, Perideridia erythrorhiza, Senecio hesperius, and Streptanthus howellii. Yet the DEIS also indicates only a small portion of the analysis area has been formally surveyed. Based on the incomplete surveys, your analysis must be considered inadequate for addressing additional impacts.

Response: All necessary surveys have been completed and the FEIS reflect's their findings. Surveys have been concentrated near affected areas, according to species protocols and standard survey techniques.

Comment: There are 33 rare, threatened or endangered species in 18 plant families which are known or expected to occur in this area. This fact alone makes the Rough and Ready watershed one of the most prized botanical areas in the state.

Response: The Siskiyou National Forest has several Botanical Areas. The Siskiyou National Forest recognized the uniqueness of these areas in the Land and Resources Management Plan.

Comment: Although the various alternatives to the Proposed Action attempt to lessen the effects of the operation bottom line is that they all traverse sites of the sensitive plants and thereby pose serious threats to extremely rare plant species which may very well lead to the "Loss of viability to the population or species." To go forward with any of the action alternatives would be highly irresponsible and again contrary to current regulations regarding the protections sensitive plant species.

Response: Impacts to plants are discussed in the EIS and will be considered in the final decision. Preferred Alternative 9 does not pose significant threats to any rare plant species.

Comment: Regarding page 4-10 and 4-11; Figure 16 indicated that approximately 45 to 60 sensitive plant sites would be degraded. How many plants would that mean?

Response: The analysis displayed in Chapter Four and Appendix G of the FEIS disclose known population and habitat size for the different plant species. The numbers of plants at each site varies.

Comment: The DEIS does not discuss habitats such as *Darlingtonia* fens that are, exceedingly rare on a regional, national and global scale.

Response: *Darlingtonia californica* is not a sensitive plant but is addressed in the EIS. The habitat occupied by *Darlingtonia* is also occupied by other rare plants. As part of the Aquatic Conservation Strategy, the fens will be protected.

Comment: "*Viola primulifolia* ssp. *occidentalis*" is a Oregon natural heritage program list 1 plant and should receive a "will impact" determination under the criteria you specify on page 18 of the BE.

Comment: The DEIS also indicates that none of the alternatives will impact any *Viola primulifolia* SSP. *occidentalis* site included in the Draft Conservation Agreement (CA) for that species. No range-wide study has been conducted to determine the critical populations of these species for inclusion in the respective conservation strategies, and it is clearly premature to conclude that one or more populations located within the project area will not be of importance to the overall conservation strategy.

Response: Chapter Four and Appendix G in the FEIS both address the sensitive plant analysis and biological evaluation. The finding for *Viola primulifolia* for all alternatives except Alternative 9 and No Action is "May Impact, Not Likely to Adversely Effect" (Alternative 9 and No Action would have No Impact on this plant). For all alternatives except Alternative 10, the haul route comes near (but not through) the rare plant habitat and impacts are certain to be mitigated through careful road design and avoiding off-road activity in that area. Road improvement in Alternative 10 may impact one fen where this plant grows. Final road design will most likely be able to avoid this habitat, but there remains uncertainty about potential effects.

Comment: After only a cursory two-day examination of the area, we found several rare lichen sites that were within the proposed project area, including locations for 2 species believed to be new to science. We think that additional rare lichen sites or undescribed species may be negatively impacted or lost as a result of the proposed mining operation.

Response: The Agencies are aware of your findings. Given the scale of the project in comparison to the unaffected acres of similar habitat, we do not agree that any species may be lost as a result of the proposed mining operation.

Comment: There is considerable scientific evidence that lichens are extremely sensitive to air quality. Dust created by project operations is likely to adversely effect lichen communities.

Response: Dust abatement is expected to mitigate these concerns.

Comment: On page 3-5, it states the bench road and new construction on the route to Mine Site B have not been surveyed for rare plants. Your analysis is not complete without the survey. It appears that the ore stockpile site might also have other locations that is in the original mining proposal. This would also need to be surveyed for rare plants.

Response: Surveys have since been completed. The analysis continues to be refined, with up to date findings reported in the FEIS.

Comment: The sensitive species section of the DEIS lists, *Arabis mcdonaldiana*, as occurring at the site but does not recognize it as a Federally listed endangered plant. This plant species was recently documented as occurring in Oregon, and location the project site represents a range extension. The species is protected throughout its range, and the produced proponents may need to develop a biological assessment and initiate consultation, per section 7 of the Endangered Species Act of 1973 [as amended].

Response: At the time the DEIS was written, Oregon was not included as part of the range for the Endangered *Arabis* (the plant was listed in Mendocino and Del Norte Counties in California). *Arabis macdonaldiana* was on the Regional Six Sensitive Plants List. It was subsequently listed as Endangered in Oregon by the time the SDEIS was written and it was discussed as such in the SDEIS and FEIS.

Comment: The Nicore EIS must also address the cumulative impacts of other reasonably foreseeable or future mining operations to *A. macdonaldiana*. Other known occurrences of the species are in California in the North Fork Smith Botanical Area which is also subject to proposed nickel laterite strip mining by Cal Nickel and off road and 4-wheel drive impacts.

Response: The decision will consider impacts to *A. macdonaldiana*. The preferred alternative would have no impact on this plant. Cumulative effects are discussed in the FEIS.

NORTHWEST FOREST PLAN/AQUATIC CONSERVATION STRATEGY

Comment: Page 4-18: The Aquatic Conservation Strategy sounds too good to be true, Has such a strategy ever successfully been implemented under similar conditions? Please document successful projects and compare these to Rough and Ready Creek conditions.

Response: The Aquatic Conservation Strategy is part of the Northwest Forest Plan and applies to all projects considered by the Forest Service and BLM within the range of the spotted owl.

Comment: The Northwest Forest Plan requires that surveys for C-3 species must be completed "prior to ground disturbing activities that will be implemented in 1999 or later." Does the FS or BLM plan to have completed the surveys for the 71 species listed as C-3 species by the time the Plan of Operations is adopted?

Response: Surveys have been completed for the Preferred Alternative with results disclosed in the FEIS.

Comment: How can the FS and BLM justify permitting any of the potential action alternatives after correctly acknowledging that none of them will meet Aquatic Conservation Strategy objectives?

Response: The FEIS discloses that none of the alternatives, including the "No Action" alternative fully meet the Aquatic Conservation Strategy objectives. These effects of implementation are available to the Decision-maker and is part of the rationale for selection of an alternative.

Comment: The admission that none of the proposed alternatives are consistent with Northwest Forest Plan requirements (and therefore the Siskiyou LRMP as amended by the Forest Plan) highlight the need to create some alternatives that would actually be legal to implement.

Response: The range of alternatives was expanded in the SDEIS and FEIS. Any alternative selected will be legal to implement.

Comment: Riparian Reserves in the DEIS (4-2) have not been mapped adequately. Unstable area beyond the standard buffer widths have not been included within riparian reserves as required by the Northwest Forest Plan ROD.

Response: No field mapping of unstable areas has taken place. An air photo review revealed no unstable areas outside of the riparian reserves mapped for the West Fork Watershed Analysis. Mine site D is not now considered an unstable area, however stability analysis would be required prior to mining the site.

Comment: There is no discussion in the DEIS of the importance of withdrawn and roadless area watershed refugia to the Aquatic Conservation Strategy.

Response: The current condition of the watershed, as evaluated in reference to the Aquatic Conservation Strategy, is discussed in the EIS. The issue of mineral withdrawal is outside the scope of this EIS.

Comment: DEIS Page 4-21, paragraph 1, clearly states "Many sensitive plant species...may be adversely affected by the alternatives." This is a direct violation of the Riparian Reserves S&G #9.

Response: The EIS discusses the Aquatic Conservation Strategy and Riparian Reserve S&Gs. Some of the road development within the Riparian Reserves is not consistent with all Standards and Guidelines or Aquatic Conservation Strategy Objectives.

Comment: The Record of Decision of the Northwest Forest Plan states that the goal of watershed analysis is to determine whether the proposed actions are consistent with the objectives of the standards and guidelines (ROD, A-7) Project specific planning is supposed to use information developed from watershed analysis (ROD, B-21) and the information from the analysis is supposed to flow into the NEPA documentation (Northwest Forest Plan ROD, A-7). Site-specific information from the Watershed Analysis has not flowed into the Nicore DEIS, as intended by the Northwest Forest Plan ROD. It remains outside the NEPA process, generally unavailable to the majority of the public.

Response: The Watershed Analysis was used to characterize the Affected Environment and is incorporated into the EIS. It has become a part of the Affected Environment section, and is therefore part of the NEPA process. The Watershed Analysis continues to be mailed to anyone who requests it and has been available electronically at the Siskiyou National Forest web site.

WILD AND SCENIC RIVER

Comment: The DEIS has incorporated the Rough and Ready Creek Wild and Scenic River eligibility assessment into the DEIS. This assessment has not undergone NEPA.

Response: The Eligibility Study process is considered an inventory and is not subject to NEPA. The Eligibility Study report contains factual information pertinent to the Nicore EIS and is incorporated by reference.

Comment: The DEIS fails to disclose the terms of the legally binding settlement agreement of the American River appeal of the Siskiyou National Forest Plan.

Response: The part of the settlement agreement relevant to this project is discussed in the EIS. In summary, the Forest Service will protect identified outstandingly remarkable values and the highest potential classification of waterways that have been found eligible for Wild and Scenic River status until such time as they are found unsuitable or are made part of the Wild and Scenic River system by Congress.

Comment: The action alternatives all violate the terms of the July 15, 1991 settlement agreement with American Rivers and Oregon Rivers Council. Because the FS has not completed the suitability study, targeted for completion in 1996, there has been no NEPA analysis on the finding of the wild and scenic river assessments. The public now has no process to contest the FS's unsubstantiated conclusions about Rough and Ready Creek's ORVs and highest potential classification.

Response: The Wild and Scenic River issue is discussed at length in the EIS and those discussions will not be repeated here. In summary, the policy of the Forest Service is to protect identified outstandingly remarkable values and the highest potential classification of waterways that have been found eligible for Wild and Scenic River Status. The highest potential classification is a finding made by the Siskiyou National Forest Supervisor based on the Eligibility Study.

Comment: While the DEIS acknowledges that the FS must manage areas eligible for Wild and Scenic River status to "Protect and where possible and enhance the outstandingly remarkable values," the DEIS does nothing to consider whether the identified ORV's will be protected or enhanced by the proposed plan.

Response: The EIS contains a description of the outstandingly remarkable values and the effects of the alternatives on these values. Effects on the Outstandingly Remarkable Values (ORV's) will be considered in the final decision.

Comment: Why is the 12th issue, Wild & Scenic river eligibility (pg 1-7) left out of the table on "effects of the alternative in terms of the issues" (pg2-16)?

Response: The Wild and Scenic River issue was inadvertently omitted from the table and is fully addressed in the FEIS.

Comment: The main stem and North Fork of Rough and Ready Creek was found eligible for Wild and Scenic River Status. Current policy requires the Forest Service to 'protect and where possible enhance these Outstandingly Remarkable Values. The Proposed Action and Alternatives may have adverse effects of the ORVs. From this it seems clear that the Forest Service would be required to not approve any of the action alternatives.

Response: The effects on Outstandingly Remarkable Values are disclosed in the EIS and will be considered in the selection of an alternative.

Comment: Building roads is going to greatly impact the free-flowing character of the river. The FS is required to protect those values which make a river eligible until the river is either designated wild/scenic or found ineligible.

Response: Road development is unlikely to impact the free-flowing character of the river. None of the alternatives would result in long term blocking of the creek. The fords in the Proposed Action would be washed out annually. Other effects on Wild and Scenic River Eligibility are discussed in Chapters Two and Four.

Comment: Page 4-5: From reading this table [fish habitat matrix of factors and indicators], it appears that any alternative other than NO ACTION would degrade all factors on the Matrix. This is unacceptable in the light if the fact that this creek is under consideration for designation a Wild and Scenic River.

Response: Please review the matrix again. The Proposed Action would degrade several (but not all) factors in the matrix. The other action alternatives degrade fewer factors. This issue will be considered in the final decision.

Comment: Pages 3-9: I read the statement about the Rough and Ready Creek's eligibility for designations a Wild and Scenic River to mean that the stream must be managed to maintain its's status as potentially a Wild and Scenic River. How could this happen if the stream were mined?

Response: No alternatives propose mining of the stream. Each alternative is considered regarding its impact on Wild and Scenic River values and eligibility in the alternative comparison in Chapter Two. The Proposed Action and Alternative 7 may degrade the "scenic" classification for a segment of the creek. This issue will be considered and rationale for selected alternative is in the ROD.

Comment: Placement of temporary crossings across streams [in the Proposed Action] is to be done using washed rock. The appearance of the imported washed rock will be different than the native gravels. What value does the Forest Service place of the appearance of foreign gravels in the wild and scenic creeks of the area?

Response: The washed rock would be derived from the similar material as in the area of the crossings, but would be broken. The amount of broken rock would likely be greater than presently in the area. Over time, and especially each winter, this broken rock would be scattered and rounded, and would eventually become less noticeable.

Comment: The FS asserts that the effects of mining activity on the Illinois, a designated Wild and Scenic River, will be diluted because of the analysis area is ten miles upstream from the Illinois. Please include scientific data to address this assertion.

Response: This assertion is based on the scale of the operation in relationship to the scale of Rough and Ready Creek watershed and the Illinois River. Impacts from the project are likely to be relatively localized, and impacts to Rough and Ready Creek itself would often be difficult to discern. Further downstream, along the Illinois River, impacts to Wild and Scenic River values would be impossible to discern.

ECONOMICS

Comment: Who pays for post-mining maintenance of the roads?

Response: The roads needed for mining would be maintained by the miner. The roads would be stormproofed and closed as part of the final reclamation. The miner would pay for the final reclamation.

Comment: It is unclear from the EIS who will be paying for the operations in the analysis area.

Response: All costs except necessary Forest Service administration of the operations would be paid by the proponent.

Comment: The SDEIS should present a table showing nickel, chromium, and iron concentrations in the Rough and Ready Creek watershed and compared to locations such as Riddle, Oregon and New Caledonia.

Response: The SDEIS and FEIS contain this information in the discussions about the economic viability of the proposed project, with further information in the analysis files.

Comment: It is fool-hardy to open a low grade nickel mine at this time of a world glut in nickel production.

Response: An economic analysis considering the world nickel situation is included in the EIS.

Comment: The Draft EIS attempted to evaluate proposed operations within the sideboards established by the claimant for the context, scale, and duration of the project. The scale of operations proposed in NICORE may not sufficiently support an economically viable operation.

Response: An economic analysis considering this issue is in the EIS.

Comment: The Forest Service states that it cannot base its analysis on the possible lack of economic viability of the mining operation (P. 4-26). If this is the case then it also can not evaluate the conditions of approval on the possible economic impacts to the applicant. Either both economic issues need to be addressed or neither.

Response: The SDEIS and FEIS address the economics of the proposal and alternatives.

Comment: I see no input on the DEIS regarding a cost/benefit analysis of the proposed mining project.

Response: The FEIS includes a cost/benefit analysis.

Comment: There is no indication that the SNF has been provided a feasibility analysis, or that the applicant has conducted a feasibility analysis.

Response: The FEIS contains an economic analysis. Alternative 9 is intended to assure the project is feasible.

Comment: The condition of approval may be costly to the applicant, just as the mining operation will be costly to the environment. Mining these sites may not be an economically viable process at this time. This is a decision the applicant must make and is one all business ventures must face. It is not the FS's job to guarantee profits for potential mining operations.

Response: The Forest Service may require mitigation aimed at protecting surface resources, however these may not materially interfere with the operation. Cost is a factor in determining "material interference." The Forest Service Decision Maker will consider the economics of the operation in this decision.

Comment: *The claimant must prove marketability: show that his smelting process will produce stainless steel, that there is an established market for the product and that the price of the product will be high enough to make the mine profitable. If a mining claim such as this one appears to be invalid, then the Department of Interior (D of I) should hold a validity hearing. The D of I should contest this claim.*

Response: Marketability is an element of proving the discovery of a valuable mineral deposit, which is required to prove validity. Forest Service initiates a validity examination when a locator chooses to exert their rights, under the mining law, to gain title to a claim or they propose to conduct mining operations in areas that have been withdrawn from mineral entry. The Bureau of Land Management, U.S. Department of Interior cannot contest a claim until after a mineral examination has determined that the claim is not supported by a discovery, or a location contains an uncurable defect and is within a withdrawn area. The EIS does discuss the apparent economics of the project, and that issue will be addressed in the Record of Decision.

Comment: *The Forest should have the claimant provide a careful analysis of the nickel market situation at present and over the expected life of the venture*

Response: The SDEIS and FEIS includes such an analysis. Nickel prices are currently low and are expected to remain at depressed levels.

EFFECTS ON RESIDENTS

Comment: *I bought property particularly because it borders a National Forest. I wanted that land because it's quiet, and because I knew it would be protected.*

Response: Effects on residents, specifically related to noise, is discussed in the EIS. The assumption that land bordering a National Forest will always be quiet is not based in fact. Several types of operations that make noise are permissible on National Forest.

Comment: *The ambient noise level needs to be measured at the nearby residences.*

Response: The noise issue was examined in detailed and mitigation measures for each alternative have been designed to ensure compliance with the applicable noise regulations. Monitoring will show how well the operation meets state regulations.

Comment: *We feel we should not have to listen to his trucks and excavation equipment much earlier than 6:00 AM and no later than 6:00 PM. We also demand that USFS put limits on the noise levels from the NICORE operation which propagate into our immediate area.*

Response: Mitigation discussed in Chapter Two of the EIS restricts operations to between 7 am and 7 pm. Noise limits are established through state law.

Comment: *We demand that a team of certified acoustical & bio-acoustical experts in these fields be commissioned to create an acoustical attenuation map of the area surrounding the proposed mining, haul route, stockpile area, and any other place that any type of noise generating will be located or driven.*

Response: This type of map is not necessary to determine whether the project can meet laws related to noise. The operator will be responsible for meeting all laws. Monitoring noise levels is part of the plan shown in the EIS.

Comment: *I don't think its reasonable to ask the residents along their private road to become a commercial byway.*

Response: The EIS discusses that the residents ultimately control the private road and the Forest Service cannot require that they provide access for ore haul. The use of the private road would eliminate the need for at least one crossing of Rough and Ready Creek and would reduce the need for new road construction.

Comment: *The proposed new road in Alt 4 is less than ½ mile from the church camp. NICORE's plan should be modified to eliminate Site C because this would reduce noise pollution experienced by the church camp as well as for other reasons.*

Response: Noise pollution is expected to be within acceptable limits as defined by Oregon law (see FEIS discussion about noise impacts).

Comment: *The quarter-mile limit for addressing impacts to property owners is arbitrary (4-16) . The cursory treatment of impacts under social settings must be expanded to address the real concerns and the extent of the impacts to the property owners in the O'Brien and Cave Junction area in the revised DEIS.*

Response: The section regarding impacts to residents is based on professional judgement and is appropriate for the scope of the activity proposed.

Comment: *The idea that property values would increase with the mine is a complete misconception.*

Response: The EIS discloses that property values are not expected to be significantly affected by the proposed operation.

Comment: *The DEIS goes into little detail on property values on p.4-27.*

Response: The SDEIS and FEIS provide further information about potential effects on property values.

Comment: Quality of life, like peace and solitude, is why people live in Illinois Valley. This needs to be considered in any property value study.

Response: These concerns are discussed in the EIS. They may determine whether someone buys property in a particular area.

Comment: The beneficial effects of road improvement were mentioned as potential to increase property values, but no mention was made of the loss of solitude, quiet, clean water and pristine beauty. Property values could go down in spite of the road improvement because of the mining operation.

Response: The property values discussion in the FEIS addresses these issues.

Comment: Mr Freeman be required as a precondition to starting his mining operations pay for three independent appraisals of private land values so that baselines can be established for value comparison.

Response: A baseline for property values has been established using data from the Josephine County Assessor's Office.

VISUAL QUALITY, RECREATION, INTERPRETIVE DEVELOPMENT

Comment: Page 4-17: Under "Recreation" what does "User Conflict" mean? Wouldn't it be better closed off entirely to the public?

Response: The Proposed Action does not include restrictions on access to the general public (non-mining traffic). This would potentially create safety hazards and conflicts between those using the road for mining and those for other uses. Other alternatives would close the roads to motorized vehicles, but hiking, biking, and horsebackriding could still occur. There is a potential for conflicts between people engaged in these activities and the mining operations. Alternative 9 includes a closure during helicopter operations. Similar closures are routinely part of air operations during logging and firefighting activities.

Comment: NICORE project will hurt tourism. Some of best things in Illinois Valley are scenic beauty, solitude, and amazing diversity.

Response: Potential effects on tourism are discussed in the FEIS under the Visual Quality, Recreation and Interpretive Development issue.

Comment: Recreation Department (OPRD) is concerned that additional truck traffic due to mining access near Rough and Ready State Natural Area will result in further deterioration of the site.

1. As a natural interpretive site, the truck traffic associated with a mining operation could be quite disruptive from both a site and noise perspective. We request that the number of truck trips per day be limited and that scheduling of these trips be tightly controlled through your permit process. We recommend that truck trips be limited to weekdays, only.

2. Dust associated with both the truck traffic and overall mining activity could have negative effects of the highway traffic, recreational users of the site and the health of the plants in areas where dust would fall. Dust abatement should be strictly monitored and controlled.

3. Proposed stockpiles could significantly detract from the beauty and interpretive potential of the site. We propose that the piles be very low profile, used for short term storage only, be located well away from the creek, and be covered with either earthtone colored tarps or vegetation.

4. Overall visual effects of the operation should be considered from the highway, the OPRD Natural Site and from other vantage points and corridors.

Response: These concerns are addressed in Chapter Two within the section on mitigation and Chapter Four on Visual Quality, Recreation and Interpretive Development. A stockpile site that is away from view from the highway and Botanical Wayside is part of all action alternatives to the Proposed Action.

ROADLESS CHARACTER

Comment: How would the proposed road development and use affect the potential for portions of the analysis area to be designated wilderness? What are the current management standards for the inventoried roadless area and how are any of the proposed action alternatives consistent with this standard?

Response: Road development and use could affect the potential wilderness character of portions of the analysis area (see Roadless Character issue). Congress could designate the area as part of the National Wilderness System regardless of alternative. There are no current management standards that apply specifically to the South Kalmiopsis Roadless Area; rather, there are standards for the management allocations within the area.

Comment: The roadless character analysis fails to address the spiritual value of the area as it currently exists.

Response: Spiritual values are difficult to describe or resolve because they are specific to individuals and vary widely. The EIS states that roadless areas are valued for the lack of human intrusion and opportunities for solitude. These are spiritual values. The West Fork Watershed Analysis (incorporated by reference into this EIS and available in the analysis file) invited people to address the question: Why Rough and Ready Creek Watershed is Important to Me." Most respondents identified personal or spiritual values they associate with the area.

Comment: How would the proposed road development and use affect the potential for portions of the analysis area to be designated wilderness? What are the current management standards for the inventoried roadless area and how are any of the proposed action alternatives consistent with this standard?

Response: Many standards and guidelines apply are associated with the various federal land allocations present in the project area. These are discussed at length in the EIS. The FEIS discussion of roadless areas discloses that road development and use would degrade the roadless character in the area, but is unlikely to diminish the area's wilderness potential. Congress could (and has) create a Wilderness or other special designation for an area regardless of the presence of a mining road or mining activity.

Comment: This analysis does not address the impacts to recreational and ecological values, nor the overall impact to the wilderness character, potential and values of the South Kalmiopsis.

Response: Effects on recreational values are discussed in Chapter Four, under the issue titled "Visual Quality, Recreation and Interpretive Development." Ecological values are discussed throughout Chapter Four, in the sections regarding Soil Productivity, Slope Stability and Erosion, Stream Flow and Water Temperature, PETS Fish Species, Port-Orford-cedar, Noxious Weeds, Botanical Diversity, Aquatic Conservation Strategy Objectives, and elsewhere. Wilderness character is similar to Roadless Character, which is also discussed. The FEIS has been expanded to discuss the wilderness potential of the area.

Comment: The DEIS should include a map of the eastern portion of the South Kalmiopsis Roadless Area.

Response: The portion of the South Kalmiopsis that is within the project area is clearly depicted on the maps. The rest of the area is unlikely to be affected by the project.

Comment: With Chief Dombeck stating it is unwise to allow extractive practices in roadless areas, it would seem this mining would be very contradictory.

Response: The range of alternatives include the "No Action" alternative and Alternative 9, neither of which would have significant effects on the roadless character of the area.

Comment: No road construction or reconstruction should be allowed in the fragile South Kalmiopsis Roadless Area.

Response: The analysis has addressed roadless character as an issue with a range of alternatives.

Comment: Preserving its unique scenic beauty, rare plants, and the wilderness character of the South Kalmiopsis Roadless Area are far more important to me than the nickel ore.

Response: Your comments have been considered and the rationale for the decision will be in the Record of Decision.

AIR QUALITY

Comment: The DEIS states that "none of the alternatives would have significant impacts on air quality." DEIS at p.4-25. Outside of a passing reference to dust abatement, absolutely no support or analysis is given for the bold statement.

Response: Further details are in the FEIS Chapter Four, Air Quality Effects.

Comment: A new smelter would be subject to new source performance standards (NSPS). Nickel and some metals likely to be contaminants in the ore are hazardous air pollutants which must be controlled as required by the Clean Air Act.

Response: As discussed in the EIS, a new smelter has not been proposed nor analyzed.

Comment: A mine associated transport, and the smelting operation would have an adverse impact on visibility and regional haze. As EPA finalizes the new regional haze rules, the impact of this proposed mine must comply with those requirements.

Response: The operator would be responsible for meeting all laws and regulations that apply to the project.

Comment: Please address the requirement under the Clean Air Act pertaining to the increase in vehicular traffic into the area as well as the potential smelter operation.

Response: Traffic is not expected to increase beyond levels already experienced in the area with past logging, mining exploration, residential development, and the mill and airport. Dust abatement is an important part of the mitigation required to maintain good air quality. An air quality monitoring station has been placed at the airport and would register any anomalies. No smelter has been identified and none analyzed.

Comment: There is no indication in the EIS that monitoring has been done to determine the pre-mine impacts so they can be compared with the emissions expected upon commencement of this operation.

Response: An air quality monitoring station has recently been installed near the project area. Comparative data will be available and is discussed in the Monitoring section of Chapter Two of the FEIS.

OTHER QUESTIONS

Comment: How can we justify destroying the environment for the sole benefit of a private corporation and never see the land restored?

Response: Nothing in the EIS suggests that the “environment” would “be destroyed” as a result of this project. Nor is there evidence to suggest that the land would never be restored following mining. The laws, regulations, policies, and plans discussed in Chapter One provide the basis for the decision making regarding this plan of operations.

Comment: *The DEIS inadequately discusses the effects of the Nicore mine in relation to past, present, and future mining and related activities in the Rough and Ready watershed. In particular, present and future mining and related activities in the Rough and Ready watershed. In particular, there is a absence of discussion of the potential scope of the Nicore project over time, and the extent of the patent for which Nicore has applied.*

Response: These discussions are included in the EIS in the sections on project history, Affected Environment, and the Environmental Consequences. The EIS discloses that Nicore has applied for a patent, but goes on to explain that the patent application is beyond the scope of this EIS. The Chapter Three map of known laterite deposits is used as the basis for cumulative effects analysis.

Comment: *The NICORE EIS should be withdrawn and replaced with an adequate analysis. Develop data which discloses the abundance, location and surface coverage of mining claims on Federal land within the analysis area and areas affecting the analysis area. Petition the EPA to direct state-delegated authorities to prohibit all new or additional pollution discharges from mineral mining operations into waters on Federal land. Withdraw from mineral entry and exploration all roadless areas, areas of ecological significance, and riparian conservation areas in and surrounding the analysis area, subject to valid and existing rights.*

Response: The abundance, location, and surface coverage of mining claims with known nickel content are mapped and evaluated through the cumulative effects. Changing state actions are outside the scope of this analysis. Mineral withdrawal is addressed in the SDEIS and FEIS as outside the scope of this analysis.

Comment: *The DEIS fails to consider the large number of existing mining claims and to evaluate mineral mining in a cluster analysis.*

Response: Mining claims may exist for years without any activity (other than annual assessment work) or significant surface disturbance. It would be more appropriate to consider the number of claims with active operations within the watershed. No other Plans of Operations are approved in the analysis area. Cluster analysis is generally used to classify individuals (e.g. medical cases, plants, etc) into groups or communities, and variation within them. It is unclear how cluster analysis relates to mining claims and “mineral” mining, particularly since no variables were identified. This type of multi-variate statistical analysis is not needed to make a reasoned and informed decision.

Comment: *A detailed and readable map of the existing network of all roads should be included in a supplemental DEIS. All roads including Forest Service, BLM, and private roads, should be included regardless of whether the roads are maintained, abandoned or otherwise in disrepair.*

Response: The maps show all roads that could be part of the project. The existing condition map shows the inventoried roads on federal lands. A detailed road log, describing the condition of the roads, is in the Analysis Files. Forest Service Road Management Objectives are summarized in the EIS and discussed in more detail in the Analysis Files.

Comment: *The DEIS needs to explain further the existence and reclamation of the roads.*

Response: Most of the roads west of Highway 199 in the project area were built to sample the nickel laterite. Notable exceptions include residential roads on private land, and the McGrew Trail and Wimer Roads were part of a wagon route between the coast and the Rogue Valley. The FEIS includes discussion about the need for stormproofing and closure of identified roads in the area, and reclamation discussed in Chapter Two of the EIS includes rehabilitation of the haul route.

Comment: *The DEIS needs to study the legality of the existing roads.*

Response: This question is addressed in the EIS, noting that the mining roads were likely constructed with little Forest Service oversight, that documents about the original road construction are not available, and that no evidence that the roads were built illegally exists. Roads on the National Forest belong to the US Government unless a right-of-way or right of ownership has been given to others.

Comment: *There is more disturbance than indicated if you consider the road construction widths and your plan does not address restoring roads.*

Response: The SDEIS and FEIS include specific discussions about road construction widths and reclamation of roads.

Comment: *The DEIS indicates 35 acres will be mined over a 10-year period but the acreage does not include haul routes, stream crossings, rock and gravel pits and stockpile areas.*

Response: Estimates of total areas of disturbance (including the mine sites, haul routes, and stockpile site) are in the SDEIS and FEIS.

Comment: *The DEIS does not indicate how many miles of existing and new road will be in-sloped by alternative. It does not display the effect of in-sloping on stream flow or sediment delivery, and it does not address the effect of increased stream flow and sediment deposition on the Arabis macdonaldiana occupying alluvial flats and gravel bars down stream.*

Response: Page 16 of the DEIS stated that all roads would be outsloped except on flats and the road to Site B. The section of road to Site B to be insloped is the portion on the hillside which is about 3/4 mile in length. Alternatives using this road section are the Proposed Action, 6, 7, 8, and 11. Culverts would be placed approximately where there are existing cross ditches and waterbars, so the stream flow would not have much change, and therefore would have little effect on *Arabis macdonaldiana*.

Comment: The concept of bridges ought to be further explained in order to understand the potential pollution they propose.

Response: Temporary bridges are not risk-free in introducing pollution to the site. The installation will require heavy equipment to place temporary bridges each season, and then to lift each end while supports are placed under the bridge. Travel on bridges will deposit grease and oil on the deck which may eventually allow some to get into the water (this would be a reduction of petroleum products that could get into the stream if there were no bridge). Removal of temporary bridges will also require a cat or crane at the site to move the bridge and end supports. Some grease and oil on the bridge deck will most likely be washed off during the winter at the storage site.

Comment: The EIS also fails to describe the existing road density in the project area and the impacts on the water quality, as well as wildlife, the existing roads are having.

Response: Existing road density is addressed in the Fish Habitat Matrix of Factors and Indicators in Chapter Three and effects are discussed in a similar chart in Chapter Four. The existing and predicted road density does not have a significant adverse effect on wildlife within the area.

Comment: Cumulative effects analysis is inadequate: Pg 3-4--amount of past sediment is unknown; pg 4-4--no other activities are known but pg 4-26 says development of hundreds of additional acres is planned; pg 4-7--effects of past activities on fish are unknown; pg 4-15--future mining is likely to have further impacts.

Response: The cumulative effects section has been expanded to include more detail both in the SDEIS and the FEIS.

Comment: We request that the DEIS present the complete results of the chemical analysis of the samples recently gathered by the BLM from the Queen of Bronze mine drainage waters.

Response: The Queen of Bronze mine is located in a sulfide deposit, these conditions are not met in the Rough and Ready area and as such the information would not be helpful in comparing alternatives.

Comment: The effect of dust on plants, animals and the environment requires a detailed analysis. Since several methods of dust abatement may be approved, the impacts of all methods being considered must be discussed within the DEIS.

Response: Dust abatement is expected to reduce impacts. Water is considered the most likely method and is analyzed in the EIS. If the miner requests another method, appropriate analysis will be completed.

Comment: Rough and Ready Creek could have harlequin duck habitat. Has this watershed been surveyed for harlequin ducks?

Response: The watershed has not been surveyed for harlequin ducks. A review of the Siskiyou National Forest wildlife observations data base does not reveal any harlequin duck observations on Rough and Ready Creek watershed and the species was not seen during the 1991 and 1994 stream surveys of the watershed.

Comment: The DEIS fails to identify the amount of existing and potential Federal land mineral mining. Consequently the environmental social and economic impacts of changes in Federal land uses attributes to the NICORE POO, including the number of recreation and tourism jobs at risk compared to the number of jobs produced by the NICORE mine.

Response: The analysis does discuss the potential cumulative effects of mining. No impacts to recreation and tourism jobs are at risk. However, the effects of implementation on recreation are displayed.

Comment: The Forest should request that the claimant demonstrate how the experimental direct reduction technology provides NICORE with a comparative advantage likely to last before others in the industry adopt the favorable technology.

Response: That is beyond the scope of the FEIS. The ability to maintain proprietary confidentiality is speculative.

Comment: The issue of sanitary waste facilities at the mine site was not addressed.

Response: State law requires providing latrine facilities at all locations where people are working (this may be included in Oregon DEQ Water Pollution Control Facility Permit). Page 22 of the SDEIS in "4)" states that "All refuse would be regularly removed from federal land." This would include latrine wastes.

Comment: The issue of fire hazard was given only a cursory examination. The increased access associated with the action alternatives is only likely to increase the fire hazard.

Response: The effects of implementation have been updated to include those effects.

Comment: The DEIS mentions the Mendenhall fire on page 3-8, a fuller explanation of this event and its relation to proposed and historic mining in the area is necessary.

Response: The Mendenhall Fire event itself is not related to proposed or historic mining and is more fully discussed in the West Fork Watershed Analysis (which has been incorporated into this EIS). In suppressing the 1994 fire, the Forest Service constructed a fireline. Under several of the Nicore Alternatives, the fireline itself would be improved (road construction) to accommodate ore haul.

Comment: The Surface Use Determination (SUD) report raises many issues and questions not addressed in the DEIS.

Response: The Surface Use Determination has been published as Appendix C. The issues and questions raised are a part of the analysis and are part of the basis for development of Alternative 9.

Comment: The discussion of irretrievable commitment of resources in the DEIS failed to include the permanent change in biotic communities associated with disturbance with the project, even after reclamation is conducted.

Response: No permanent changes in the overall biotic community is predicted to result with the proposed disturbance/project. Change in the number of individuals and or groups of individuals that occupy the disturbance sites is expected, even after reclamation is conducted.

Comment: I believe you made a mistake when you wrote the DEIS. Your overall scope was too small, giving the impression to many people that the Rough and Ready Creek drainage is a very small, geologically and biologically unique area. The fact is the peridotite sheet is huge, 350,000 acres or more, all of which is similar biologically.

Response: The EIS provides many discussions about the scale of the operation relative to the amount of peridotite habitat. The Rough and Ready Watershed contains habitat, particularly in the lower reaches, which is recognized as unique to this region.

Comment: The maps in the Draft EIS do not indicate the topography.

Response: A topographic map has been included in the FEIS.

Comment: The DEIS fails to consider the effects of mineral mining on the economic and social contributions of recreational opportunities.

Response: This is discussed in Chapter Four of the EIS, under the Issue: Visual Quality, Recreation and Interpretive Development and in the Economic Analysis.

Comment: One persistent problem throughout the DEIS were the vague references to various analysis files without citing any specific page numbers in those analysis files or providing any summary of the information being referred to in those files.

Response: Analysis file information will be summarized in the FEIS when referenced.

Comment: The probable future impacts of road development are significant and need to be acknowledged in the DEIS. Increased infrastructure, especially roads, changes the level and use of an area.

Response: Increased infrastructure indeed may change the level and use of an area. This is discussed in the EIS (see Effects on Recreation, Residents, and Roadless Character). The mitigation discussed for this project make it unlikely that use would be increased, since bridges would be removed during periods of non-operation and roads would be gated during periods of operation. The roads will likely be closed once they are no longer needed for mining.

Comment: The section in the DEIS on the social setting (3-7) has failed to discuss the educational, scientific and amenity values of the Rough and Ready Creek area. This section of the DEIS must be expanded to reflect the breadth and depth of the social issues regarding the Nicore Proposal.

Response: These issues have been discussed throughout the documents incorporated into the EIS, including the Wild and Scenic River study and the West Fork Watershed Analysis. The FEIS has been expanded to summarize these discussions.

Comment: Figure 1, on the DEIS does not show Rough and Ready creek. Throughout the DEIS the Wing and Farren ditch is misspelled (not Ferren).

Response: This misspelling has been corrected in the EIS. Rough and Ready Creek is named on maps in the FEIS.

Comment: The SDEIS should include an itemized list for the entire Rough and Ready Creek watershed of all mining sites including their area, depth, age, and reclamation method and results. A map should also be presented in the SDEIS showing each of those mined sites.

Response: Extensive mineral sampling has occurred throughout the watershed. The recovery/revegetation of these sites varies. These facts are disclosed in the EIS. An itemized list is not needed to differentiate between alternatives or disclose environmental effects.

Comment: The DEIS fails to evaluate the demand for, and thus, the value of preservation of natural landscapes, compared to the contribution of the Nicore Mine and other existing and potential mineral mining in the analysis area.

Response: Several issues address this subject, including wild and scenic river eligibility, visual quality, recreation, and interpretive development, and roadless character. The effects are displayed in Chapter Four.

Comment: The DEIS fails to mention, let alone identify, the number of potential mining claims in the analysis area and surrounding areas.

Response: The EIS addresses this in Chapter One, in the section titled The Analysis Area, and in other descriptions of the existing condition.

Comment: The cost of Road Development and estimated to be between \$527,030 and \$625, 560 depending upon which action alternative is looked at. That is a high price for the American Public to pay for the potential destruction of a pristine area that is widely known for its botanical diversity and number of rare plants, and was found eligible for inclusion into the National and Scenic River System, five short years ago.

Response: The American Public will not pay for the costs of road development related to mining.

Comment: The DEIS does not list any biologists or zoologists involved in the preparation of the EIS; why not?

Response: The Lead Biologist on this project was inadvertently left off the list. The FEIS lists all of the biologists involved in the project.

Comment: There should have been a date on the document. I have no idea what month it was put out.

Response: A date (month/year) is on the first page (abstract) of the FEIS.

Comment: The legend map of figure 2A shows items with very poor to no contrast.

Response: The maps have been improved in the FEIS.

Comment: The map on Figure 2 shows the proposed locations of the stockpile, but the other maps for other alternatives do not show their proposed locations for the stockpile.

Response: This has been added to the SDEIS and FEIS.

Comment: EPA believes that the alternatives analysis here is very limited and does not accomplish the purpose of the Council on Environmental Quality's (CEDE) NEPA regulations 40 CFR Part Specifically, we believe that more information needs to be gathered in order to generate alternatives that truly present options that would have a range that impacts on the environment. The following should be addressed in the final EIS:

- 1) Possible locations for siting of an alternate stock pile.
- 2) A fuel storage, transportation plan and a spill plan.
- 3) Mitigation plans for the ore stockpiling site.
- 4) Various approaches to mine site development
- 5) A detailed description of water uses on site and any potential discharges.
- 6) Alternative access routes to the mine site.

Response: These have been added to the FEIS.

Comment: I believe that the DEIS did not adequately address fueling on the National Forest.

Response: As discussed in the EIS, for the Proposed Action and full mining alternatives, fuel would most likely be taken to the sites in pickups or small trucks and pumped to equipment as needed. For the Sampling Alternative 9, fuel would be transported in containers via helicopter. For all action alternatives, spills are possible. The proponent will be required to submit a spill plan, which will include clean-up procedures.

Comment: According to Ramp it is clear that the total ore reserves are much greater than suggested in the DEIS.

Response: Ramp's work was used as the basis for cumulative effects analysis.

Comment: The details given in DEIS are much too sketchy for evaluation and seem to be conservative in regards to ore reserves and time required to open pit the ore bodies.

Response: The analysis is based on the plan of operations submitted which only alludes to development of 35 acres.

Comment: Alternatives should include analysis of the amount of time ore would be stockpiled. This may be connected with the economics for the proposal. If the miner is waiting for a time when he can process the ore and this not in the foreseeable future, the 5-10 acre stockpile site could be occupied for a very long time.

Response: The action alternatives require completion within a 10 year period, except for Alternative 9, which would require completion within 5 years. The reclamation plan would require reclamation of the stockpile site upon completion. In addition, no more than 40,000 tons of ore would be stockpiled at one time.

Comment: Monument information from the National Geodetic Survey (NGS) data base for the subject area project. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affecting the proposed project. If there are any planned activities which will disturb or destroy survey monuments, the NGS requires not less than 90 days notification in advance of such activities in order to plan for the relocation.

Response: No monument sites are likely to be affected.

Comment: Your office could produce a more meaningful analysis if you would give the reader some idea of the relative scale of the impact of the project compared to the environment as a whole and other impacts. For instance: from a geographic and geologic perspective, there are about 500 square miles or approximately 320,000 acres of ultramafic terrain in the Klamath Range; Nicore is proposing to disturb 35 of the acres.

Response: The EIS endeavors to share analysis of the impacts at a variety of scales. Some of the impacts appear less significant when viewed at a larger scale (35 acres in relationship to 320,000). However, some impacts would not be meaningful discussed at a larger scale, but are significant to a local area or situation (such as potential water temperature increases at ford sites).

Comment: No comprehensive study of the biological resources of the area yet exists. The capacity of the plants and animals to survive on serpentine soils has not been fully examined.

Response: Studies regarding serpentine habitats have been completed as part of Forest Planning and Watershed Analysis across this type of terrain. Areas have been allocated for protection of biological resources. The analysis in the EIS incorporates these studies and discusses how the project meets the Standards and Guidelines specific to land allocations in the analysis area.

Comment: It appears to me, in reading the Draft Environmental Impact Statement, that the drainage below mining site B in the Woodbury Creek into the west fork in not being considered.

Response: Woodbury Creek is specifically mentioned in the SDEIS and FEIS and in the Physical Scientist's Report in the analysis file.

Comment: If NICORE expands in the future, how is the public included in these alterations and expansions of operations on their public land if the final EIS does not allow further public comment in the future?

Response: Changes to any approved plan of operations (beyond what is disclosed as the decision in the Record of Decision) would be subject to further analysis and documentation (level of documentation depends on the nature of the change).

Comment: The statement that Naue Way and Airport Drive receive frequent use by heavy trucks and equipment is questionable and needs to be referenced and qualified.

Response: No studies have been done to determine the use of these roads by trucks and equipment. The level of residential, agricultural, and small woodlot development in the area would indicate that trucks and equipment are a common, if not frequent, sight on these roads.

Comment: The scope of the analysis area has been artificially and incorrectly confined to only about 15,000 acres of the 23,000 acre watershed.

Response: The "effects analysis" area varies depending on the resource being studied. In many cases, enlarging the area would artificially reduce the impacts (percentage of affected area would become smaller). The area shown on the maps covers the areas where direct impacts would occur.

Comment: The Rough and Ready Creek watershed should be closely surveyed for archaeological sites and artifacts. We have heard from three people that they have seen artifacts in the area.

Comment: The DEIS does not address the historic trails.

Response: The area was surveyed for cultural resources. Cultural resources are discussed in Chapter Four. No cultural sites were found in areas that could be impacted by the project.

Comment: The SDEIS should include an analysis by a qualified Industrial Hygienist of the effects on human health of the dust, water quality degradation, and sound from the mining operations.

Response: Analysis is included on dust, water quality, and noise, among other items. An Industrial Hygienist is not considered necessary to understand or mitigate impacts.

Comment: The miner should be required to conduct a industrial hygiene study of it's mining practices, fuel storage, and use of mining chemicals.

Response: All legal requirements (including Mine Safety and Health Act standards) will be met as a condition of the Plan of Operations. No mining chemicals are proposed for use.

Comment: The DEIS fails to analyze the economic and social effects of restricted access to public land related to the Nicore POO and other existing and potential mineral claims and operations.

Response: Access is currently limited by private land, road conditions, and unmaintained stream crossings. No additional economic or social effects of restricted access are expected. Potential conflicts between users of the area are discussed in Chapter Four.

Comment: The DEIS fails to analyze the historical and potential impacts of Siskiyou National Forest and BLM mining operations which are not subject to a plan of operations approved in advance of operation in the analysis area and surrounding area.

Response: Any operation that is not subject to plan of operations approval would be covered under a Notice of Intent. By definition, an activity covered under a Notice of Intent is not expected to result in any significant disturbance of surface resources.

Comment: The following is an expanded description of the principle physical impacts of mining related to the factors above, which must be considered in the Nicore DEIS, mining waste, acid drainage, metals and dissolved pollutants, transportation storm water, ground water quality, site stability, and soils.

Response: These issues are addressed in Chapter Four of the SDEIS and FEIS.

Comment: The DEIS also fails to consider the multiple factors related to mineral mining which could have wide-scale effects individually and collectively. The DEIS also fundamentally errs by not analyzing the individual and cumulative effects of small scale mining operations.

Response: Direct, indirect and cumulative effects are discussed throughout Chapter Four.

Comment: Why is there not a soil scientist among the list of preparers? There are issues associated with soil chemical and physical changed that should be addressed by a qualified soil scientist. The "Affected Environment" and "Environmental Consequences" section are seriously deficient in discussion of the soil resource.

Response: The discussions related to the physical environment were expanded in the SDEIS. The list of preparers includes specialists skilled in geology, hydrology and soil science.

Comment: We must take in consideration that the reason there are still old roads in this area is because the vegetation growth of a serpentine area is so painfully slow.

Response: The EIS discloses that plants grow slowly in many parts of the analysis area, that complete restoration of vegetation is not expected in the short term, and that roads are likely to remain evident on the landscape for centuries and may be considered an irreversible commitment.

Comment: DEIS is fine document identifying the outstanding and remarkable natural values of Rough and Ready Creek. It also clearly points out the adverse consequences of mining laterite within this watershed.

Response: These considerations will be explored, and the rationale for the selected alternative will be in the Record of Decision.

Comment: We appreciate the very readable quality of the DEIS and especially the excellent maps.

Response: The EIS Team appreciates your comment, and has continued to strive to improve the document and the maps.

SDEIS COMMENTS AND RESPONSES

LAWS AND POLICIES

Comment: The summary of the 1872 mining law states that "all valuable mineral deposits in lands belonging to the United States are to be free and open to exploration." This summary needs to show how this law actually requires the FS/BLM to grant a patent to mine. Also, exploration is to be allowed only for all valuable mineral deposits. There is considerable doubt as to whether or not these nickel deposits are valuable, thus precluding even exploration. Since nickel exploration has occurred since World War II, but have not resulted in actual mining, it would appear that these deposits are not valuable.

Response: The patent process is not addressed in the EIS and is not a part of the proposed action. An economic analysis is included in the EIS.

Comment: The 'Decisions to Be Made" section incorrectly fails to state that the Responsible Officials may also decide that the "No Action" alternative is the in the best public interest. It also needs to state why the alternative is to be included if it is not be considered, which would generally be a violation of NEPA and administrative law.

Response: The No Action alternative is within the range of alternatives to be considered by the decisionmakers.

Comment: The Project History section needs to outline the required steps taken by the applicant which gives him whatever "rights" he has under the 1872 mining law.

Response: Under 30 USC Section 26 , a locator "shall have the exclusive right of possession and enjoyment of all the surface included within the lines of their locations, and of all veins, lodes, and ledges throughout their entire depth,...". The locator's rights are subject to the Surface Use Regulations of the US Forest Service (36 CFR 228) and the Bureau of Land Management (43 CFR 3809).

Comment: Mr. Freeman has rights to use this particular access route to service his claims under the 1872 Mining Law. A 1959 Solicitor's Opinion held that roads built by miners without the grant of an express right-of-way were "roads constructed under clearly implied statutory authority as way of necessity." This particular access route built by Mr. Freeman's predecessors for the purpose of accessing the same mining claims cannot be denied. Mr. Freeman also has rights to access his claims by means of the existing roads pursuant to the Alaska National Interests Conservation Act.

Response: Public highways cannot be claimed on National Forest Lands after it has been removed from the public domain. ANILCA applies only to private inholdings and does not apply to mining.

Comment: The first mitigation listed states that all necessary permits would be obtained, and lists several state permits that may be required (page 21). Proper permitting should be a prerequisite to operations rather than a mitigation.

Response: Proper permitting is a prerequisite to operations. The State and other permitting agencies are responsible to administer and enforce regulatory requirements within their jurisdiction.

Comment: *There is no legal authority for the statement: A mineral discovery is assumed valid until proven otherwise.*

Response: This statement appears in the SDEIS on page 18. It is incorrect and has been corrected in the FEIS to read: "A mining claim is assumed to be valid until proven otherwise." Once a claim is located the courts have held that the locator may continue to work to develop his claim and confers upon him a possessory right against all other locators. The Forest Service does not initiate a mineral examination until the locator proposes to conduct mining operations within an area that has been withdrawn from the mining laws or applies for patent.

Comment: *Since the miner has not submitted a plan of operation that meets requirements of the Forest Service's mining regulations and that provides the information necessary for the Forest Service to prepare and EIS that complies with NEPA, the Forest Service must suspend analysis of the Nicore mine until the needed information is provided.*

Comment: *Under NEPA, ore processing is clearly a connected action and therefore must be fully addressed in the Nicore SDEIS. Mineral resources are not mined to be stockpiled. Processing or smelting is a direct, connected, and cumulative outcome. If smelting does not occur, there is no need to remove the ore.*

Response: The Nicore EIS complies with NEPA. It states that the ore processing facility has not been identified, however no Plan of Operations would be approved until the site is identified and any needed analysis is completed. The miner has stated that he needs a decision from the FS and BLM regarding selected alternative in the EIS before he can arrange for a processing facility.

Comment: *Botanical Diversity/Sensitive and Endangered Plants, Aquatic Conservation Strategy, and Riparian Reserve Standards and Guidelines, Wild and Scenic River Eligibility. All of these designation were put in place subsequent to the submission of the Plan of Operations and cannot legally restrict access to the ore-body, unless the federal government chooses to pay just compensation for the loss of Mr. Freeman's rights.*

Response: These issues are related to effects of the Plan of Operation, and have been used to develop alternatives to reduce impacts on the land. They help characterize the ecological conditions and concerns in the area. Indeed, Forest Service standards continue to become more restrictive over time. No law, regulation, or policy provides unrestricted access to a miner holding a claim, however, the Forest Service is required to minimize environmental impacts.

Comment: *Nicore must disclose it's proprietary process to a panel of certified metallurgical experts in order to demonstrate that this process can indeed magically produce marketable stainless steel directly from the low grade ore present in this area.*

Response: There is no legal requirement of this nature.

MERITS OF THE ALTERNATIVES CONSIDERED

Comment: Although not stated in the EIS, an underlying Purpose and Need for this project is to mine nickel ore to supply a nickel demand. If there is insufficient demand, the need for the project is low and must be weighed against the environmental costs to this biologically diverse area. We believe the economic viability of the project and the need for the project must be ascertained and presented to the public before a decision to allow the mine to proceed. Therefore, in light of the uncertain economic viability of this project, the preferred alternative 9 is a reasonable and cautious approach if the laws, regulations and policies governing the development of a mining claim truly prohibit the FS and BLM from denying outright the plan of operations. We [EPA] prefer No Action, but support the preferred alternative if the FS and BLM give rationale on why they cannot select No Action.

Comment: Alternative 9 is the best of the action alternatives because it would have the least impact.

Comment: If the decision is to allow the claimant his right to mine, the only acceptable action would be Alternative 9.

Comment: The only alternative that does not impact Rough and Ready Creek's outstanding values are the no action and Alternative 9 (if equipment was required to be flown in).

Comment: The Proposed Action is unacceptable to me. The adverse environmental impacts are adequately described in the SDEIS and are the reasons I oppose the Proposed Action.

Comment: Alternative 6 is unacceptable to me because of the new road construction and reconstruction within a roadless area.

Comment: Alternative 7 is unacceptable to me because of the new road construction and reconstruction within a roadless area. I also object to the irretrievable and irreparable commitment of resources associated with bench road construction.

Comment: Alternative 8 is unacceptable to me because of the new road construction and reconstruction within a roadless area, and the bench road construction.

Comment: Alternative 10 is unacceptable to me because of the new road construction and reconstruction within a roadless area.

Comment: Alternative 11 is unacceptable to me because of the new road construction and reconstruction within a roadless area.

Comment: Most of my concerns are well-addressed in the Preferred Alternative 9. I commend you for this.

Comment: The main purpose of the original Proposed Action was to move the haul route away from residential uses along Rough and Ready Creek Road and Naue Way. Three of the Forest Service Alternatives (6, 9 and 11) would impact those residential neighbors much more seriously than the Proposed Action.

Comment: Alternatives 7 and 8 are objectionable because they require construction of a new road.

Comment: Alternative 8 does not fulfill the project purpose because it denies access to Site D, where a significant portion of the ore body is found.

Comment: Alternative 10 and 11 are objectionable because they deny access to Site A where a significant portion of the ore body is found. These Alternatives also incorporate cable haulage without any documentation of whether such a system is reasonable.

Comment: The Proposed Action should be preferred because use of existing roads is less disruptive of the environment than any of the Forest Service proposals suggesting fully engineered roads.

Comment: I believe that ore removal via existing roads and reasonable other roads would be in the best interest of the USFS, BLM, the public and the Nicore Project, within the confines of existing laws.

Comment: The Forest Service evaluation of the economics of the proposed action and its alternatives demonstrate that Nicore's mining plan...is associated with negative present net values. [Therefore] the Forest Service and BLM have an affirmative duty to choose the no-action alternative.

Comment: Alternatives 6, 7, 8, 10 and 11, as well as the Proposed Action all have inherent risks that are too great for this sensitive and botanically rich and rare ecosystem to be viable options.

Comment: Concerning Alternative 9, while it is the most desirable of all the action alternatives, it seems to me that all it does is stall the clear decision-to adopt the no-action alternative.

Comment: I did my Ph.D. research on a group...of species...including *Arabis macdonaldiana*. I consider the serpentine and peridotite areas to be one of the botanical gems of our nation. The minerals can be found elsewhere, the rare and endemic plant species cannot. Were this a wartime crisis, or were our economy in a crisis, we might wish to reevaluate the costs-benefits of mining versus not. However, considering our nation at this time, I can see no justification for impacting this biological treasure in this manner.

Response: These comments represent public opinions that require no response. The rationale for the selected alternative will be in the Record of Decision.

Comment: All haul routes converge in the heart of the Botanical Area. Roads are not compatible with the protection of the sensitive plants. The development and use of these roads would fragment the botanical area into pieces, interfering with the natural life processes of many species. Scientists from all over the world visit the Botanical Area to study the values that must be protected.

Response: Effects on the botanical area are disclosed in the EIS and will be considered in the decision.

Comment: I believe the risk and consequences of POC root disease introduction are greater than your document indicates. Based on consideration of POC alone, I believe that there is a good case for excluding all mining. Even your preferred alternative poses risks far beyond those justifiable for a money-losing mining operation.

Response: The EIS reflects the analysis done for the project. Opposing professional opinions are recognized. The ROD will discuss rationale for the selected alternative.

Comment: Alternative 9 is unacceptable to me because taking ore samples will not resolve the economic and operational uncertainties associated with the project. The range of concentrations of minerals is already known, and more precision will not change the operational costs, abundant world nickel resources and resulting depressed prices.

Response: The Agency recognizes that the concentrations of minerals is not subject to change. A sensitivity analysis examines a range of operational costs. Information on the abundant world nickel resources is part of the process records. Alternative 9 is part of the range of analysis designed to help resolve these uncertainties.

Comment: Alternative 6 also inappropriately places part of the haul route in privately owned land. The Forest Service can neither require a private property owner to allow its property to be used as a haul route, nor can the Forest Service condition Mr. Freeman's rights upon acquiescence by a private party.

Response: Under Alternatives 6 and 11, the EIS discloses that if access cannot be secured by the claimant, the agencies would be required to provide access via federal land.

Comment: Nicore has, on three occasions, informed the Forest Service the need for a 5,000 ton bulk sample no longer exists because a sample has been successfully reduced to a high quality alloy, and that full scale mining is not contingent upon results of a bulk sample.

Response: The bulk sample is one alternative among a range of alternatives. The sample alternative would remove some uncertainties associated with processing, economics, and final product. It would allow the orderly development of mineral resources and allow a test to determine feasibility of full scale development. Alternatives other than the Proposed Action have been developed by the Forest Service to help resolve issues with the Proposed Action.

Comment: The SDEIS attempts to make the proposed plan of operations appear to be unworkable while proposing alternatives which are clearly impossible to implement. It is clear that the purpose of the alternatives analysis is to place insurmountable obstacles in the path of rational project development in continuing violation of the General Mining Law and the Minerals Policy Act of 1970.

Response: The EIS analyzes a range of alternatives which respond to issues with the Proposed Action. The purpose and need is described in the EIS, and does not include an objective to place insurmountable obstacles in the path of project development.

Comment: Alternative 9 will not resolve the uncertainties surrounding the Nicore proposal. There are no conditions in Alternative 9 that give oversight of the bulk sample's tests to Forest Service and BLM mineral examiners, or that guarantee access to the information that is necessary to determine whether Nicore's mining operation is economically viable or reasonable. There are no provisions in the preferred alternative that Nicore will have to provide FS and BLM examiners the information needed to resolve other present uncertainties-including but not limited to where and how the ore will be processed, transported, what other raw materials are needed and whether these are available, and at what costs, and what the costs are of complying with environmental laws. The economic and operation uncertainties surrounding the proposed Nicore Mine are as much associated with Nicore's refusal to disclose how and where the ore will be processed as with the glut on the world market of much higher grade ore and the limited market for the stainless steel that Nicore is proposing to produce.

Response: The bulk sample is one alternative among a range of alternatives. The concept behind the alternative has been clarified in the FEIS. The sample alternative would remove some uncertainties associated with processing, economics, and final product. It would allow the orderly development of mineral resources and allow a test to determine feasibility of full scale development. The Forest Service would have full access to information associated with sampling. In fact, development beyond the sampling stage would be dependent upon that data.

Comment: Because the Nicore project will not meet Aquatic Conservation Strategy Objectives, it cannot go forward.

Response: The alternatives described in the Nicore EIS provide a range of responses to Aquatic Conservation Strategy Objectives. None fully meet all aspects of the strategy (including No Action). The EIS includes an evaluation of Aquatic Conservation Strategy Objectives relative to the alternatives; this evaluation will be addressed in the Record of Decision.

Comment: The Forest Service's Economic Report notes that the value of other resources in the Rough and Ready Creek watershed includes "potential wild and scenic river resources, the water quality of Rough and Ready Creek and the fisheries resource" among other things. As the report states, "these values are becoming increasing scarce in the United States and consequently are increasing in value." Indeed, usable water comprises one of the most important parts of a human society's resource base, therefore, any efforts to preserve the integrity of freshwater supplies is in the best interest of all segments of society. The proposed Nicore Mine and all action alternatives places all these invaluable resources at risk.

Response: Chapter Four displays the range of effects of implementation. The Record of Decision documents the rationale for the decision.

Comment: The Nicore SDEIS demonstrates that none of the action alternatives would be profitable even when counting only the costs of mining and processing the ore. Add to this the low grade of the Rough and Ready Creek ore bodies and the fact that, despite the historic location of a nearby smelting facility at Riddle, Oregon, none of southwestern Oregon's nickel laterites have been commercially developed.

Response: The SDEIS and FEIS recognize the effects you have stated.

Comment: The SDEIS declares that 7 of 19 species would likely be adversely affected by the Nicore Proposed Action. In other words, 37 percent of the sensitive plants species would be adversely affected. I am not arguing that allowing the mine to proceed would necessarily cause the listing of plants or damage to their populations. Clearly, there is some concern about the potential for this. There are two important considerations to keep in mind: one is the potential to contribute to a trend towards federal listing and the other is the loss of viability of the population or species. These two phenomena are related, one is political and the other is ecological. The FS might wish to manage its resources in such a way as to result in the listing of 37 percent of the sensitive species in a given area as Endangered, but it ought never permit a biogeographical area to suffer such as reduction in biodiversity.

Response: The effects of implementation for botanical resources are listed in Chapter Four. The rationale for the decision is in the Record of Decision.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Comment: I urge the Forest Service to withdraw areas protected for their biological values from mining.

Comment: Under Alternatives Considered but Eliminated from Detailed Study, the Forest Service found that an alternative to withdraw part of all of the Rough and Ready Creek watershed from mineral entry would not meet the purpose and need of the analysis and would be outside the scope of project level analysis. But mineral withdrawal is just the sort of alternative that meets the purposes of NEPA, and according to the Siskiyou National Forest Plan and other documents, mineral withdrawal is not outside the scope of project level analysis. The Siskiyou National Forest Plan prescribes mineral withdrawal when mitigation measures would not adequately protect other resource values which are of greater public benefit (S&G 10-2). Also, the Forest has declined to address mineral withdrawal at the forest planning level, stating recently in the environmental assessment revising the SNF LRMP with regard to mining riparian reserves that "the option of looking at specific stream reaches for withdrawal can be considered on an individual project basis at any time."

Response: Withdrawal may be considered for Rough and Ready Creek or any other area. However, it will not be considered in this EIS, since mineral withdrawal is outside the scope of the EIS, as defined by the Purpose and Need.

Comment: The revised SDEIS must include an alternative that would not approve surface disturbing activity until it is determined whether Nicore has discovered a valuable mineral.

Comment: The statement in the SDEIS that mining claims "are assumed valid until proven otherwise" is based on agency policy, not rules, regulations or law. This policy does not address the 1872 Mining Law's stipulation that the right to mine public lands is conditioned on whether or not a valuable mineral has been discovered. Forest Service analysis and information provided by the public demonstrate there is little likelihood that Nicore's mining claims contain a valuable mineral. Therefore, it is unreasonable for the Forest Service to hold to their assumption of claim validity.

Response: This comment reflects some people's request that a mineral examination be done to determine that a valuable mineral exists. The Forest Service does not initiate a mineral examination until the locator proposes to conduct mining operations within an area that has been withdrawn from the mining laws or applies for patent. The areas proposed for operations have not been withdrawn from mineral entry. A validity determination is not required to approve a plan of operations. The No Action alternative would not approve any surface disturbing activity and is in the range of alternatives considered. Alternative 9 reduces impacts to a great degree, and is intended to resolve questions about the operation.

Comment: I do not believe that an alternative that 1) would withdraw the area from mineral entry, 2) creates a National Conservation Area, and 3) buys out the miner's claim is an inappropriate response to the Plan of Operations, especially given the questionable economics.

Response: Refer to the purpose and need of the analysis listed on page 7 of the SDEIS and "Decisions to be made" listed on page 8 of the SDEIS. Those alternatives you mention are outside the scope of this purpose and need and analysis.

Comment: Since every effort should be made to protect botanical resources (per the LRMP) then the only acceptable alternative is no action or creation of a National Conservation area with greater protection.

Response: This alternative was eliminated from detailed study, as discussed in the EIS. Consistency with the LRMP is part of the required findings in the ROD.

Comment: I believe that the Rough and Ready Watershed would make a good Port-Orford-cedar sanctuary--a gene pool, as it were.

Response: That comment is outside the scope of this analysis. There is an ongoing assessment to address Port-Orford-cedar on a range-wide scale.

Comment: Modify Alternative 10 so that access to site C is by tram. The lower terminal would be on the powerline route in Section 14 on the south bank of the Rough and Ready Creek before the first creek crossing. The tram would be about the same length as proposed to access Site D and could be relocated from one site to the other. The bench road, and reconstruction on the 438 road would not be required. Stream crossings would not be required.

Response: This modification was considered but not fully developed. The range of alternatives as described in the EIS provide an adequate basis for decisionmaking. The cable option is feasible as proposed, a feasibility study has not been completed for other sites.

Comment: *The Nicore EIS must include alternatives that prescribe permanent road closures since your own Watershed Analysis and the work of experts agree that exclusion of the vehicles is the preferable action.*

Response: The purpose and need of this document is listed in the EIS, road closures would not meet this need. Permanent road closures are not included in any of the alternatives, but could be analyzed in a future project that would have a purpose and need to improve watershed condition by reducing the road network in the West Fork.

Comment: *On what basis was full scale helicopter ore haul deemed too expensive to implement and eliminated from detailed study as an alternative, relative to the losing economic prospect of any action alternative?*

Response: The relative haul costs of using a helicopter is about 24 times as expensive as hauling ore in trucks (about \$7.00 per ton for Alternative 7 versus \$168 per ton for Alternative 9). Page 19 of the SDEIS (and the FEIS) address this point under alternatives considered, but eliminated from detailed study.

Comment: *The fact that helicopter mining is extremely expensive to implement does not constitute a denial of access.*

Response: In this case, even the cheapest haul methods do not appear to be economically viable. Helicopter haul costs about 24 times more than using trucks. Therefore, full scale ore haul with a helicopter would likely be so expensive as to preclude the operation. Bulk sampling with a helicopter is reasonable, since it would move a small amount of ore (1/80th of the full scale amount). Results from the sampling could be used to determine the economic viability of full scale mining.

Comment: *I question the need for the applicant to sample 5,000 tons of rock to find out if this is viable ore. Why can't he, or an unbiased third party, take representative samples of only a few pounds? These samples could be packed out by a person with a backpack, a horse or a trail bike, thus negating the need for the disturbance caused by improving old roads. It would also alleviate the concern about the helicopter flights.*

Response: A sample of this size is required to perfect the processes needed for full scale production. Bulk sampling is a common and accepted practice within the mining industry.

BUREAU OF LAND MANAGEMENT/AREA OF CRITICAL ENVIRONMENTAL CONCERN

Comment: Why is Mr. Freeman not required to stockpile the bulk sample on his private land, rather than damaging BLM and USFS public land?

Response: Mr. Freeman did not propose stockpiling on any land that he owns. However, stockpiling on other private lands in the vicinity of the proposed operation was considered. Stockpiling on unpatented mining claims is considered an appropriate use of the BLM lands.

Comment: We also believe that regardless of the alternative chosen, Mr. Freeman should be required to immediately remove his dwelling, outbuildings, and junkyard from the ACEC, and be required to restore the land to its original condition.

Response: Mr. Freeman's use and occupancy of the BLM lands within the ACEC will be reviewed following the issuance of the Record of Decision. Those uses and occupancies that are considered reasonably incident to mining, as approved through the ROD and BLM Approval Letter, will be allowed to continue subject to Mr. Freeman's compliance with the BLM Mining Claim Use and Occupancy Regulations.

Comment: The lands of the BLM ACEC appear to have no mineral deposits yet are claimed under the 1872 Mining Law. Thus, absolutely no mining activity can occur on these lands since there is no possibility that the claims contain a valuable mineral deposit within the meaning of the law.

Response: The BLM administered land within the ACEC is open to mineral entry. Mining claims may be located within the ACEC along with the exploration and development of those claims. A determination of the mineral potential of the BLM lands within the ACEC has not been made.

Comment: The Plan of Operations submitted to the Medford District of the BLM states that there are two possibilities for ore processing - one, transportation of the ore to an off-site processing facility, and two, processing ore on the Rough and Read Creek ACEC utilizing an electric arc furnace. Processing must, therefore, be fully addressed in the Nicore SDEIS, not in a later document.

Response: Mr. Freeman withdrew his original request to place a processing facility on the BLM land. At this time there is no proposal to smelt ore on either BLM or National Forest lands.

Comment: In reference to the need to cover all the stockpiles, does this include piles ready to load into helicopters or trucks at the mine sites, and the piles before and after drying and processing, or just the major ore pile at the stockpile locations? Would plastic be used to cover the stockpiles? Be careful, plastic splinters easily and causes havoc further downstream in watersheds.

Response: All stockpiles will be required to be covered with a cloth/canvas material that would not deteriorate through exposure from the weather.

Comment: All haul routes converge in the heart of the Botanical Area. Roads are not compatible with the protection of the sensitive plants. The development and use of these roads would fragment the botanical area into pieces, interfering with the natural life processes of many species. Scientists from all over the world visit the Botanical Area to study the values that must be protected.

Response: Effects of the alternatives on the Area of Critical Environmental Concern, the Botanical Area, and botanical resources are discussed in Chapter Four of the EIS. Rationale for the decision will be in the Record of Decision.

Comment: Specifically where the helicopter loads will be dumped should be identified.

Response: Under Alternative 9, helicopter loads will be placed at the stockpile site (see Alternative 9 map for stockpile site). A rough design for the stockpile site is in the analysis files.

Comment: [The statement that] the Proposed Action may degrade scenic quality...is untrue. Mr. Freeman has previously agreed to locate the stockpile out of view of Highway 199 and the Botanical Wayside. Moreover, the SDEIS is incomplete because it fails to disclose that Pacific Power and Light was allowed to construct a major power substation on BLM land within view of 199 on property just across US 199 to the east.

Response: A BLM specialist reviewing the proposed action has stated that the proposed stockpile would be within view of a proposed trail within the ACEC and within view of Highway 199. Mr. Freeman may have verbally agreed to locate the stockpile out of view of Highway 199, however, his proposed action specifically identifies the location of the stockpile near his existing shop and residence. The Pacific Power and Light substation is not on BLM administered lands.

ROAD DESIGN AND DEVELOPMENT

Comment: The SDEIS needs to state what portions of the project, if any, would be paid for with public funds, including reclamation, road improvements, mitigation, bridge and culvert replacement, monitoring, etc. I believe the claimant should pay since the project necessitates all of these expenses.

Response: All costs of the operation would be paid by the proponent except for Forest Service administration of the permit and plans required of the proponent.

Comment: The terms "outsloped" and "insloped" need to be defined.

Response: These terms relate to the cross slope of the road surface. An inslope would be sloped down toward the cut slope. An outslope would be sloped down toward the fill slope.

Comment: It is imperative that the USFS consult with experts in the field of road building and consultants from various ore truck manufacturers in order to find out what the actual specification for mining roads would really need to be.

Response: The ore truck planned for use has been stipulated by the proponent as a Terex 25 ton articulated dump truck. The specifications of a similar truck in the Caterpillar Performance Handbook, Edition 27 is used. The 12 foot running surface for the road is adequate for this vehicle, which has a 9 foot operating width.

Comment: The construction of the bench road across the steep peridotite rock outcrop in Section 14 is very destructive visually to this area. The scars will be there for many years. Rehabilitation would be expensive and difficult and probably not done. If you were to construct access across this face, how about constructing a viaduct out of steel and timbers. It would be much easier to remove afterwards, leaving minor visual scars.

Response: A viaduct is not considered reasonable for this project. A temporary road may be needed to set footings for such a structure, and the concrete footings and temporary road could have more of an effect on the creek than the proposed road.

Comment: On page 15, the SDEIS states that "Road grades will not exceed 25% except a few short pitches that may be up to 30%." These are extremely steep grades, especially if it is not to be paved! When I create a road for land partitions in this county I am required to surface them with asphalt if they exceed 12 and they are never allowed to be over 18%. I have seen a lot of 18% gradient roads which are only surfaced with gravel, and they all have erosion problems, I've never seen a road much steeper than 18% unless it was called a jeep trail. 25% is way to steep for either safety or erosion control.

Response: These are steep roads but are expected to accommodate the equipment as discussed in the EIS. Sediment from the roads is likely as has been disclosed.

Comment: As to the costs associated with removing the ore, the SDEIS has both faulty premises and gives false impressions. For instance, the comparison of costs of the various alternatives assume that Mr. Freeman will be required to build fully engineered roads consistent with the Forest Service's practice for permanent roads associated with timber harvest. This is inappropriate for several reasons. One, the roads in the Proposed Action are not permanent, nor are they intended to be permanent. They will be reclaimed and they will not be used by the general public. Two, roads designed to be permanent such as those associated for timber harvests are more disruptive to the environment than the temporary roads in the Proposed Action. Three, and most importantly, the Forest Service's own records demonstrate that its practice is not to require fully engineered permanent forest service roads when approving mining plans of operation. Instead, it appears that this requirement is being imposed on Mr. Freeman solely to make the Proposed Action appear more costly than it really is.

Response: The intent is to build very simple roads with idea that they would not be permanent, with the knowledge that the roads may be visible for long periods, regardless of who built them. The planned road widths are about the same as the existing mining roads, and many of them are used as is except for minor repairs and surfacing. However, some of the mining roads in the area are troughs that collect and channel water. These “troughs” would be filled in with borrow material and the road built up with surfacing. New construction would use borrow material over small rocks and boulders rather than dig them out to avoid building channels. Borrow and surfacing would build the road surface above the surface on the flatter ground. Water bars and cross ditches would be built in or installed prior to winter to allow water to cross and get off the road surface. Details about road conditions and proposed improvements are summarized in the EIS and available in the Analysis File.

MITIGATION, RECLAMATION AND MONITORING

Comment: The SDEIS acknowledges that a reclamation plan detailing how reclamation would be accomplished is a required part of a plan of operations, but defers development of reclamation to final approval of a plan of operations. The proposed action's reclamation plan only addresses the mine sites. It does not address reclamation of the stockpile area, the roads, the area where road surfacing material will be mined, the area of disturbance of the installation and removal of the stream crossing structures, and the reclamation of the areas where these will be stored.

Response: The SDEIS describes reclamation objectives for drainage and erosion control at the mine sites, restoration of native vegetation at the mine and stockpile sites, and stormproofing and erosion control along the haul route.

Comment: What is meant by “A full monitoring plan...” that would be developed under mitigation 14. What parameters would be monitored for each of the elements listed? Who would be responsible for such monitoring and how would it be enforced? What actions could or would be taken in the event adverse effects were observed during monitoring such as the spread of POC root disease, noxious weed invasions, mass wasting or water quality impairment as a result of the mining activities?

Comment: The SDEIS states that a “full monitoring plan would be developed for the final plan of operations”, then lists the elements that would be monitored. The SDEIS must discuss each component of the monitoring plan in adequate detail so that its effectiveness in maintaining water quality and other resources can be determined.

Response: Further discussion about monitoring has been added to the FEIS. The operator will be responsible to develop a detailed monitoring plan based on the information provided in Chapter Two.

Comment: If the miner's operating period would be between June 15 and October 15, that would allow less than three weeks to have the season's reclamation work finished before the winter wet season.

Response: The operating period proposed in the Proposed Action (and for Alternative 9) is June 15 through October 15. Full scale mining alternatives described in the EIS have a more limited operating season (June 15 to September 15). In all cases, the reclamation work for each mine site would have to occur during the operating season.

Comment: Another discrepancy is that seasonal bridges and/or culverts are removed by September 15. So, does the miner drive through the creek for the last month of operation each year?

Response: The operating season would be limited to the time that bridges and/or culverts were in the ground. These would be removed, and no access would be approved until the following season.

Comment: Even though the proposed action calls for restoration with native vegetation, the present diverse plant communities could never be duplicated, even by professional botanists. Our rare, endemic plants are rare for good reason. They don't reproduce well, and they often live in symbiotic relationships, which once torn apart can be difficult to put back together. From my experience restoring logged areas, in the better soil areas more common plants come in so thick that the slower to establish plants either don't germinate or are stressed from competition. And in the poor soil areas, nothing grows. It is definitely not a once-over deal. Restoration must be an ongoing commitment. The mining pits, from what I have seen, will not be restored in our lifetime.

Comment: Several members of the IVGC have strong horticultural skills, with hundreds of years of combined experience. Our members have experimented with the propagation of local plants...with poor results. The plants at Rough and Ready Creek Watershed cannot be reintroduced successfully. The truly rare and fragile plant communities are lost forever when the surface is disturbed. Dealing with serpentine soils and specialized sensitive plants makes any reclamation effort a waste of time and effort. Far better to protect the surface from disturbance to begin with.

Response: The difficulty in restoring native vegetation within the mine pits is acknowledged in the EIS. The reclamation plan emphasizes minimum disturbance.

Comment: Listing three reclamation objectives does not adequately satisfy the NEPA review process...stating that "best management practices would be incorporated into all aspects of road work and project design" and that such BMPs are listed in the analysis file does not comport with the NEPA requirement that a plain and understandable statement of the mitigation measures for the alternative be made available. How can the public assess the environmental effects of any alternative without having a detailed reclamation plan available for review prior to a final decision being made on approval of any alternative?

Response: Further information about the reclamation plan is in the FEIS. Best Management Practices are identified, and the effectiveness of all mitigation measures is assessed.

Comment: The SDEIS lists possible mitigation measures, but does not discuss them in adequate detail nor does the SDEIS discuss or disclose the effectiveness or efficacy of the mitigation measures, or whether they will in fact be implemented.

Response: The FEIS discloses the effectiveness of the mitigation measures. The Record of Decision explicitly discuss which mitigation measures will be adopted for the selected alternative.

Comment: The reclamation plan is to bulldoze material that was scraped off the bank onto the sites that will be below grade. Is there evidence that an adequate seed and bulb bank is present and would survive a move?

Response: The stockpiling of overburden and later placement within the pits is likely to result in some revegetation of plants that can survive disturbance. Some trees may be planted in the area. The reclamation plan acknowledges the need to respond to site conditions as the mining progresses.

Comment: Why is there no indication in the SDEIS that application has been filed with the Josephine County Planning Department for a Development Permit for this mining operation. The Rural Land Development Code (RLDC) is clear about the necessity to follow very specific procedures to develop a mining operation in the county.

Response: Mining on federal lands is not subject to a County permit. However, there are State and other permitting agencies that are responsible to administer and enforce regulatory requirements within their jurisdiction. Required permits must be obtained before mining begins.

PHYSICAL SETTING/WATER QUALITY ISSUES

Comment: The lack of long term seismic records or recording stations near the site area preclude an evaluation of local seismic risk. Nonetheless, awareness of the major fault and its potential for additional fault movement is important.

Response: The mapped fault that defines the contact between the Josephine Peridotite Sheet and the Galice formation was discussed in the West Fork Watershed Analysis. The potential for movement along the fault cannot be predicted and does not affect project design. No permanent structures are proposed near the fault.

Comment: Rough and Ready Creek supplies water to the Illinois Valley and the Rogue River. As such, it is subject to the Diack decision...that prohibits the use of surface water and the issuance of new surface rights into Wild and Scenic Rivers.

Response: Bruce Sund, Josephine County Water Master, advised the Forest Service that the Diack prohibitions were valid until 1994, when the state decided how much water must be retained in the creek. The Diack prohibitions no longer apply, and the state will consider the in stream needs before granting a permit for Nicore to use water from Rough and Ready Creek.

Comment: Modification of stream beds and streamflows by filling necessary for equipment crossing, and disruption of subterranean water movement by excavations for roads and mining pits may in some situations disrupt the perched water tables and the consistent water levels that I believe are required for maintaining some stands of POC.

Response: Under the Proposed Action, some ponding will likely occur upstream of the rock ford crossings. This may inundate tree roots and potentially kill some trees, resulting in a small loss in stream shade. The analysis discusses areas on the haul route that have denser POC populations; outside of these areas, POC does not appear to provide a lot of shade (the relationship between POC and water temperature has not been specifically established, but the relationship between vegetation density and shade can be observed). There are no POC present in the immediate vicinity of the pits and therefore effects to the species from mining at the pits is unlikely.

Comment: One aspect of root rot exclusion that was not considered is control of drainage from roads, which should be directed as far as possible from POC populations.

Response: Road improvements are designed with consideration given to POC protection.

Comment: The SDEIS assumes that a water withdrawal permit for Rough and Ready Creek would be granted. How will dust abatement occur if a water right is not granted?

Response: The SDEIS relied on the use of water for dust abatement because water use was considered by the team to minimize effects on other resources (e.g. water versus paving, lignin etc.). If Rough and Ready Creek is not used for water withdrawals, an alternate source subject to Forest Service (and possibly other agencies) approval would be used.

Comment: I feel that stream temperatures increases would be measurable in the Proposed Action, given water withdrawal, low flow timing of operations, and fords. Alternatives 6, 7, 8 and 10 may also increase water temperature.

Response: The SDEIS discussed that water temperatures may increase under alternatives 6, 7, 8 and 10, but that this increase is not likely to be measurable. Measurable increases were disclosed as possible under the Proposed Action. Recalculations between the SDEIS and the FEIS have resulted in a dramatic reduction in estimated water withdrawals. The FEIS now reflects that no alternative will likely result in measurable increases to water temperatures, given the potential effects relative to the proposed actions.

Comment: What chemical compound expresses alkalinity, such that it can be expressed in terms of concentration (75-182 ppm)?

Response: HCO₃ (Miller, 1998).

Comment: The statements within Chapter Four that say "decreasing low flow could exacerbate already high water temperatures" contradict the Chapter Two Alternative Comparison that states that measurable increases in water temperature are not expected.

Response: The statements are not contradictory. The analysis points out that some actions would result in a TREND toward a higher temperature, but that these temperatures are not likely to be MEASURABLE. The ability to measure stream temperature changes and find that they represent a statistically distinct value involves many factors, including: instrument precision, environmental variables (stream shade, air temperatures, and flow levels) and sample size.

***Comment:** I am unclear how the Outstandingly Remarkable Value represented by large substrate will be protected if the alternatives result in sedimentation to the creek.*

Response: The EIS discloses that the Proposed Action may result in sedimentation that will be visible. Alternatives that construct the bench road may also result in sedimentation, at least for the summer and fall months prior to winter storms. Winter storms are expected to transport much of the construction debris downstream. It is possible, however, that some of the construction debris will be very large and remain where it falls. However, the large substrate is expected to dominate the area and would still be considered outstandingly remarkable.

***Comment:** Regarding toxicity of the ore, the concern is not whether "new elements would be introduced into the watershed" but whether or not their concentrations would change such they would become a source of toxicity.*

Response: Toxicity is relative to the affected organism, the path of contact (ingestion, skin contact, airborne, etc.) and the concentration of the element(s). The existing laterite soils are not considered toxic, removing some of the soil will not increase the concentration of elements in the area. Excavation of the soil may expose some new surfaces to weathering. This issue is discussed in the EIS, particularly as it applies to nickel concentrations in the water. In conclusion, no adverse effects on human health or aquatic organisms is associated with the project.

***Comment:** The No Name Fan area is unique. The creek there lies on a bed of shifting sands that are the source of cold spring water. It is not stable ground and not the place for a road. Any roads in this unstable area is bound to add much to the sediment load of the creek.*

Response: The No Name stream channel appears to migrate during storm events. Under the Proposed Action, some erosion could occur during storm events that overtop the banks. This erosion will result in some sediment delivered during storm events. All other alternatives avoid this area.

***Comment:** The potential for polluted storm run-off seems real and large. Will the Nicore Mining Area be considered a "point source" for pollution as outlined in the Clean Water Act?*

Response: The project does not fall under the point source provisions of the Clean Water Act. With the exception of the Proposed Action, the amount of sediment 'pollution' associated with the alternatives is not expected to be "real and large".

Comment: It is not clear how the 5,000 ton removal would affect the 4 mine sites. On page 28, it says about 0.5 acres would be affected, and on page 41, it says 5 acres. It would be informative to list each site and the maximum planned acreage, the sample size in terms of acres and ore weight, the estimated number of helicopter trips and flight time, and costs.

Response: This information has been in the analysis files and is now published in the FEIS. The SDEIS page 28 discussed the amount of land disturbed from sampling 5,000 tons; page 41 discussed the amount of land disturbed from both sampling and stockpiling.²

Comment: Merely acknowledging the need for a permit to pollute (p. 60) does not abdicate the Forest Service from its responsibility to maintain the high water quality of Rough and Ready Creek.

Response: The EIS includes alternatives and mitigation measures intended to protect water quality; the responsibility for maintaining water quality is shared by many agencies (including the Forest Service). The miner would ultimately be responsible to follow all guidelines and stipulations in the approved Plan of Operations.

Comment: The SDEIS lists vehicle and equipment washing as a mitigation measure, but does not identify the water source, calculate the amount of water required, or disclose the impacts of water withdrawal.

Response: Vehicle washing water requirements have been added to total withdrawals in the FEIS. Volume estimates of water needed for dust abatement has been corrected between the SDEIS to the FEIS.

Comment: The SDEIS in one place says that all the action alternatives are expected to maintain in-stream flows sufficient to create and sustain riparian and aquatic habitats. Elsewhere it states that water withdrawal for dust abatement...could exacerbate already high stream temperatures and affect aquatic organisms. It cannot be both ways.

Response: The water withdrawal estimates have been corrected between the SDEIS and the FEIS, resulting in a decrease in the estimated quantity of water needed. However, some of the alternatives may still trend toward an increase in water temperature. However, in-stream flows sufficient to create and sustain riparian and aquatic habitats would be maintained in all alternatives.

Comment: The increased sediment from development of haul routes and from stream crossings is not going to be flushed out of the system in one big whoosh as the SDEIS would have the public believe. The scenario is more likely that the sediment will fill pools, and how long it will take to flush out of the pools, and where it will go next cannot be calculated by Forest Service models, expectations, or assumptions. For instance, in defiance of the Siskiyou National Forest's stream power model, the sediment still has not flushed out of the Diving Board pool...

²The size requirements for the stockpile site was found to be larger than discussed in the SDEIS; the FEIS discloses that 10 acres may be needed to accommodate helicopter operations.

Response: Sediment transport is dependant upon many variables; stream power, sediment supply, channel roughness and frequency of flows capable of transport. Pools fill in and riffles aggrade when supply exceeds transport. The analysis finds that Rough and Ready is capable of transporting the relatively minor quantities of sediment associated with Alternatives 6 though 11 (this finding is based on an evaluation of the project compared with the scale of the watershed). The Proposed Action may supply sediment in excess of sediment transport, likely resulting in local deposition. The Forest Service did not attempt to predict how long the sediment would remain in deposited areas.

Comment: *The SDEIS states that fine material is expected to have a very low clay content, and thus would settle out of the water column rapidly. This statement is not in agreement with the West Fork Watershed Analysis which states that "if disturbed, serpentine soils may contribute fines. Much of the serpentine weathers to clay." Whether the fine sediment settles out of the water table, or not, the discharge of sediment violates OAR 340-041-0026(3)(a)(c).*

Response: The soils in the watershed vary in their clay content. The roads and mine pits intersect many soil types. Observations of Rough and Ready during storm events show that the stream is exceptionally clear, indicating the low levels of disturbance and the low percentage of clays in transport. Discharge of sediment is permitted under Oregon statutes but the duration and percent above background is regulated.

Comment: *If the water is withdrawn for dust abatement from Rough and Ready Creek or most any other stream in the Illinois Basin, water quality standards will be violated and the ACS objectives will not be met. If water is not used for dust abatement, then the SDEIS must analyze the effects of the chosen dust abatement measures.*

Response: Water withdrawals were recalculated; the highest estimated use is now expected to be less than 2% of 4 cfs (an August low flow value). Water quality standards are not likely to be violated, given the water withdrawals described in the FEIS . Water withdrawals are regulated by the Oregon Department of Water Resources.

Comment: *The Forest Service's analysis of the Nicore proposal admits sediment will be introduced into Rough and Ready Creek. The Forest Service must establish a baseline for turbidity that the Nicore proposal can't exceed.*

Response: The baseline is that water quality currently supports beneficial uses, which is the standard against which sediment delivery would be measured and monitored. There is no requirement to establish a baseline for turbidity.

Comment: *The SDEIS does not disclose how it came to conclude that the risk of serious hazardous fluid spill is low.*

Response: Observations of various operations over time led to this conclusion.

Comment: The physical science report excuses this violation of the Clean Water Act [sediment from stream crossings] by stating that the majority of the proposed crossing sites have been used in the past and the disturbance has already occurred. While primarily two of the stream crossings have been bladed with a bulldozer under the guise of erosion control, the other crossings (except for Alberg Creek) have not been disturbed for many years. The last time the approaches to crossing 5 were bulldozed, fine sediment coated the substrate below the crossing, remaining in the creek until winter high flow flushed it out.

Response: The physical science report discloses that sediment is likely to be delivered as a result of road construction and use.

Comment: The Forest Service and BLM have not gathered site specific information nor conducted studies to understand the hydrological processes that are key components to the ecological/botanical, scenic/aesthetic, recreation/quality of life values and water quality. The SDEIS's characterization of the hydrological regime of the Rough and Ready Creek watershed is, in fact, piecemeal, not based on site specific analysis and may be inaccurate or at least inadequate to provide the basis for the analysis of impacts.

Comment: The Watershed Analysis characterizes most parts of the Josephine ophiolite as having shallow, rocky soils with little capacity for water storage, leaving less water for the summer low flow season. However, this representation of geology and its effects on the hydrological regime of the Rough and Ready Creek area may not be completely accurate. The Forest Service must map and study the springs, fens and shallow wells of Rough and Ready Creek and address the essential processes of infiltration and recharge of the Rough and Ready Creek aquifer.

Response: Forest Service specialists use a combination of survey data, field observations, air photo interpretation and professional judgements to provide the analysis in the SDEIS. The analysis is thought to be adequate given the scope and scale of the operation and potential impacts.

Comment: Literature on hydrological regimes in general notes that recharge of groundwater sources is never uniformly distributed, but occurs in areas that are favorable for infiltration. Where are those areas in the Rough and Ready Creek watershed, and where are they in relationship to the proposed mine sites, haul routes, and stockpile and ore processing sites?

Response: The extensive mine sampling that has occurred within the watershed previously does not appear to have measurably altered hydrological conditions. Given the scale and scope of the operation, the type of analysis suggested here is not necessary to understand effects of the alternatives. Potential risks associated with hazardous substances leaking into the groundwater is discussed in the EIS.

Comment: Along with the geology and topography of the peneplains, there is another indication that the Rough and Ready laterite deposits may be important recharge areas. Similar to the ore body at Eight Dollar Mountain, the laterite soils at the proposed mine site B are also saturated as indicated by the March 16, 1992 Nicore mining plan of operations. The Nicore plan states that, "[d]uring the wet months, the laterite deposits such as the one that is the subject of this plan of operations, become "red bogs" - a condition that probably occurs at all of Nicore's proposed mine sites. One possibility is that the deep undisturbed laterite soils of the Rough and Ready Creek watershed, covered with their native vegetation, act as a sponge promoting infiltration to the boundary at the base of the laterite deposit and from there to fractures and shear zones in the bed rock to be stored and emerge as springs or otherwise contribute to the aquifer. Because alterations in ground surface less severe than strip mining can reduce infiltration and thereby causing a reduction of groundwater recharge, the impacts of the proposed Nicore mine may have irreversible long term impacts on the water resources of Rough and Ready Creek and its surrounding area.

Response: The maximum number of acres proposed for treatment is 35, roughly 6% of the 512 known acres of nickel-bearing laterite in the watershed. These 35 acres sit within a 23,000 acre watershed. Given this scope and scale, effects on water infiltration and storage are unlikely to have "irreversible long term impacts" to water resources. Infiltration can be expected to occur within the pits.

Comment: The SDEIS does not address the indirect effects of roads on sensitive species and biological diversity. Roads act as interceptors of surface and subsurface water that would normally flow down slope and in part infiltrate into soils. Road 445 for example is now a foot or more below the land surface. The condition has worsened significantly in the last 12 years despite the mining claimant's "erosion control." The road now acts as a stream channel diverting natural drainage patterns. Change in drainage patterns and infiltration could affect sensitive species or species diversity in the Rough and Ready Creek corridor. Some plant species, while they may not be obligate hydrophytes, are still dependent on being able to send their roots down to the water table or to the capillary fringe overlying the water table and in order to obtain a perennial and secure supply of water. These plants are known as phreatophytes. For instance, plants growing on Rough and Ready Creek's floodplain may be tapping into the shallow water table. The development of the haul route may change natural drainage patterns and impact plant communities and microhabitats. Port Orford cedar and western azalea may fit into this category.

Response: Continued use and development of roads in the area may affect local drainage patterns and individual plants or habitat. This is discussed in the EIS in Chapter Four.

Comment: A characteristic of Rough and Ready Creek's outstanding geology is the fractured bedrock which provides for the numerous springs and seeps along its banks which maintain summer flow and form sensitive plant wetlands. The SDEIS has not adequately addressed the impacts of the proposed Nicore mine on this feature.

Response: The mining proposal would remove some of the ‘geologic’ material in Rough and Ready Creek but the fractured bedrock that provides for springs and seeps is not likely to be affected. Effects from the operation on physical features and rare plants are discussed in the EIS.

Comment: Why hasn't the need for permitting through the Army Corps of Engineers been discussed in relation to filling or altering wetlands in the project area? Must permits be obtained from the Corps before the project is approved?

Response: The miner is responsible for obtaining any needed permits. The permits that are most likely to be required are listed in Chapter Two. The Forest Service and BLM are not responsible to identify all necessary permits required by other agencies.

Comment: Has the miner provided evidence of a Water Use permit from the State of Oregon authorizing the use of sufficient water at appropriate times of the year?

Response: A water use permit would be required prior to removal of water from Rough and Ready Creek.

Comment: How will removal of vegetation and road development in riparian areas affect water temperature in Rough and Ready Creek and its tributaries? How will the potential introduction of POC root disease and removal of POC trees in riparian areas affect water temperatures?

Response: This is discussed in the SDEIS and FEIS. Proposed road development within riparian areas is not likely to result in increased water temperatures, but fords proposed in the Plan of Operations (Proposed Action) may result in water ponding and a trend toward temperature increases. Areas where Port-Orford-cedar is providing substantial shade are disclosed in the POC discussion in Chapter Three. Local water temperature increases could occur if trees in this area became infested with root disease.

Comment: On page 62, there is a misleading and erroneous statement “Each CFS is equivalent to 646,272 gallons of water.” A CFS is actually a rate of flow, not a volume. On page 35, “Implementation of the Proposed Action could lead to the withdrawal of between 0.35 and 1.56 CFS of water each day.” This does not make sense, since cfs is not a measure of volume.

Response: The FEIS has been corrected and the estimated volume of water needed for each alternative is displayed in gallons.

Comment: On page 35, it is stated that, “Temperature increases are not expected to be measurable”. I strongly disagree. Streamflows are directly proportional to temperature increases, all else being equal. And as your flow estimates make clear, when viewed in conjunction with the data that are shown on page 47 (existing flow rates as low as 3.6 CFS), the amount of water withdrawn for dust control is almost half the streamflow. And it would be more than half at certain times of the year and in certain locations.

Response: Water withdrawal estimates have been corrected between the SDEIS and the FEIS, and have dramatically decreased. Measurable temperature increases based on water withdrawal for dust abatement are not expected.

Comment: Page 87 makes reference to "The presence of asbestos in the project area may not be linked with health concerns related to other asbestos minerals." However, I have received information from an agency of the Superfund Legislation which would question this. According to reports, asbestos is found at dangerous levels in virtually all the samples of serpentine. Many miles of roads which were surfaced with crushed serpentine rock in northern California had to be paved over with asphalt by the EPA in order to stop the dangerous levels of asbestos which was finding its way into homes adjacent to these roads. Most disturbing, according to these reports, it is the high levels of a type of asbestos known as tremolite. Tremolite, associated with serpentine rock, tends to stay trapped in the lungs for life and is considerably more potent than chrysotile in the development of mesothelioma (a fatal form of cancer affecting the lungs).

Response: The presence of asbestiform tremolite (linked to health concerns) in the analysis area has not been specifically field researched, but previous mineral sampling has not revealed the presence of this mineral. Phone conversations with geologic researchers familiar with the area (Dr.'s Gregory Harper and David O'Hanley) revealed that the likelihood of this mineral being present is low, but is greater than zero. The risk of exposure to tremolite that might become airborne would be related to (1) a source of the mineral and (2) the frequency of interaction with airborne particles of tremolite. Road surfacing and dust abatement would limit exposure to any airborne particles.

Comment: The nearest domestic water source is only about 0.25 miles below mine Site B, not 2 miles as stated in the SDEIS. The water that feeds several domestic water sources originate at or near mine site B and people have been drinking this water untreated with no ill effects for many years. Those water sources have been granted water right certificates by the state and those rights are not allowed to be injured.

Response: Background water chemistry tests on several springs were conducted in the Fall of 1998. These sites would be monitored under an approved Plan of Operations. The nickel dissolved in the domestic water sources exceeds state standards, and is a condition inherent to rocks that are in contact with the water. The amount of nickel currently in the water is not associated with any health risks. The mining operation will not be allowed to result in any increase in nickel concentrations, nor is it expected to be adversely affected in any other way.

Comment: We reviewed the USGS report referenced in the SDEIS which reported on the analysis of water samples collected in the Rough and Ready Creek Watershed. The report states that no precipitation occurred during the time that samples were collected. However, our records show that more than 0.8 inches of rain fell during the two day sampling period. What effect does this unreported rainfall have on the report's conclusions? Why was this information omitted from the report?

Response: The lack of precipitation is a quote from page 2 of Miller, 1998. Even if rainfall did occur, it would not likely result in enough of an increase in Rough and Ready Creek stream flows to have affected his reported results.

***Comment:** The Water Quality - Sediment report assumes that crushed rock will be used on the road surfaces, however the SDEIS states that native peridotite rock will not be crushed. So is foreign rock going to be introduced into the watershed? This discrepancy needs to be resolved.*

Response: The FEIS resolves this discrepancy. There was a recommendation in a USGS report (Miller 1998) to avoid use of peridotite material in road surfacing, however, the report also stated that even if peridotite was used, adverse effects would not be significant. Given the potential effects on using "foreign" rock, peridotite is a better option and would be used in road development.

***Comment:** There are 3,390 round trips identified annually (page 16). This includes only the haul trucks; how many round trips will the support vehicles make annually? The table on page 83 and 85 should show all vehicle trips (not just haul trucks) for all alternatives.*

Response: For the Proposed Action and Alternatives 6, 7, 8, 10 and 11, support vehicles are estimated to add 10 to 20 percent more traffic during the activity period. This information is now included in the EIS.

***Comment:** According to the SDEIS, page 48, nickel concentration in the water is elevated. What is the standard concentration of nickel found in the water samples and what is the EPA safe drinking water standard? How much and how fast will nickel concentration increase in our drinking water?*

Response: The existing condition is 11-33 parts per billion (ppb) in the surface waters of Rough and Ready, according to Miller, 1998. Results from sampled springs indicate values of 30-40 ppb. The EPA does not have a national primary nor secondary drinking water regulation for Nickel, but these values do exceed the State of Oregon ambient water standards. These concentrations are not associated with short or long term health risks (Kauffman, 1999). The rate of nickel concentration change in Rough and Ready Creek following any action alternative will be monitored, but is not expected to be measurable.

***Comment:** The proposed water application rate for road dust control conflicts with the POC root disease measures.*

Response: The mitigation measures, including dust abatement, do not conflict with the disease control strategy.

Comment: The key to understanding cumulative effects is finding the right set of resources to analysis. In "Cumulative Effects of Forest Practices in Oregon," Robert Beschta, et al. (1995) identified several conditions that area required for accurate analysis of cumulative watershed effects, including: 1) accurate understandings of natural variation in environment; 2) reliable baseline information at the local and regional scale; 3) accurate assessments of the probable effects on key resources of past, present and future activities; 4) development of reliable models that relate resource conditions within a dynamic spatial framework; and 5) establishment of levels of acceptable change in the environment.

Response: Dr Beschta's recommendations were followed in the EIS analysis:

1) Watershed analysis and other previous work, along with current observations of the existing condition provide the basis for understanding natural variation. 2) Baseline information has been collected in the form of level 2 fish surveys, water temperature readings, Miller's 1998 geochemistry study, and limited alkalinity and turbidity data collected by Rilling and Ullian. 3) The assessment of the alternatives is believed to be accurate and thorough. 4) Bedload transport was modeled. 5) The levels of acceptable change are included in state regulations governing water quality.

Comment: The SDEIS did not address my Quality of Life concerns in any acceptable manner. The only attention paid to the water quality issue is the testing of three springs, at best this is only a beginning in addressing water quality. To my knowledge, no substantive studies have been done on mineral contents and how it will affect the neighbor's water quality.

Comment: Water quality is fully addressed in the EIS. A geochemical study of the surface waters of Rough and Ready Creek was performed by Miller, 1998 of the US Geological Survey. Three springs were also sampled to provide baselines for monitoring. Exhaustive testing was done on the water to determine mineral contents. The results were within expected ranges for waters in contact with ultramafic rock. In general, water quality is excellent. Nickel concentrations are greater than the ambient water standards established by the Oregon DEQ, however, they are not great enough to be associated with any human health risks (Kauffman, 1999). No measurable increases in any metals is expected from the project (see FEIS analysis).

Comment: EISs must include the exact width of roads at various segments and how much they would be widened, where rocks and template would come from and how that could be crushed into fine sediment of asbestos.

Response: The analysis comparing the alternatives used an average 12 foot road width to estimate impacts. The source of rock for road surfacing will be from a local peridotite rock pit located within the watershed (see engineering report). The threat of asbestiform tremolite in associated serpentinite exists, but is thought to be a low risk to human health (see previous responses to questions about asbestos).

Comment: Who is Miller, 1998, who basically says "The mining of the laterite should present no problem to the chemical quality of the waters within the watershed? I am interested in Miller's background as far as historic facilitation to assist extractive industries.

Response: Dr. Miller is a geochemist with the US Geological Survey. His history regarding ‘extractive industries’ is not known to the US Forest Service, nor is it relevant, since he used accepted scientific techniques in his published analysis.

Comment: There is a range of estimates in various documents as to how much mining of nickel-laterites could be reasonably foreseen to occur in the Rough and Ready watershed and vicinity. The Physical Sciences Report by McHugh says that 93% of the watershed has serpentine/peridotite soils. Yet the SDEIS says that 512 acres is the maximum feasible to mine. On the top of page 6 of the Rough and Ready Creek Eligibility Study it says, “At least 14 deposits of ancient lateritic soil containing iron and nickel are known to occur in the Rough and Ready Watershed. These cover about 3,000 acres.”

Response: These statements are not contradictory. The laterite soils are a sub-set of the total range of serpentine/peridotite soils. The laterites are located in patches scattered throughout the watershed. About 512 acres of laterites similar to those proposed for mining under the Plan of Operations were mapped by Ramp, and provide a reasonable basis for cumulative effects analysis. This was confirmed by the miner, who stated that “it would be possible to mine up to an additional 400 acres within the next 50 years, depending on the market...This additional acreage would likely be in the vicinity of the 35 acres proposed for mining at this time.” (See Nolan 10-97 memo) Ramp also mapped other areas (including the Rough and Ready alluvial fan) that may have lower concentrations of nickel and are far less likely to be mined in the foreseeable future.

Comment: Is there evidence that the pits drain adequately, or does this reclamation plan create ponds?

Response: The pits would be designed to drain, rather than create ponds. During periods of heavy precipitation, infiltration may be slower than the rate of accumulation, and water is likely to fill a portion of the pit. To mitigate for this risk, an engineer would be required to consider including an armored outflow and/or drainage structure at the bottom of the pit. Any design would be subject to approval by the Forest Service.

Comment: The SDEIS states that road development and use, pit development, and ore storage would disturb ultramafic soils and lead to a loss of productivity. The implication is that the soil is productive and that the loss of productivity would be significant. Due to the high mineral content of the ore in the mining area, the soil’s productivity is quite low and the level of reduction applied to such risk is practically meaningless.

Response: The EIS and incorporated documents (specifically, the West Fork Watershed Analysis) discuss the differences between ultramafic areas and other parent materials. Site productivity in terms of total biomass production is lower within the proposed mine sites, than non-serpentine sites. However, serpentine sites that have been disturbed are less productive than nondisturbed serpentine sites. This effect is apparent from the extensive sampling that has occurred; the disturbed areas has less vegetation and plants tend to be smaller. The EIS also discloses that the extent of this loss of productivity is relatively small, given the acres proposed for mining compared to total acres in the watershed.

Comment: A second paragraph refers to nine smaller tributary crossings. The SDEIS allows a false impression to be drawn...by failing to mention that all but two of these crossings are dry during the summer months. The tributaries will not be functioning as tributaries during the time when crossings will occur.

Response: The nine tributary crossings are associated with the Proposed Action. Most of these crossings are on Alberg and No Name Creeks, or on side channels of Rough and Ready Creek. All are mapped as perennial streams. Even if they are seasonally dry, they are part of the stream systems and are subject to Riparian Reserve Standards and Guidelines.

Comment: The SDEIS states that the use of water would lead to lower flows and higher temperatures. This statement is misleading because summer flows are already low. That fact would not be altered whether or not the project is developed.

Response: Stream temperature and flow are directly proportional (Brown, 1972). The EIS states that high water temperature are inherent to the area and that temperature increases (from water withdrawal) are not likely to be measurable. Because Rough and Ready Creek is water quality limited for high temperature, even a small increase would not meet state standards.

Comment: The SDEIS fails to identify what "other hazardous substances" are. Consequently, there is no way to know what this risk really is and whether the consequence of such a spill is significant.

Response: Page 63 of the SDEIS identifies hydraulic fluids, gas and diesel as the most likely hazardous substances associated with this proposed operation. The EIS discloses that the significance of such a spill is related to many factors. Even a small spill could affect aquatic organisms, and because at least one family drinks water directly from the creek, a spill could affect human health. The EIS also states that groundwater may become contaminated, but the likelihood that downstream wells may be affected is very low, given the underground filtering that would occur between a spill site and residents.

Comment: Since the proposed pits are small, their six-foot deep depressions are unlikely to destabilize large amounts of slope. Thus, proper mitigation should not be difficult to provide as a project feature.

Response: Mine Site D is the only site where stability issues are anticipated. Mitigation discussed in Chapter Two requires the miner to complete a stability analysis and a final design to ensure slope stability at Mine Site D, if that site is to be mined. Some alternatives avoid mine site D entirely.

Comment: *Affected Environment - There is no discussion of rainfall or other forms of precipitation. In order to determine whether there might be a discharge from the mine pits (which would require an NPDES permit if the discharge was to affect the water of the U.S.), net precipitation should be determined for both average and extreme wet years (reasonable worst case over the life of the project).*

Response: The West Fork Watershed Analysis is incorporated into this EIS. It includes a discussion of precipitation. Average annual precipitation in the area is 65 inches. The pits would be drained as a part of the reclamation plan (see EIS Chapter Two for details). Some permits may be required.

Comment: *Environmental Consequences - It is stated on p. 57 that the holding capacity of the pits could be exceeded. In addition to determining possible extreme precipitation events, consideration should be given to using such events for design purposes in sizing pits to contain storm water rather than allowing a discharge (assuming no or limited infiltration).*

Response: The reclamation plan includes provisions for an engineered drainage design to mitigate for the risk of their holding capacity being exceeded. The pits are likely to contain water some of the time, especially during times of heavy precipitation.

Comment: *The SDEIS points out that Rough and Ready Creek exceeds State Water Quality standards for temperature during the summer when the flow is low. For completeness, expand on this point in the FEIS. Explain that not only does it exceed the water quality standard for temperature but that it has been legally listed as impaired under Section 303 (d) of the Clean Water Act. This listing sets into motion legal requirements for Oregon to take actions, such as the development of total maximum daily loads that will bring the Rough and Ready Creek back into compliance to the standard.*

Response: Discussions in the FEIS include this information.

FISH AND WILDLIFE

Comment: *The fact that lower Rough and Ready Creek is marginal, as opposed to optimum, for fish habitat is a stronger reason for opposing this project, since associated activities would more likely result in extirpation of resident populations.*

Response: Mining and associated activities are not likely to result in extirpation of resident fish populations. Seasonally high water temperature is the primary limiting factor for fish; temperatures would not be measurably increased in any alternative, and the trend towards increase can be avoided in some alternatives (see EIS discussions for more information).

Comment: *Habitat access may also be decreased by water withdrawal if flows are below that necessary for fish passage. This is not considered in the PETS fish or Aquatic Conservation Strategy/Riparian Reserve discussions.*

Response: Water withdrawal could have a seasonal influence on fish passage, however withdrawals discussed in the FEIS are small (2% of the low flow) and are not likely to affect fish passage.

Comment: The way the Aquatic Conservation Strategy is addressed in a comparative fashion does not provide information about whether any alternatives in fact meet the strategy. An alternative may "better meet the strategy" than another alternative, but none meet it completely.

Response: No alternative, including the "No Action", can completely meet all Aquatic Conservation Strategy Objectives (1-9). However, No Action and Alternative 9 best meet the objectives, and the Proposed Action clearly would not meet the intent of the strategy.

Comment: Road construction will certainly affect the variability of floodplain inundation.

Response: Road development associated with the Proposed Action could affect floodplain inundation. The other alternatives are less likely to affect floodplain inundation since they avoid high risk areas.

Comment: The EIS must give the Riparian Reserve Standards and Guidelines which the analysis responds to. The EIS must also state which alternatives, if any, actually meet them. It is not adequate to assess what alternatives best meet the standards without stating whether they actually meet them.

Response: The Riparian Reserve Standards and Guidelines have been added in the FEIS.

Comment: Both humans and wildlife are very sensitive to sound, especially at certain pitches. Industrial noise pollution has been proven to cause serious adverse reactions with many animal species. Birds are especially sensitive. They will not reproduce under these conditions; they will most likely permanently leave their native habitat in the Rough and Ready Watershed.

Response: Industrial noise pollution associated with NICORE could result in adverse reactions by some animal species adjacent to the activity. These effects would not likely lead to significant impacts on any animal populations, given the scale of the proposed operations.

Comment: The SDEIS states that habitat for the foothill yellow-legged frog, *Rana boylii*, exists within the analysis area, but that no significant effects on the species are expected. The SDEIS does not provide any basis for this conclusion. The Forest Service has provided no information on the status of the yellow-legged frogs in the watershed. There is no discussion on what impacts the Nicore project may have on the frogs. The SDEIS discusses many adverse effects to water quality and aquatic habitat. Since frogs are much more sensitive to environmental pollution than fish, how can the SDEIS conclude that no significant effects on this species are expected? As the Forest Service has not conducted surveys for the yellow-legged frog in the watershed, and offers no analysis of their status, habitat, and populations in relation to the mining proposal, haul route, water withdrawal sites, etc., the analysis does not meet the intent of NEPA.

Response: The EIS describes many activities that could have direct impacts on individual yellow-legged frogs. These include development of stream crossings and disturbance of areas within the Riparian Reserves. The Proposed Action would have the most widespread effects, Alternative 9 and No Action would have the fewest effects. Significant effects are not likely in any alternative, given the scale of the operation in relationship to the amount of habitat in the area.³ Surveys are not necessary to support this conclusion.

Comment: The discussion and analysis of impacts to fish and other aquatic animals is inadequate. Apparently the Forest Service believe that they only have to assess impacts to fish habitat.

Response: The discussion and analysis of potential impacts to fish and other aquatic animals is based on information gathered from Level II stream surveys and field observations. Forest Service specialists use a combination of survey data, field observations, air photo interpretation and professional judgements to provide the analysis in the SDEIS. The analysis is adequate given the scope and scale of the operation and potential impacts.

Comment: Without discussion, the SDEIS dismisses any significant impact to the hundreds of vertebrate and thousands of invertebrate species that occur with the Nicore analysis area. Won't reptiles and amphibians (including rare ones) be at increased risk of being run over by trucks?

Response: Some reptiles, amphibians, birds and mammals may be displaced from mining activity sites and water crossings. Increased vehicle traffic would likely result in increased mortality in some animals. However, the predicted impacts to individuals and groups of individuals are not likely to reduce overall populations.

Comment: The statement on page 67 that "no critical habitat of salmonids would be adversely affected by this project" is contradicted by the matrix on page 66.

Response: Since the SDEIS was released the National Marine Fisheries Service has declared that all federal lands identified as Riparian Reserves adjacent to coho bearing waters as Critical Habitat. This finding is included in the FEIS.

Comment: The SDEIS states that unless there are hazardous material spills and high magnitude landslides, the water quality would be expected to remain within the range that currently supports biological and chemical integrity to support aquatic and riparian species. There is no support or evidence for the Forest Service even knowing the existing condition or the range that currently supports biological and chemical integrity, let alone evidence that this will be maintained.

³Significant effects to the existing yellow-legged frog populations within the Nicore planning area are defined as measurable effects that would likely lead to a reduction in overall population size or species distribution within the area.

Comment: The SDEIS states that water quality would be expected to remain within the range that currently supports biological, physical and chemical integrity to support aquatic and riparian species. First, the Forest Service has established no baseline to determine the range, has done no studies on the adaptation of aquatic species in streams flowing through ultramafic watersheds, and appears to know little about the aquatic species that inhabit Rough and Ready Creek.

Response: The existing water quality is evidenced by the USFS Level II Stream Surveys, site-specific USGS Baseline-Geochemical Studies, USFS Water Temperature Studies, and field observations. The Aquatic Conservation Strategy discussions and findings are based on the known (surveyed) condition; the potential risk of the operation, given its scale and scope; and professional judgements.

Comment: The Forest Service and other agencies in their emphasis on fish production numbers ignore Rough and Ready Creek's value to maintaining aquatic bio-diversity. Rough and Ready Creek's steelhead and cutthroat trout have adapted to survive in an environment much harsher than those that inhabit streams which flow through a more typical geology. Fish production numbers are not the only criteria that must be considered in determining the importance of Rough and Ready Creek's fishery and the impacts of the Nicore mine.

Response: The National Marine Fisheries Service recently determined that Klamath Mountains Steelhead Trout are genetically similar over the entire Ecologically Significant Unit (ESU). Rough and Ready Creek populations are included in the ESU. The potential impacts of the Nicore project are discussed throughout the EIS, not just in relationship to "fish production numbers."

Comment: The SDEIS discloses that bench road construction may deliver between 50 and 100 cubic yards of coarse and fine sediment is likely to enter Rough and Ready Creek. It then excuses the...sediment...by stating the fact that Rough and Ready Creek is capable of transporting this material through the system at high flows. However, [a pool below the construction area] is occupied by juvenile steelhead and other aquatic species during the summer months.

Response: The construction of the bench road may deliver coarse and fine sediment to aquatic habitat directly adjacent to the road. Winter high flows can be expected to transport some of this material through the system. Direct impacts to aquatic organisms, including fish, would likely occur during the construction phase. The overall quality and quantity of pool habitat, adjacent to this construction, may be reduced in terms of carrying capacity during the low flow period prior to the first winter transport period.

Comment: Have any surveys been conducted within the analysis area for PETS fish species and if so, why wasn't specific data included in the SDEIS? What are the estimated numbers of juvenile and spawning fish present in Rough and Ready Creek and its tributaries, and what estimated percentage would the proposed project or its alternatives reduce these numbers?

Response: Forest Service, Region 6 Level II Stream Surveys were conducted in 1991 and again in 1994. Specific survey data is part of the analysis files and was published for the West Fork Watershed Analysis, which is incorporated by reference into this EIS. The survey data is summarized in Chapter Three of the EIS. Juvenile numbers are low relative to other survey areas on the Siskiyou National Forest. Spawning surveys have not been conducted by Oregon Department of Fish and Wildlife. A couple of juvenile coho salmon were observed last year in the early spring in the vicinity of Seats Dam. The potential reduction in population was not estimated for the project, rather, the trend toward maintenance of degradation of habitat was disclosed. It is not possible to estimate actual losses in terms of numbers of fish.

***Comment:** Specific data and the results of any National Marine Fisheries Service consultation and informal conferencing must be included in the Final EIS to facilitate informed decision-making.*

Response: The National Marine Fisheries Service has requested the Forest Service consult on the Preferred Alternative and not on the entire range of alternatives identified in the EIS. The Preferred Alternative in the FEIS (Alternative 9) would not affect any listed fish, so consultation is not required.

***Comment:** The cursory treatment of other wildlife species in the SDEIS is absolutely inadequate. An extensive industrial mining project like the Nicore project with its potential for opening up the area to future development and consumptive industrial uses will certainly affect the habitat and movement of other PETS and Survey and Manage species.*

Response: Hundreds of vertebrate and thousands of invertebrate species may occur within the Nicore analysis Area (see West Fork of the Illinois River Watershed Analysis 1.0). Some habitat alteration and impacts to individuals would likely occur from any full scale mining alternative. The cumulative effects of continued mining would impact greater numbers of animals.

***Comment:** Based on what survey data, studies or other information is the conclusion drawn that there will be no impact to the del Norte salamander?*

Response: No del Norte salamander habitat has been identified at the proposed mining sites.

***Comment:** What is the basis for concluding that "no wildlife species would be extirpated or otherwise significantly affected by the project"? How can this conclusion be drawn before consultation with the US Fish and Wildlife Service?*

Response: This conclusion is based on professional judgement (working knowledge of species/habitats and the proposed actions). There are no Listed or Proposed wildlife species affected by the proposed actions. Consultation with the Fish and Wildlife Service is not required.

Comment: The analysis of cumulative watershed effects is extremely poor. The SDEIS lamely concludes that “the effects of past activities on fish are unknown...the conditions for fish prior to construction of the diversions is unknown.” NEPA requires the agency to provide a detailed analysis of the environmental impacts. The Forest Service may not plead ignorance in this matter.

Response: The effects analysis includes existing information from USFS, BLM, ODFW and USFW. No historical data for Rough and Ready Creek information on fish populations, prior to the construction of diversions, is available.

Comment: The SDEIS states that “the Proposed Action may adversely affect fish and their habitat by blocking fish passage at mainstream and South Fork crossings and degrading other habitat features.” However, no explanation is given of what other habitat features might be degraded and how. During the summer months when the Proposed Action utilizes these crossings, the interference with fish passage is nonexistent. Because the lower portion of Rough and Ready Creek goes dry in the summer months, there will be no impact to fish passage.

Response: The lower portion of Rough and Ready Creek, in the vicinity of the crossings, does not go dry every year. The other habitat features are listed in the Matrix of Factors and Indicators. The Proposed Action may degrade many of these features.

POR T ORFORD CEDAR

Comment: Modification of stream beds and streamflows by filling necessary for equipment crossing, and disruption of subterranean water movement by excavations for roads and mining pits may in some situations disrupt the perched water tables and the consistent water levels that I believe are required for maintaining some stands of POC. unlikely, bridges & culverts in some alternatives. Your document needs to consider the indirect consequences of the loss of POC, which will produce even more change in several resources that you consider separately as items of concern. The document partially makes this point in item 8, page 77, but it needs to be made more completely and widely. These impacts are:

1. POC probably affects the soil chemistry and shade sufficiently that its loss may produce changes in the vegetation composition, increasing likelihood of entry of weeds.
2. POC produces much of the shade for streams, and most of the rot-resistant large wood for habitat.
3. POC produces calcium rich litter in a landscape where Ca deficiency may be a major cause of plant exclusion and poor growth.
4. POC is highly valued for aesthetics.
5. POC provides habitat for martens.

Response: These benefits are discussed in the FEIS. High quality habitat for marten does not exist in the analysis area, nor have marten sightings been documented within the area.

Comment: Your statement on page 41 that the preferred alternative has no more risk of fungal entry than no action seems incorrect to me. Even the exploratory ore removal that your preferred alternative allows carries with it substantial risk, associated with movement of equipment to and from the mining sites. All measures necessary for full scale mining should be applied to Alt. 9.

Response: Currently, the area is open and used by the public without regard to Port-Orford-cedar (see the EIS for a description of the access in the area; some roads are not currently passable with a passenger vehicle, but can be accessed with motor bikes, pack stock, or hiking). The FEIS contains a POC Root Disease Containment Strategy for the Preferred Alternative. This strategy does not include some measures that would apply to other alternatives, because Alternative 9 does not allow traffic on the roads (except for limited use of Road 461 for equipment transport - vehicle washing would be required for the few trips allowed on this road).

Comment: Many of the measures that you list for reducing risk are appropriate for any operation around POC, but the efficacy of these measures remains largely unproven. These measures should be required and enforced rigorously, but the measures are no guarantee of excluding the disease. Decisions should be and based on losses if the disease is introduced, not on the assumption that it will not be introduced.

Response: Agreed. The EIS acknowledges these facts.

Comment: Operating periods should be determined by current road conditions-if there is any mud, then operations should stop, no exceptions. No operations should be considered between September 15 and June 15.

Response: June 1 thru Sept. 30 is considered the dry season. The Disease Containment Strategy recognizes wet weather can occur during these months. The vehicles equipment permitted in the project area will have been washed. Since there are no known infestations within the area, any mud sufficient to adhere to tires is unlikely to be carrying spores. Further restrictions on operating season are part of full scale mining alternatives, given other resource concerns.

Comment: On pages 16 and 23, using rock free of root rot and weed seeds is discussed, but how will such rock be produced? Steam sterilization is the only method I can think of to assure that.

Response: Rock sources that are root rot and noxious weed free would be required. Some sources are available within the analysis area.

Comment: On page 23, use of water for dust abatement is discussed. How will such water be determined to be disease-free?

Response: The water must come from a source that is considered free of the disease (such as Rough and Ready Creek).

Comment: One aspect of root rot exclusion that was not considered is control of drainage from roads, which should be directed as far as possible from POC populations.

Response: Page 16 of the SDEIS discusses this issue. Site "B" includes insloping and ditching to control water flow away from POC. The FEIS discusses the affects of outsloping the roads.

Comment: All restrictions [related to root disease] should be applied to all operations, not just mining. Site restoration should include planting of POC, using root resistant stock if it becomes available.

Response: The No Action alternative is the only alternative where all restrictions will not be applied. The area disturbed at the mine sites do not have POC growing on them. Road restoration may include treeplanting with Port-Orford-cedar.

Comment: I question two statements on page 50. POC probably does not grow on dry sites within the study area, is there evidence to the contrary? And I wonder how a calculation was done that found only 7% of the range of POC affected by root rot - that seems like a highly understated figure.

Response: Reference to dry site POC has been omitted from the EIS. The 7 percent figure came from a comparison of total acreage of federal lands with POC (cited in a 1994 letter to Region 5 and 6 Regional Foresters) and monitoring data published annually.

Comment: One more comment about POC sanitation. Get rid of that misleading word. You are not removing anything that is disease, but killing the resource that you are claiming to protect. While in some circumstances it may be an effective tool, when applied in excess it destroys what you are trying to save.

Response: Silviculture texts define sanitation as "the elimination of trees that have been attacked or appear in imminent danger of attack by insects or pathogens in order to prevent these agents from spreading to other trees" (Smith 1962, Daniel et al. 1979). Such a treatment would be applied only where necessary, and is not included in the Preferred Alternative.

Comment: I believe the risk and consequences of POC root disease introduction are greater than your document indicates. Based on consideration of POC alone, I believe that there is a good case for excluding all mining. Even your preferred alternative poses risks far beyond those justifiable for a money-losing mining operation.

Response: This comment will be considered in the final decision with rationale discussed in the Record of Decision.

Comment: The SDEIS states that all action alternatives include a Root Disease Containment Strategy but does not address the effectiveness of these measures or which ones will be implemented.

Comment: The SDEIS merely lists mitigation measures for POC but fails to analyze the measures in detail and explain their effectiveness. The SDEIS relies on mitigation measures whose efficacy is unknown and whose effectiveness experts have questioned.

Response: Effectiveness of POC disease management techniques has been documented in the annual Siskiyou POC Monitoring reports. Results from these reports has been used to draft a Range Wide Study Assessment (due to be published in June 1999). The FEIS includes a specific POC Root Disease Containment Strategy for the Preferred Alternative.

Comment: *The SDEIS states that Clorox may be used to control root disease but provides no discussion regarding the effectiveness of using Clorox, the environmental impacts of Clorox, or at what concentrations the chemical will be used.*

Response: Clorox is recognized as a potential part of the Disease Containment Strategy. Test on efficacy have shown that mortality of zoospores occur at concentrations of 1gal/1000 gals water. As of August 4, 1998 Clorox is a registered pesticide in Oregon for control of P.lateralis. Clorox would not be used if washing is done with a clean water source.

Comment: *The SDEIS lists vehicle and equipment washing as a mitigation measure, but does not identify the water source, calculate the amount of water required, or disclose the impacts of water withdrawal.*

Response: This issue is addressed in the POC Root Disease Containment Strategy for the Preferred Alternative (Appendix J). Vehicle and equipment washing for the Preferred Alternative would occur at a commercial wash site off federal lands. No impacts to federal lands are expected. If a full scale mining alternative were selected, disease free water would be required and any water source would be subject to Agency approval.

Comment: *The loss of Port-Orford-cedar from serpentine streams is an irreversible and irretrievable commitment of resources. Without taking the required hard look at the values of Port-Orford-cedar and the irreversible and irretrievable commitment of resources that its loss from sensitive habitats constitutes, the FS is not meeting the intent of NEPA. Please incorporate work from the Six Rivers National Forest, the West Fork Watershed Analysis and other documents from the Siskiyou National Forest to develop an understanding of POC.*

Response: This analysis incorporates information from the West Fork Illinois Watershed Analysis and monitoring results. Wholesale loss of Port-Orford-cedar from serpentine streams is not an outcome predicted in this EIS. Even if root disease were introduced into the watershed, the effects would not be expected to constitute an irreversible or irretrievable commitment of resources.

Comment: *The SDEIS states that the mitigation for unauthorized vehicle traffic to the north side of Rough and Ready Creek would be eliminated by gating the access roads, but provides no supporting evidence that gates will eliminate unauthorized traffic.*

Response: Gate closures have been both effective and ineffective. Placement and strength of gates are important factors in temporary or seasonal road closures. Monitoring and enforcement are other important factors.

Comment: Port-Orford-cedar found along the mainstem of Rough and Ready Creek and the Forks is often associated with springs and seeps and their diverse plant communities which often harbor rare and sensitive species. If the cedar is lost to the root disease, will these habitats persist? The SDEIS does not make the connection between Rough and Ready's outstandingly remarkable botanical streamside habitat values and the benefits of large and/or firmly rooted Port-Orford-cedar.

Response: These issues are addressed in the EIS. Effects would be greatest in particular locations that are avoided in many of the alternatives.

Comment: It is stated on page 23 that equipment could be cleaned, perhaps with Clorox to help prevent spread of POC Root Disease. This is unacceptable--who will oversee this equipment washing? Are we to expect that the Forest Service will keep an inspector at the beginning of the road to inspect each vehicle to make sure that it passes muster?

Response: Compliance with Plan of Operations stipulations, including equipment and vehicle washing, would be required, and the miner would be responsible to fulfill any requirements. Periodic inspections would occur to ensure compliance with mitigation measures. The miner could be shut down if requirements were not met.

Comment: The proposed water application rate for road dust control conflicts with the POC root disease measures.

Response: Watering the road for dust abatement is not considered a conflict. Roads will not be muddied through the dust abatement.

Comment: The SDEIS states that Clorox may be used to control POC root disease. But we were sent a letter by Mr. King, dated July 29, 1998 that states that bleach is not a registered pesticide and the FS cannot recommend its use.

Comment: Clorox is being suggested for use in vehicle washing to lessen chances of spreading root disease. Is this okayed for use as a pesticide?

Response: Clorox was register as a pesticide in Oregon August 4, 1998.

Comment: Many of the measures that you list for reducing risk are appropriate for any operation around POC, but the efficacy of these measures remains largely unproven. These measures should be required and enforced rigorously, but the measures are no guarantee of excluding the disease. Decisions should be and based on losses if the disease is introduced, not on the assumption that it will not be introduced.

Response: Root disease is a major issue and will be an important aspect of the decision. The EIS acknowledges the efficacy of mitigation measures are unproven. The Record of Decision states the rationale for alternative selection.

Comment: *The SDEIS does not address the impact of the potential loss of Port-Orford-cedar from the botanical areas due to the mining operation. How will the loss of ecological benefits provided by Port-Orford-cedar affect other plant species in the Botanical areas?*

Response: Port-Orford-cedar (POC) in the botanical area is at risk of root disease introduction regardless of alternative (including No Action). The mining Plan of Operations will include a POC Disease Control Strategy, which will reduce, but not eliminate the risk of introduction from mining. The EIS discusses the places within the project area that are at greatest risk, and would have the greatest impact if the POC became diseased. The "No Name Fan" (one of these places) is within the Botanical Area. The non-mining risk is also being assessed with the Botanical Area Management Plan. An analysis to determine the relationship between POC and rare plant species is also ongoing; it has not revealed any co-dependent relationships between POC and rare plants, although they may occupy similar habitats.

NOXIOUS WEEDS

Comment: *I am concerned about the spread of noxious weeds from the mining operation. The volunteers in the Illinois Valley could not keep up with pulling the star thistle if it increases due to the operation. Where would the helicopters fly in and out from? The runways of the IV Airport are infested with star thistle. Vehicles and equipment transported there could easily spread star thistle to sample sites deep within the watershed. The present star thistle program does not have the manpower to pull noxious weeds from the airport area.*

Comment: *I believe it will be virtually impossible to prevent the spread of Star Thistle into this watershed.*

Response: The EIS discloses that all alternatives (including No Action) may spread exotic plant species, including noxious weeds. Mitigation common to all action alternatives includes monitoring and eradication of noxious weeds at the mine site, stockpile site, and along the haul routes. However, since access is not restricted in the lower reaches of the watershed, noxious weeds are likely to be introduced and spread, but the infestations are likely to be small, due to the serpentine influence.

Comment: *The SDEIS does not analyze the risk of spreading noxious weeds associated with helicopter use.*

Response: Noxious weeds may be brought in by helicopter operations, however, the likelihood is reduced by the fact that the helicopter does not land at the mine sites.

BOTANICAL DIVERSITY/SENSITIVE PLANTS

Comment: What happened to *Lilium vollmeri?* *Lilium bolanderi?* *Juniperus communis frankii?* These plants were not listed as sensitive in the EIS.

Response: These species may occur within the analysis area, but are not a survey and manage, special status species, sensitive, threatened or endangered. Thus, they are not discussed specifically.

Comment: In the Botanical Biological Evaluation, *Darlingtonia* is not mentioned. Isn't it listed as endangered? Please provide documentation and address all applicable management policies for the protection of *Darlingtonia* bogs. Include site-specific locations within the EIS area and mitigation measures.

Response: *Darlingtonia californica* is not a sensitive plant. The biological evaluation analysis includes only sensitive and listed plants. *Darlingtonia* will be protected by avoiding fen areas. The key component for conservation is to maintain the hydrological integrity of the fens as is discussed in the EIS.

Comment: The SDEIS states that "bulbs of *Calochortus howellii* that may be affected by the proposal would be harvested and replanted." Digging up the bulbs of a species the US Fish and Wildlife Service is considering for listing under the ESA cannot be defined as protecting, preserving, and enhancing the species. There is no discussion of the survival rate of transplanted bulbs of *C. howellii*, and the costs of this mitigation measure. The SDEIS fails to provide any information on whether replanting *C. howellii* bulbs has been successful and if so, how long the transplants have survived, survival rates, and under what conditions.

Response: Dr. Frank Lang suggested that *C. howellii* may be replanted. The replanting could occur in an area protected from human disturbance, or a nursery or other site elsewhere. The Forest Service does not have information on the success of this type of operation, and would monitor the replanting. *C. howellii* would not be removed from areas that are not directly affected by the selected alternative.

Comment: The Draft Fen Conservation Agreement states that the greatest threat to the serpentine fen species is from commercial mining in and adjacent to their habitat. It noted that "due to the great expense of extraction facilities, it is likely that all of the nickel laterite deposits in an area may be mined as part of one operation." This is not disclosed in the EIS.

Response: The Draft Fen Agreement is incorporated into this analysis and will be followed. The quote regarding the mining of all the deposits is not cited, however, the EIS contains discussion about the "great expense" and concerns about economic viability. There are no proposals to "mine all the nickel laterite deposits," however, the analysis does consider the potential cumulative effects from mining the known, similar deposits within the Rough and Ready Creek watershed. The EIS discloses that continued threats to rare plants, including fen species, could occur with the mining of the 512 acres mapped by Ramp.

Comment: The Botanical Area may also be a significant site for non-vascular plants (given the findings of the Oregon State University Lichen and Bryophyte Study Group; significant finds included 1. two locations of *Bryoria tortuosa*, a Survey and Manage Species and 2. *Lecidea deldes*, a crustose lichen threatened with extirpation throughout its range). Effects of dust, air pollution, and other factors on non-vascular plants must be addressed in the EIS.

Response: These effects are addressed in Chapter Four of the FEIS. Dust and air pollution will not be increased enough to have measurable effects.

Comment: The narrow analysis of the SDEIS obfuscates the potential impact to the rare and sensitive wetland dependent species and their habitat, including those species that the U.S. Fish and Wildlife Service would like to avoid listing under the ESA. The SDEIS only states that the "critical fen" from the draft agreement is not on any of the proposed haul routes and that, while the haul route comes close to a fen where *Viola primulifolia* ssp. *occidentalis* occurs, it is not a "critical fen". The SNF Plan's S&Gs for Botanical Areas, however, does not restrict protection and preservation of botanical features to only "critical fens". The SDEIS does not acknowledge potential reduction in the flow of springs which provide the water source for *Darlingtonia* fens (see discussion above) and the direct impacts on species from impacts on wetlands.

Response: The biological evaluation for plants discusses riparian areas and that the hydrological integrity of the riparian areas will not be compromised. By concentrating on the protection of critical key habitat and conservation of wetlands, the rare plants that occupy it should continue to thrive.

Comment: [The Watershed Analysis stated that] a more complete map of wet areas and intermittent streams is needed to help identify/quantify available rare plant habitat and associated protection/conervation areas.

Response: The Forest Service has pursued mapping these areas. Satellite imagery has been used to identify wetlands, however, the process has not been perfected sufficiently to determine what species of rare plants are within the wetlands.

Comment: Port-Orford-cedar found along the mainstem of Rough and Ready Creek and the Forks is often associated with springs and seeps and their diverse plant communities which often harbor rare and sensitive species. If the cedar is lost to the root disease, will these habitats persist?

Response: Yes, the habitats should persist regardless of whether POC root disease is introduced into the area or not. The EIS discloses the places that would be most affected if root disease was introduced into the area. However, effects from death of individual POC trees are not known, but are unlikely to affect the viability of any rare plant species. The approved plan of operations and the selected alternative will protect key habitats.

Comment: The Forest Service recommends, but does not explain, what avoiding road impacts to *Darlingtonia* fens entails. The Forest Service must discuss the extent to which the adverse affects can be avoided by the mitigation measures.

Response: New roads will be routed away from fens and will not come within 80 feet of any fen. This is expected to maintain hydrological integrity of the fens. The EIS discloses that small wetlands may already be affected by disruption of drainage due to existing roads. Continued use and development of roads may affect local drainage patterns and individual plants or habitat, however no “critical fens” are at risk. This is discussed in the EIS in Chapter Four.

Comment: *The last sentence in the Chapter Three discussion of sensitive plants says that surveys for certain survey and manage species would occur once a haul route is selected. This seems to imply that the No Action Alternative is not being seriously considered.*

Response: There was no intention to imply that No Action is not being considered. The alternatives vary in terms of what Survey and Manage requirements apply. Depending on the choice of alternative, Survey and Manage will be carried out appropriately. If No Action is selected, no Survey and Manage requirements would apply.

Comment: *The US Fish and Wildlife Service sent a species list dated March 31, 1998 for the proposed SDEIS project area in response to a request from the Forest Service. The SDEIS found, based on the species list and other information, that alternatives proposed by the plan “may affect or are likely to adversely affect” a federally listed species *Arabis macdonaldiana* (flower). As such the Forest Service should initiate Section 7 consultation pursuant to the Act prior to issuing the Final Environmental Impact Statement.*

Response: The Forest Service has not initiated consultation since the Preferred Alternative has a No Affect finding. If this finding should change, consultation will be initiated and completed prior to any decisions.

Comment: *Chapter 4, page 70 states that “Cumulative impacts are not precisely known since the population distribution on all laterite deposits have not been inventoried.” A complete inventory of the flower [*Arabis macdonaldiana*] needs to be indicated on a map showing the general locations of the two newly discovered populations as well as the previously recorded populations so that an estimate of the cumulative effect to the species can be adequately assessed.*

Response: A complete inventory of all laterites has not been done, and will not be done for this analysis. All areas that could be affected by the proposed plan of operations have been surveyed and all PETS plant species have been mapped. Further surveys would be accomplished as part of any future analysis regarding laterite mining in the watershed. Given the economic analysis, continued mining of these deposits is certainly not a forgone conclusion.

Comment: *Figure 19 [of the SDEIS] displays the number of sites documented within 100 feet of the haul routes or within the mine sites themselves. A map should accompany a table that displays the general locations of the flower in relation to the haul routes. It should be accompanied by a detailed discussion of the potential impacts to the flower.*

Comment: The table in Appendix B indicates that Alternatives 6, 7, and 8 would each impact 5 populations of the flower and Alternative 10 would impact 3 populations of the flower. The Environmental Consequences section of the SDEIS should indicate the number of plants in each population that would be impacted, what kind of impact the plants and population as a whole is likely to incur under each alternative.

Response: The specific nature of effects is discussed in Chapter Four and in the Biological Evaluation. Maps showing the locations of PETS species are not published but are in the analysis files. The numbers of plants at each site varies.

Comment: On page 16 [of Appendix B] it states that "suitable habitat for Arabis macdonaldiana will be identified and no impacts allowed." On page 13 it states that the plant "may be affected." The Forest Service needs to explain what kind of impacts may adversely affect the plant and the details of the proposed avoidance measures so that the USFW can assess the possible impacts to these species.

Response: Some alternatives "May Affect" Arabis macdonaldiana, because the haul route goes through or near known populations. Mitigation would require botanical assistance in road lay out to avoid as many of the plants as possible. The Preferred Alternative 9 would have No Effect on the plant.

WILD AND SCENIC RIVER

Comment: The bench road in itself is a permanent defacement of the scenic attributes of a riparian area and will degrade Wild and Scenic River Eligibility.

Response: The scenic resource was not an attribute having outstandingly remarkable value, nor do roads necessarily conflict with the Scenic River classification. In itself, the bench road is unlikely to affect the eligibility of Rough and Ready Creek.

Comment: Alternative 11 is unacceptable to me because the permanent bridge will degrade the Wild and Scenic Eligibility of the creek.

Response: The bridge proposed in Alternative 11 would not affect the eligibility of Rough and Ready Creek.

Comment: The Forest Service must study the suitability of Rough and Ready Creek prior to issuing a record of decision that would impact, in any way, the land and water resources of Rough and Ready Creek and its corridor. This includes land use outside the corridor that affects corridor and river values. The SDEIS' analysis of the impacts of the proposed Nicore Mine on Rough and Ready Creek's Wild and Scenic River values and classification will be seriously flawed until these [values and classification] have been subjected to the NEPA process. Only the selection to No Action or possibly the preferred alternative precludes the need for Wild and Scenic River NEPA analysis.

Response: As discussed in the EIS, the Forest Service must protect identified outstandingly remarkable values and potential classification until such time that the Rough and Ready Creek has been found unsuitable or is made part of the Wild and Scenic River System by Congress. If an alternative is chosen that would not protect the values or classification (some may not - see the Wild and Scenic River Eligibility issue discussion in Chapter Four), no mining would occur until the Suitability Study and any other needed analysis is done. The Suitability Study will likely be part of the next Forest Plan revision (scheduled for 2002).

Comment: The Forest Service is also bound by the June 1991 Final Settlement Agreement with American Rivers, et al. which requires that upon determination of eligibility...the Forest will initiate the process to amend the Forest Plan to protect and manage the streams for their outstandingly remarkable values and potential classification. In order to comply with this Settlement Agreement, the Rough and Ready Creek watershed and surrounding area should be withdrawn from mineral entry so that the validity of the mining claims that are the primary threat to Rough and Ready Creek's values and classification can be determined.

Response: Effects on Wild and Scenic River eligibility are disclosed in the EIS and do not necessarily lead to a conclusion that the area must be withdrawn from mineral entry to protect the eligibility of Rough and Ready Creek, nor is withdrawal mentioned in the Settlement Agreement. The potential classification and outstandingly remarkable values will be protected pending a determination of Wild and Scenic River Suitability (likely will be done during the Forest Plan revision scheduled for 2002). Preferred Alternative 9 does not degrade outstandingly remarkable values or the potential classification of Rough and Ready Creek.

ECONOMIC VIABILITY

Comment: [The United States Department of the Interior believes] that the FEIS needs to demonstrate that nickel can be economically recovered from project ores using existing metallurgy and facilities. The FEIS needs to use a rigorous model to estimate the economic viability of the project. The citation of a few general references, which suggest the project is uneconomic, is insufficient as metal prices are difficult to predict. The USGS believes that the AME Economics 1998 quote in the SDEIS that cobalt may fall to \$10 per pound is speculative and weak evidence that the project lacks economic viability.

Comment: The USGS believes it is extremely unlikely that these deposits are economically viable because 1) the tonnage of ore is significantly less than any operating laterite deposit, 2) the ore grades are below those of virtually all operating laterite deposits, and 3) the critical infrastructure needed to develop these deposits is not present. The FEIS should provide a realistic economic model prior to development. It is needed to access that the ore deposits are sufficient for a successful project.

Response: The economic analysis has been updated and additional sensitivity analyses are included. The reference to cobalt is to use today's prices for cobalt. Alternative 9 is intended to allow the proponent to provide a realistic economic model prior to full scale development.

***Comment:** Concerning the Nicore project, I question the legal basis of considering economics, profitability, or feasibility as a factor in determining minability. There is already reasonable evidence the Nicore ore or "dirt" is valuable in relation to the documented tests ("batch") already performed.*

Response: Economics is discussed in the EIS, with the conclusion that the proposed mining may not be economical. Alternative 9 is designed to resolve issues with the economic viability of the operation.

***Comment:** The mining operation is in direct conflict with the overall strategy for economic development in the Illinois Valley.*

Response: The proponent has not characterized his plan as having any relationship to the overall strategy for economic development in the Illinois Valley. Potential effects on tourism, Interpretive Development, residents, and economic development are discussed. The Strategic Plan does not directly influence management on federal lands.

***Comment:** The FEIS needs to complete the reference to the expanding production capacity at Voisey Bay by noting that the Project has no current production and some serious development issues have been encountered. The comments about global resources need to be expanded. The implication that the world has plentiful supply of nickel and therefore, this deposit should not be mined, needs to be rigorously supported in the FEIS*

Response: The FEIS includes these references; Appendix I contains the full Economic Analysis prepared by the Forest Service.

***Comment:** The focus of NEPA is environmental analysis, not an analysis of the economics of the Proposed Action. NEPA does not require the agency to examine the economic consequences of its actions. In response to Mr. Freeman's request that the Forest Service articulate under what authority the SDEIS was expanded to include an analysis of the economics of his proposal, the Forest Service gave Mr. Freeman a copy of Chapter 1900 of the Forest Service Manual. Section 1970.1 lists seven different statutes or regulations which the Manual asserts authorizes or requires the Forest Service to engage in an economic analysis of Forest Service decision-making. Each of these requirements relate to the economics of proposals which lie within the economic discretion of the Forest. In the present case, Mr. Freeman has a right to access his ore, and the Forest Service must allow him access regardless of what the Forest Service believes about the economics of his proposal.*

Response: The proponent has no absolute "right" of access under any law, regulation, or policy. Forest Service policy in NEPA clearly allows economic considerations in the analysis and selection of an alternative.

Comment: The economic analysis used in the SDEIS is flawed. One, it relies on reports which were both paid for and submitted by the Nature Conservancy-an organization which has made quite clear that it is opposed to the project. The SDEIS [and reports] fails to recognize the full value of the nickel laterite ore. Instead, they focus only on the nickel content and ignore completely two other valuable materials which Mr. Freeman proposes to extract from the ore: both iron and chromium. No one who has concluded that the project is not economic has calculated the value of the iron and chromium content of the ore which will be extracted in addition to the nickel.

Response: The analysis has been redone in the FEIS to include the values you suggest. Mr. Freeman has had the opportunity to input his own analysis and or factors into the analysis, but has not provided any written input.

Comment: Several comparisons have been made of Mr. Freeman's proposal to the Riddle project. This is faulty because that plant used an antiquated process from the 1920s which failed to use both the iron and chromium, but instead simply discarded those elements. Freeman's proposal will be able to take advantage of the iron and chromium, rather than discard them as waste.

Response: This fact is recognized in the FEIS. However, the proponent has not identified where the ore would be processed, leading to uncertainties in the analysis.

Comment: The SDEIS recognizes that nickel prices have fallen since the Plan of Operations was first filed in 1992. If the Plan of Operation were approved in a timely manner when nickel prices were higher, Mr. Freeman's proposal would have had even more economic benefit. If approval of the plan of operations is affected by lower nickel prices, the Forest Service should recognize that approval will place Mr. Freeman in a better position if nickel prices rise.

Response: A sensitivity analysis for the price of nickel is included in the FEIS. The breakeven point (the price at which costs equal revenue) for the price of nickel and associated minerals such as cobalt and iron varies for the different alternatives. The proposed action's costs would equal its revenue when the world market is \$3.75/pound for the price of nickel and associated minerals. In contrast, Alternative 7's breakeven point is at \$4.02 per pound. If and when the price for nickel and associated minerals would reach \$5.54/pound, the proponent would receive a reasonable rate of return for the investment on all alternatives. Within the last five years, nickel did reach a price of \$3.73/pound in 1995. However, as noted above, the price has fallen significantly to \$1.95/pound in August, 1998 (lowest in a decade) and long term trends are not expected to exceed \$3.00 per pound (Anaconda Media Release, 17th July 1998).

Comment: The SUD "evaluation" was performed by personnel who were not qualified to make such economic determinations. Their work was based on data and information that was in error, out-dated, and supplied by individuals and groups that opposed the project. Information relating to favorable project economics was discussed with the Illinois Valley District Ranger on Nov. 10, 1998, but this information was ignored.

Response: The Surface Use Determination (SUD) was performed by an experienced Forest Service Mining Engineer. Information related to basic economic analysis was requested from Mr. Freeman, but has not been provided to date. Mr. Freeman provided an oral evaluation of the economic analysis when the SDEIS was already at the printer. No written evaluation has been provided.

Comment: *The SDEIS also gives a false impression. For instance, the table on page 81 shows the preferred alternative (#9) to have haul costs of \$840,000 and compares that to the Proposed Action's haul costs of \$2,080,000. At first blush, it appears that the Preferred Alternative is more economic than the Proposed Action, that is, until one remembers that the amount of ore being hauled in the Preferred Alternative is much smaller than in the Proposed Action. The Preferred Alternative ...result[s] in a cost of \$168 per ton, the Proposed Action...result[s] in a cost of \$5.20 per ton.*

Response: An additional economic criteria of benefit/cost ratios is included in the FEIS. This criteria reveals the average marginal costs and benefits for the alternatives.

Comment: *I urge the Forest Service to require that each pit site to be disturbed by mining be economically productive in its own right; any requests for mining at sites that would produce a loss should be rejected even if overall permission is given.*

Response: The economic analysis reflects the effects of the project as a whole. Individual parts of the analysis are included, but do not need to be discussed individually because all sites have similar economic effects; based on the economic analysis none of the sites would produce a profit.

Comment: *...Even if Nicore could capture 100 percent of the US market for 414 stainless steel, there is not enough of a market in the US to make the construction of a steel mill viable. The US production of the 414 stainless steel in 1996 was 25,000 NT. According to Barrick, a production of at least 250,000 to 300,000 NT per year would have to be produced by a new steel mill to generate adequate return on a new steel mill today.*

Response: Chapter Four of the SDEIS and FEIS state "the size of the ore body is far smaller than other similar ore bodies considered for commercial use (page 81)."

Comment: *The analysis does not take into consideration the full costs of the mining operation. For instance, the cost of compliance with environmental regulations does not appear to have been considered. The SDEIS provides a list of some of the state permits that Nicore may be required to obtain, but it does not associate any costs with acquiring and complying with the permits. The expenditures of acquiring the permits may be considerable.*

Response: The estimated cost associated with the mitigation measures are discussed in Chapter Two of the FEIS. The economic analysis in the FEIS takes into account the costs associated with the mitigation measures and environmental requirements in each alternative.

Comment: The SDEIS incorrectly states that the No Action Alternative has a present net value of zero. The No Action has a large positive present net value as evidenced in the October 19, 1998 Nicore Economics Report by King.

Response: The analysis recognizes the positive environmental effects relative to other alternatives associated with the No Action alternative.

Comment: The cost of complying with NEPA should be factored into determining the profitability of the proposed mine. While the taxpayer has paid the expense, preparation of an EIS is required in order to comply with NEPA, an environmental law, and is therefore a cost of developing the mine.

Response: The economic analysis in the FEIS takes into account the expense of EIS preparation.

EFFECTS ON RESIDENTS

Comment: The use of heavy lift helicopters, along with the great number of round trips proposed by this alternative will cause great distress and disruption to the lives of anyone within a few miles radius of their operation. Limiting flight to daylight hours is simply not acceptable, considering that it is daylight in the summer from 5AM to 10PM. A more reasonable time slot would be from 8AM to 5PM.

Comment: The hours of helicopter operation should be limited to only a few hours a day, the minimum altitude of flights should be increased by several thousand feet over the existing residential community, and the helicopter flight paths need to be shown on a map.

Response: Operations would be restricted to between 7 am and 7 pm (see mitigation in Chapter Two). All flights would be routed to avoid residences and would not come within 1,000 feet of any residence. A map of the flight line is in the FEIS.

Comment: The SDEIS continues to falsely state that only residents in the 4 to 22 homes within 0.5 miles of the haul route will be affected. It would be better to use a 5 mile distance to identify the affected population.

Response: The SDEIS does not state that only residents within 0.5 miles will be affected. It states that people living within 100 feet of the haul route would "suffer the greatest impacts" and "the closest mine site to any residence is 0.5 miles."

Comment: The ambient noise levels that you reported in your noise study indicated that it is extremely quiet along the haul route. Off-site truck noise exempt from the Oregon DEQ maximum noise limit part of the regulation, but must be included in the "ambient degradation" criteria where the increase in the hourly L10 and L50 sound levels are evaluated [OAR 340-35-035 (1) (B) (ii)].

Response: This is considered in the EIS.

Comment: The noise levels from the hauling operation alone may exceed the Oregon DEQ noise limits of 10 dBA above the existing ambient levels.

Response: The noise analysis finds that this is unlikely, yet possible. If monitoring shows that noise standards are exceeded, the operation would be modified to reduce the impacts.

Comment: Assuming attenuation only due to distance, the noise level radiating from the excavation, crushing, screening, loading or other operations at the site to any residence within 9.5 miles will be above 45 dBA, which may exceed the DEQ noise limits.

Response: 45 dBA is NOT above DEQ allowable statistical noise level shown in OAR 340-35-035, table 8.

Comment: The SDEIS states that "Noise levels during the operations would be measured and recorded by the operator, as per OAR 34-035 (3) and (4)." I would like to know the operator's understanding of the noise regulation. What measurements would he take and how will he use them? How is he planning to measure the existing noise level? How often will measurements be made, and what will happen if he is out of compliance? How is legal compliance going to be assured? None of this is outlined in OAR 34-035 (3) and (4).

Response: There is no way to measure the "operator's understanding" of the noise regulations. However, sound measurement procedures, with monitoring and reporting requirements are outlined in the OAR 340-35-035 (3) and (4). The operator will be required to follow these regulations whenever any measurements are performed. The Forest Service will provide some oversight in the administration of the Plan of Operations, but ultimately, compliance with noise standards rests with the operator as permitted through the Oregon Dept. Of Environmental Quality.

Comment: The noise issues should be addressed before the operation begins to determine if it is practical to mine the site, or if the mitigation required make it not cost-effective.

Response: The noise issue has been addressed extensively. Mitigation measures will be required to ensure that the operation complies with all applicable noise regulations. Cost is a factor, but not to the extent that it would allow non-compliance with applicable noise regulations.

Comment: The noise issues should be addressed before the operation begins to determine if the hours of operation need to be restricted so that the operation is in compliance with the noise regulations.

Comment: The noise issues should be addressed before the operation begins to determine what mitigation is required for the excavating, blasting, screening, loading, and hauling operations. Barriers, quieter equipment, or a limit on numbers of trucks may be required.

Response: The noise issue was examined in detailed and mitigation measures for each alternative have been designed to ensure compliance with the applicable noise regulations. Noise levels will be monitored, with a requirement that activities be modified if noise regulations are exceeded. Blasting is not expected in this operation.

Comment: In the July 29, 1998 noise study, Mr. Cooley repeatedly uses the phrase "heavily screened by vegetation" to describe the path between noise sources and receivers. I would like to point out that attenuation due to vegetation is finite. It would be helpful to see the analysis that brought him to his conclusions.

Response: Mr. Cooley is a forester who is familiar with the proposed operation, and has surveyed the vegetation along the haul routes. Mr. Cooley also reviewed the locations of residences near the Nicore proposal. The phrase "heavily screened by vegetation" is a generalization that describes coniferous vegetation between the mining sites and the private residences. Cooley agrees that vegetation has a finite effect on noise dissemination.

Comment: Helicopters within 1000 feet of a noise sensitive receiver may be out of compliance. How did Mr. Cooley arrive at a distance of 1000 feet? Maybe it should be greater....

Response: The standard of 1000 feet was based on considerations of safety and noise control with safety being the main factor. It is the closest we would approve helicopter near private dwellings. The operator may choose to stay much farther away and will in most cases.

Comment: In the July 29, 1998 Noise Study, Mr. Cooley states that Table 8 of OAR 340-35-035 applies to new industrial and commercial operations and it is a generous standard. In Appendix A of the Noise Study, Mr. Cooley states that noise from helicopters is not controlled by the DEQ Noise Regulation. Mr. Cooley seems to also say that OAR 340-35-030 applies to motor vehicles and that motor vehicles are exempt from OAR 340-35-035. He should familiarize himself with the ambient degradation rule in OAR 340-35-035 (1) (B) (i) and (ii).

Response: Mr. Cooley's noise analysis has been corrected to say that since the FAA does not have pre-emptive noise regulations that apply to helicopters, state standards (including OAR 330-35-035) are applicable.

Comment: It is difficult to monitor for compliance when you do not know what the noise limits are. No ambient measurements have been made.

Response: Ambient (background) noise levels would be established prior to operations. Since ambient levels change with seasons, weather, development, and vegetative growth, it seems most prudent to measure them near the time of operations, rather than what could be years in advance.

Comment: I disagree with Mr. Cooley's assertion that the noise generated by any of the proposed alternatives will be within the Oregon DEQ. Based on the limited information in the DEIS, SDEIS, and the Noise Study, the noise level radiating from the proposed operation will very likely exceed the DEQ noise regulations, even with the mitigation measures. The noise impacts should be addressed before mining begins, because the mitigation will effect the mining operation.

Response: We respect your opinion, however, Cooley's judgement is that noise impacts will be within state standards. Mitigation measures, including monitoring, are expected to ensure that standards will be met. The operator is responsible for meeting all applicable regulations.

Comment: We are convinced that comprehensive field study by independent acoustical and bio-acoustical experts is the only option that you have in order to be able to make any credible statements about the acoustical behavior of the area in question. This study must include any residential areas within a reasonable distance (at least 5 miles for helicopters) of any proposed mining related activities. The team of engineers should be commissioned to create an acoustical attenuation map of the area surrounding the proposed mining, haul route, stockpile area, and other places where noise may be generated. The equipment used by these experts must be capable of accurately simulating and measuring sound levels in the frequency range between 5 Hz. of frequencies beyond the hearing range of humans and animals. We are sure that institutions such as Cal Tech, MIT, etc. will be more than happy to recommend qualified experts capable of these tasks. A map displaying the background ambient noise must first be plotted. Next, by simulating noise generated by each piece of equipment, an attenuation plot from all locations must be measured radially, plotting the attenuation rate in every direction by distance until the noise level reaches the average background ambient noise level. Calculations and further measurements would need to be made in order to predict every possible combination of beat frequencies. These plots must continue in distance until the simulated beat noise level coincides with the average background ambient noise level. Bear in mind that nearby residents will not tolerate any significant increase in the present average ambient noise level. Rest assured that definitive legal action will be taken if any environmental degradation occurs.

Response: Additional field studies are not necessary to compare the effects of noise between alternatives, nor would it be prudent or justifiable to spend limited public funds on such a process. The operator is responsible to comply with the applicable regulations that control noise. The EIS includes mitigation, including monitoring to assure that regulations are met.

Comment: Large pieces of earth moving equipment generate tremendous amounts of low frequency energy. When multiple pieces of equipment are operated and/or moving in the same general vicinity, the sounds combine in very unpredictable ways producing beat frequencies. These beat frequencies, when caused by the interference of high level low frequency sources, can result in extremely high sound pressure levels in the subsonic and very low frequency range. These sounds can travel for over 10 miles. Humans exposed to moderate sound pressure levels experience extreme anxiety, often accompanied by nausea and unpredictable behavior.

Response: The idea that “humans exposed to moderate sound pressure levels experience anxiety, often accompanied by nausea and unpredictable behavior” is not supported by observation or studies (the comment did not include references to studies we could check). The project is not expected to generate such extreme noise as to traumatize anyone.

Comment: Part of Nicore’s supplemental proposal must include an exact listing of every piece of equipment that he intends to use (including audible signaling devices, generators, and all others). This list must include the following information as applicable: equipment description, manufacturer, model number, capacity, weight, factory certified information concerning emissions, and recommended maintenance schedules.

Response: The analysis is based on the equipment list included in the Proposed Plan of Operations (discussed in general terms in the EIS). The information requested in this comment is not necessary to compare and analyze alternatives and disclose effects.

Comment: The SDEIS does not analyze noise disturbance from helicopter flights on recreation. Helicopter noise will degrade recreation experiences for hikers, swimmers, and tourists.

Response: The SDEIS discussed this impact in the Chapter Four section on recreation impacts.

RECREATION, VISUAL QUALITY AND INTERPRETIVE DEVELOPMENT

Comment: While gating roads may constitute mitigation, it is unconscionable that the public will be denied access to a recreational area during the prime season for recreating. Helicopter use as well as the haul trucks will effectively eliminate non-motorized use of these roads. These impacts should be described under a section on recreation impacts. I do not believe that improving motorized access, when accompanied by the mining operation and involving gated roads, will improve the recreational experience for some people. It is also inconceivable that hiking, biking, and horseback riding would still occur with ore trucks constantly using the roads.

Response: Helicopter use would not eliminate non-motorized use of all the roads (hiking, biking, horseback riding). It may affect a person’s enjoyment of these activities at certain places or certain times of the day. Safety issues would be addressed through closure of areas that may be exposed to helicopter hazard. Gating roads has been recommended as mitigation for safety and POC root disease in alternatives that haul ore (except for the Proposed Action).

Comment: Why is the Visual Quality Objective “Modification”?

Response: Visual Quality Objectives are assigned during the Forest Planning process. They will be reconsidered in the Forest Plan revision scheduled for 2002.

ROADLESS CHARACTER

Comment: *The Roadless Area discussion under the comparison of environmental impacts for no action should state that although the roadless area contains several roads, they are not all passable.*

Response: This section has been edited to accommodate your concern.

Comment: *The Roadless Character issue should include the fact that "unwanted traffic" and "adverse environmental impacts" include illegal activities and trashing of the area, resulting in additional public expense to patrol and remove trash.*

Response: Any time an area is made more accessible, the possibility of illegal activities and littering exists. The roadless character section of the FEIS has been expanded to include this fact.

Comment: *Road construction and reconstruction within a roadless area are contrary to the purposes for which the roadless designation was made.*

Response: As described on page 55 of the SDEIS, the South Kalmiopsis Roadless Area was studied (for addition to wilderness) in the 1970's and 1980's. It was not added to wilderness in the 1984 Oregon Wilderness Act. The 1989 Siskiyou National Forest Plan allocated this area to non-Wilderness uses. There is no current "designation" as "roadless" in the Forest Plan.

Comment: *The SDEIS analysis of the South Kalmiopsis Roadless Area does not reflect the awareness of the numerous ecological and amenity values of roadless areas. The Forest Service must provide a meaningful analysis of the roadless area issue, one that takes seriously the irretrievable and irreversible commitment of resources in developing any of the proposed mine sites or putting one blade to any road in the RARE II area or uninventoried roadless areas adjacent to the South Kalmiopsis. It needs to take a hard look at the consequences and impacts of the Nicore mine on the area's wilderness character.*

Response: The roadless character issue has been broadened to include ecological and amenity values of roadless areas.

Comment: *The roadless character reference is misleading. The area was inventoried for RARE II but was congressionally mandated for multiple use. The plan of operations is within the South Kalmiopsis Multiple Use Area. Mr. Freeman's proposal includes areas that has [sic] existing mining roads and is not roadless.*

Response: The roadless character discussion in Chapter Three discloses the facts that mining roads exist within the area and the area was allocated to various non-wilderness uses in 1989. Roadless character remains an issue people are concerned about.

GENERAL QUESTIONS and CONCERNS

Comment: In addition, the potential impacts of haul route development, ore stockpiling and processing, and future strip mining on the aquifer underlying the Rough and Ready Creek floodplain and alluvial benches must be addressed in the EIS. A revised draft EIS addressing the effects of full-scale mining including, but not limited to, the 512 acres of nickel-bearing laterite in the Rough and Creek Watershed is required. Full-scale mining includes the stockpiling and drying of the ore produced from the strip mines and extension and additions to the proposed haul route, as well as smelting and disposal of slag wastes.

Response: The smelting and disposal of slag waste analysis is addressed on page 88 of the SDEIS. The assumptions for the cumulative effects analysis and results are found on page 56 of the SDEIS. More lands were not considered due to the even lower mineral content of sites outside of the 512 acres.

Comment: How much lateritic soils will be excavated to obtain the 5,000-ton sample?

Response: The SDEIS stated that Alternative 9 would excavate up to 0.5 acres. The volume of soil to be mined is about 2,000 cubic yards.

Comment: In which way does the Forest Service feel that the Nicore mining operations meet the guidelines established under NEPA Sec 101 (b) (1), "to fulfill the responsibility for each generation as trustee of the environment for succeeding generations?" The goal established under NEPA Sec 101 (b) (2) to "Assure for all Americans...esthetically and culturally pleasing surroundings..." I have not found this issue addressed in the SDEIS.

Response: The purpose and need, and decisions to be made for this analysis is listed on pages 7 and 8 of the SDEIS and included in the FEIS. The rationale for the decision is in the Record of Decision.

Comment: It is indicated that the miner would be permitted to use Proposed Action access routes to walk tracked vehicles to the mine sites for sampling. Since this access involves crossing sensitive areas and making stream crossings, I would favor that all equipment be brought into the area via helicopter.

Response: Alternative 9 was modified in the FEIS to eliminate all stream crossings. Heavy equipment could be walked into Mine Site B, using Roads 461 and 445 (Rock Creek Route), but the number of trips would be limited and only minor road improvement would be approved. Equipment would be required to be flown in to all other mine sites. Access for personnel would be limited to non-motorized or aerial transportation.

Comment: The public opposition to the proposed Nicore Mine is substantial and growing. Would a prudent individual expend time and resources to develop a sub-marginal mining operation to produce a product with little or no demand - especially when the mine has the added liability of significant opposition from the public and adjacent property owners?

Comment: Is the miner aware of the economic conclusions regarding his proposed project and if so, what is his response?

Response: The operator, by submission of the Plan of Operation has shown his intent to develop the mineral resource. The miner is aware of the public comments and the economic analysis. His official response (via his attorney Stephens) is on record and available for public review.

Comment: Will uncertainties about mitigation measures, such as what methods of dust abatement Nicore proposes, and what the source of water will be (if water is needed), and whether it will violate state water regulations be answered by the bulk sample? Will uncertainties about reclamation be addressed by the preferred alternative?

Response: Alternative 9 will not resolve all uncertainties with the analysis.

Comment: Why is Alternative 9 even included, let alone preferred, when the miner apparently has no interest in taking such a sample.

Response: The miner has not said he has no interest in taking a bulk sample. Bulk sampling was part of the original Plan of Operations provided to the Forest Service in 1992. Bulk sampling is an accepted industry practice. The miner has said that the likelihood of full scale mining is not dependent on the results of the sample. Alternative 9 is included as one of a range of options for orderly and reasonable development of minerals.

Comment: I have seen in other literature that one goal of the miner is to make a stainless steel alloy directly from the ore, utilizing the nickel, chrome and iron in the ore. I do not know whether this process is proven but I expect it has not been done on a production basis. Control of the process could be quite tricky to produce a uniform product that could be sold in the market place.

Response: The uncertainties associated with the smelting is recognized in the EIS. The bulk sample (Alternative 9) would be used in a test to define the plant's design and smelting process.

Comment: Would a contract for ore processing still need to be signed before any Nicore project related activities could begin also apply to Alternative 9?

Response: Yes.

Comment: *The Forest could consider a prudent compromise. The proponent would collaborate with the Forest, the public and appropriate scientists in developing a sampling and testing protocol that will resolve the critical economic and operation questions at a much smaller scale. The Forest could allow the sample to be taken with a pick and shovel or with small equipment slung in by helicopter, and the ore transported with pack animals or by helicopter. The community could be invited to help dig. These test would provide data to develop a mathematical model that would demonstrate how the ore would meet the metallurgical feed requirements and cost structure of existing or modified smelter operations and quantify the costs associated with other significant processes involved in beneficiation of the ore.*

Response: Alternative 9 is designed to meet the needs discussed in this comment. A sampling and testing protocol would be devised in cooperation between the proponent and the Forest. The miner could decide to allow the community to help dig, but this would not be required in Alternative 9.

Comment: *[Given] the amount of ore to be extracted in the Proposed Action and more economic reduction processes, the choice of a smelter will be easily made. As long as the Plan of Operation is still pending, no smelting facility will contract to process the ore. The Forest Service's request that a smelter be identified first gets the cart before the horse. Mr. Freeman has no interest in stockpiling ore that cannot be smelted, but arrangements for smelting cannot be made until the Plan of Operations is approved.*

Response: Contracts may have contingencies that would include approval of a plan of operation. No contact with the Forest Service from any smelter has occurred during this analysis, nor has Mr. Freeman identified any potential smelter owners.

Comment: *I do not feel that it is particularly relevant that the majority of comments on the January 1998 DEIS consisted of form letters generated by environmental groups. This sentence appears to denigrate the validity of such comments.*

Response: There is no intention to denigrate the form letters.

Comment: *The EIS should include not only how many trips the ore trucks will make annually, but how many they will make daily and hourly.*

Response: Assuming 100 workdays per year (June 15 to September 15, averaging about 6 days per week), there would be between 19 and 57 round trips per day. Assuming a 12-hour workday, there would be between 2 and 5 round trips per hour. Fewer trips per day or hour would be associated with the Proposed Action than other full mining alternatives, since the operating season would be extended to October 15.

Comment: *The Mendenhall firebreak is not drivable and was never a road.*

Response: The Mendenhall Fireline was considered a road in calculating miles of new construction in the SDEIS. However, in response to this comment, we have reconsidered the status of the fireline. The miles of new road construction in Alternatives 6, 7, and 8 now include the Mendenhall Fireline.

Comment: If parts of Rough and Ready are helicopter mined, the Forest Service will be deciding to use hundreds of thousands of gallons of acute toxicity, Jet A fuel. The fuel use should be seen as a drain on a non-renewable resource.

Response: The EIS estimates the amount of flight time for the helicopter (120 hours) and discloses that this is not an unusual energy requirement.

Comment: I encourage you to improve your maps. Provide names to creeks named in your discussions. Add names to topographic features named in the text. Add a scale to all the maps.

Comment: The maps do not provide a clear enough picture of the analysis areas. The scale is inadequate to clearly define the proposed routes, crossings, and other features. Streams, creeks, forks, springs, roads, fords, bridges, fans and floodplains are referenced throughout the EIS but area not labeled or discernible no the maps. A topographic map is necessary for the public to understand the character of the land and the potential environmental impacts of the alternatives.

Response: The maps have been improved in the FEIS to reflect many of these suggestions.

Comment: I do not like the size and shape of the analysis area. The area must include all of the Rough and Ready Creek watersheds, all of the South Kalmiopsis Roadless Area, all of the Illinois River drainage, all property of Walt Freeman and his blood relatives, all claims of Freeman and his family in the Klamath Siskiyou Bioregion, and all of the Josephine Ultramafic sheet.

Response: The “effects analysis” area varies depending on the resource being studied. In many cases, enlarging the area would artificially reduce the impacts (percentage of affected area would become smaller). The area shown on the maps covers the areas where direct impacts would occur.

Comment: There is a need to clarify discrepancies between descriptions of Alternative 9. Is PA the preferred alternative?

Response: Alternative 9 is the preferred alternative in the SDEIS. It is always referred to as Alternative 9 or The Preferred Alternative. “PA” is the Proposed Action, also described as the miner’s proposed Plan of Operations.

Comment: Why is Nicore allowed 5 years to complete the sampling process? We feel that time frame should be more like six months.

Response: Five years is a reasonable time frame to allow Nicore to sample the mine sites, process the sample, and consider the results.

Comment: The Forest Service has not attempted to fill the data gaps identified by the West Fork Illinois River Watershed Analysis. The Watershed Analysis does not adequately characterize the hydrological regime and resource of the Rough and Ready Creek watershed. Under the Northwest Forest Plan, project planning is dependent on Watershed Analysis for information concerning the important physical and biological processes in a watershed.

Response: The Watershed Analysis was used as the basis for Chapter Three, Affected Environment and is incorporated by reference.

Comment: How many similarly situated mining claims exist in the analysis area and the greater area surrounding it? Who holds these claims? What is the likelihood of their development, and how much will this likelihood be increased by a successful Nicore operation?

Response: No other mining claims in the Rough and Ready Creek area have been proposed for development. If Nicore is successful, there are about 500 acres of laterites with similar nickel concentrations within the Rough and Ready Creek watershed. There are also laterite deposits under claim in the vicinities of Eight Dollar Mountain and Gasquet Mountain (see Nolan memo, 10-97).

Comment: Blasting has not been mentioned very often in the SDEIS, but in order to excavate to a depth of 12 feet, I am assuming that explosives will be used to break the bedrock.

Response: Blasting as a method to excavate ore has not been suggested or proposed in any alternative. The mining would remove soils, not bedrock.

Comment: The Energy section needs to consider the energy requirement for a smelter. What is the energy requirement for an economically feasible mining operation?

Response: This issue will be considered if and when a smelter is proposed.

Comment: The miner asserts that the FS has stalled him. The chronology of events in the SDEIS indicates that the miner first attempted to avoid the EIS process and that the FS has had to make multiple requests for more specific information.

Response: The decisions made for this project will consider the information provided by the miner. The analysis has been as timely as possible.

Comment: Most topics under "Other Effects" in the SDEIS were under the heading "Non-significant Effects" in the DEIS. Is it safe to now conclude the Nicore project's impact on these topics has some effect while the significance or insignificance of the effects cannot be stated in an encompassing way covering all these topics.

Response: The section on other effects discusses topics above and beyond those issues that drove the analysis and alternative development.

Comment: Please clarify stipulations related to herbicides and pesticides, cultural resources and survey monuments.

Response: No herbicides or pesticides are proposed as part of this project. Cultural resource surveys have been completed and no resources would be affected by the project. If cultural resources are found at any time during operations, a Forest Service or BLM archaeologist would determine appropriate mitigation. No survey monuments would be affected by the project.

Comment: The Project History failed to mention that the project started many years earlier than 1992. The development of these claims has been ongoing on a continuous basis since 1970. The SDEIS fails to mention that these claims were subjected to extensive testing in the 1970's.

Response: The project history section has been expanded to consider your comment.

Comment: The SDEIS should include recognition that many of the roads in the Proposed Action were developed for mining purposes and are currently in existence.

Response: This point has been made in several places in the EIS, including Chapter Three, Existing Condition, and in Chapter One, under a discussion about the analysis area.

Comment: The Project History states that the Nicore Plan of Operation was modified in 1996, although it does not state how it was modified. We are unaware of how the Plan of Operations was modified.

Response: The project history section has been edited to correct this inadvertent error. The "paper trail" of modified Plans of Operations, requests for information and responses to those requests, and other information is confusing and lends itself to errors.

Comment: The original proposal included washed rock crossings because the FS suggested this form of crossing. It is unfair to criticize the proponent for including within the proposal a condition required by the FS. Mr. Freeman has repeatedly expressed his willingness to install bridges or culverts or any other reasonable stream crossing facility.

Response: Forest Service personnel discussed washed rock crossings with Mr. Freeman, but never required them. Mr. Freeman included the washed rock crossings in his Plan of Operations. The alternatives are not intended to be critical of the initial proposal, rather to explore various ways to reduce environmental impacts.

Comment: The SDEIS does an adequate job displaying the impacts from various access/mine development alternatives and the range of alternatives appears to cover the reasonable access options quite well.

Response: Thank you for your comment.

Comments: There should be a list of references cited, not just contents of the analysis file.

Response: References cited are listed in the FEIS.

Comment: *The owners or backers of Nicore should reimburse the USFS for all of the DEIS and SDEIS expenses, before the next step is taken. This would show the miner's good faith that his plan will be successful.*

Response: Forest Service policy is to pay for required environmental analysis unless a mine proponent offers to pay.

Comment: *We still believe that the mining plan of operation is not serious and therefore the EIS work should be suspended until the miner submits a valid mining plan that addresses all of the shortcomings identified in the Surface Use Determination report.*

Response: Upon acceptance of a mining plan of operation the Forest Service is required to perform an environmental analysis and develop alternatives to the plan based on issues raised by the public and within the agency. Issues raised in the Surface Use Determination are included in the environmental analysis, and form part of the basis for developing Alternative 9.

Comment: *How can the Forest Service go forward with the EIS when it is not even known if the mining claims are placers or lodes?*

Response: The location of a mining claim is not required to process a Plan of Operation.

Comment: *What is the basis for allowing 5,000 tons of ore sample. Why not just buy ore on the open market if the purpose is to test the process, not the ore.*

Response: The purpose of the sampling is to test the concentration process and specific chemical characteristics of the ore that may affect processing. This is a standard practice used to modify processing to attain the most efficient recovery.

Comment: *The miner has not provided detailed information about the Nicore project as is required by the NEPA and 36 CFR 228 regulations. Please note that under 36 CFR 228.3(a), the FS describe mining operations to include all functions, works, and activities in connection with prospecting, exploration, development mining or processing of mineral resources, and all uses reasonably incident thereto, including roads and other means of access on lands subject to regulation in this part, regardless of whether said operations take place on or off mining claims".*

Response: The Forest Service and BLM are required to analyze activities and connected actions that occur on FS System lands. The processing operations that occur on federal lands (FS and BLM) are also being addressed. None of the action alternatives would occur until the processing was fully analyzed as required. When a smelter or test plant is proposed, any further analysis that is necessary would be completed.

Comment: *Environmental analysis should include what the chances are of a helicopter accident, and the costs to the environment or human life.*

Response: Our nation has adopted industrial regulations and standards for the use of helicopters. These will be followed for the project. The environmental effects of a spill of ore from the helicopter is discussed in the FEIS.

***Comment:** It would be informative to list each site and the maximum planned acreage, the sample size in terms of acres and ore weight, the estimated number of helicopter trips and flight time, and costs.*

Response: This information is summarized in the EIS and included in the Cost Documentation report in the Analysis File.

***Comment:** The mention of 25 ton ore trucks has been made at most of the meetings. We would like to suggest that in all further discussions, that you state both the load capacity of the truck, and the Gross Vehicle Weight.*

Response: The 25 tons is the load capacity. The Gross Vehicle Weight is about 96,300 lbs. (a Terex truck has been specified, the weight is of a comparable truck in the Caterpillar Performance Handbook, Edition 27).

***Comment:** A table in the SDEIS notes that the roads to all four mine sites are currently impassable by vehicles. These certainly do not meet the definition of roads used in the RARE II evaluation.*

Response: The EIS discloses that the roads are low standard, and are not passable in spots due to stream crossings and disrepair. The roadless portion has not changed since RARE II.



UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

January 29, 1998

Ms. Mary Zuschlag
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction, Oregon 97523

Dear Ms. Zuschlag:

Enclosed are comments on the Draft Environmental Impact Statement for NICORE Mining Plan of Operations Siskiyou National Forest Cave Junction, Oregon. We hope our comments will assist you. Thank you for giving us an opportunity to review this document.

Sincerely,

Susan B. Fruchter
Acting NEPA Coordinator

Enclosure



Printed on Recycled Paper



MEMORANDUM FOR: Susan B. Fruchter
Acting NEPA Coordinator

FROM: Charles W. Challstrom
Acting Director, National Geodetic Survey

SUBJECT: DEIS-9801-09-NICORE Mining Plan of Operations Siskiyou
National Forest Cave Junction, Oregon

The subject statement has been reviewed within the areas of the National Geodetic Survey's (NGS) responsibility and expertise and in terms of the impact of the proposed actions on NGS activities and projects.

All available geodetic control information about horizontal and vertical geodetic control monuments in the subject area is contained on the NGS home page at the following Internet World Wide Web address: <http://www.ngs.noaa.gov>. After entering the NGS home page, please access the topic "Products and Services" and then access the menu item "Data Sheet." This menu item will allow you to directly access geodetic control monument information from the NGS data base for the subject area project. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affected by the proposed project.

If there are any planned activities which will disturb or destroy these monuments, NGS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation. NGS recommends that funding for this project includes the cost of any relocation(s) required.

For further information about these monuments, please contact Rick Yorczyk; SSMC3, NOAA, N/NGS; 1315 East West Highway; Silver Spring, Maryland 20910; telephone: 301-713-3230 x142; fax: 301-713-4175.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101

Reply To
Attn Of: ECO-088

MAR 11 1998

Mary Zuschlag
District Ranger
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction, Oregon 97523

Dear Ms. Zuschlag:

The Environmental Protection Agency has received the Nicore Mining Plan of Operations draft EIS (draft EIS) for review in accordance with our responsibilities under the National Environmental Policy Act and Section 309 of the Clean Air Act. The draft EIS presents five alternatives for mining nickel laterite at a 35 acre site in the Siskiyou National Forest Medford District of the Bureau of Land Management, Josephine County, Oregon.

Based on our review, we have rated the draft EIS EO-2 (Environmental Objections -Insufficient Information). Our primary objections are related to a lack of information about the alternatives, the potential cumulative impacts of additional mine patents in the area, a failure to meet the intent of the Aquatic Conservation Strategy in the President's Forest Plan, a lack of a detailed reclamation plan, a lack of a monitoring plan and potential sediment impacts to Rough and Ready Creek. Detailed comments are enclosed on these subjects.

An explanation of the EPA rating system for draft EIS's is enclosed for your reference. If you have questions regarding our review, please contact John Bregar in our Office of Ecosystems and Communities at (206) 553-1984.

Sincerely,

A handwritten signature in black ink that reads "Richard B. Parkin".

Richard B. Parkin, Manager
Geographic Implementation Unit
Office of Ecosystems and Communities

Detailed Comments on the Nicore Mining Plan of Operations
Environmental Impact Statement

Alternatives Analysis

The draft EIS presents five alternatives to meet the purpose and need, all of which are based on variations on the road configuration in Alternative 1. EPA believes that the alternatives analysis here is very limited and does not accomplish the purposes of the Council on Environmental Quality's (CEQ) NEPA regulations at 40 CFR Part 1500-1504. Specifically, we believe that more information needs to be gathered in order to generate alternatives that truly present options that would have a range of impacts on the environment.

The following should be addressed in the final EIS:

- 1) Possible locations for siting of an alternate stock pile.
- 2) A fuel storage, transportation plan and a spill plan.
- 3) Mitigation plans for the ore stockpiling site.
- 4) Various approaches to mine site development.
- 5) A detailed description of water uses on site and any potential discharges.
- 6) Alternative access routes to the mine site.

In addition, the section entitled 'Alternatives Considered but Eliminated from Detailed Study' provides no justification of why the seemingly viable alternatives discussed therein are eliminated. This explanation is a requirement found at 14 CFR 1502.14(a).

Cumulative Impacts

A cumulative impact as defined by the CEQ is, "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

In the draft EIS on page 4-26, there is reference to a 4,000 acre Patent Application submitted by the applicant. The EIS states,

"Some people believe the high acreage in the patent application indicates that the miner wishes to develop a much larger mine than disclosed at this time. However, no evidence exists to substantiate this concern. The miner has indicated that should this operation prove successful, development of hundreds of acres accessed from the existing roads may follow."

It would appear, based on the miner's intent, that indeed there is evidence to substantiate a concern here. A patent, if issued, would create the potential for a large cumulative impact related

to this project.

The Rough and Ready Watershed is well known for its seclusion and roadless character. We believe the Forest Service has an obligation under NEPA to disclose the fact that if the miner is successful with his current claim, he will continue to mine in this area. If this is the case, there appears to be a direct link between the proposed action and the impacts of future mining if a larger patent were to be issued. This future impact should be disclosed during this EIS process.

Consistency with the Forest Plan

The proposed action would construct approximately .5 miles of new road in Riparian Reserves, which would violate the intent of the Aquatic Conservation Strategy and the Riparian Reserve Standards and Guidelines in the President's Forest Plan. Pages 4-18 to 4-21 in the draft EIS acknowledge this point. EPA strongly encourages the Forest Service to re-think this approach and exercise as much deference as possible toward the goals of the Aquatic Conservation Strategy. The fact that Rough and Ready Creek is a unique and valuable resource known for its pristine, clear flowing waters and the project site is within the South Kalmiopsis Inventoried Roadless Area emphasizes the need to ensure that the purposes of the President's Forest Plan are upheld.

Mitigation, Monitoring and Reclamation

The draft EIS is deficient in the areas of mitigation, monitoring and reclamation. The final EIS should include a reclamation plan which includes appropriate measures to ensure that post mining impacts will be minimized as much as possible. The final EIS should also indicate how much bond money will be posted to fund reclamation.

A monitoring plan should also be included in the final EIS that clearly states when monitoring will occur, what parameters will be monitored, where monitoring sites will be and a commitment to steps that will be taken if monitoring indicates that there is a problem.

Sediment

The draft EIS indicates on page 4-3 that the amount of sediment introduced into the Rough and Ready watershed is not known, yet in the same paragraph and on the table on page 3-3, the amount of sediment in the creek is considered optimum. The final EIS should clarify this confusing point.

Rough and Ready Creek is on the Oregon 303(d) list of impaired water bodies due to temperatures that exceed State water quality standards. The EIS should not assume increases in sediment yield will not affect stream temperature (page 4-5, figure 15); it is possible that sediment delivery will further degrade water quality. The EIS must state that the mining operation will comply with the TMDL for Rough and Ready Creek when it is completed by the Department of Environmental Quality. Further, the EIS must demonstrate that the mining operation will not exacerbate the existing temperature problem in the creek.

**U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action***

Environmental Impact of the Action

LO -- Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC -- Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO -- Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU -- Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 -- Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 -- Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 -- Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

Oregon

March 12, 1998

PARKS AND
RECREATION
DEPARTMENT

OFFICE OF THE
DIRECTOR

Mary Zuschlag, District Ranger
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction, Oregon 97523

Dear Ms. Zuschlag:

This letter is written in response to your request for comments regarding the draft EIS concerning mining access and operation in the Rough and Ready Creek drainage in the Siskiyou National Forest. Oregon Parks and Recreation Department (OPRD) is concerned that additional truck traffic due to mining access near Rough and Ready State Natural Area will result in further deterioration of the site. We are also concerned about the impacts to the larger, botanically-significant and sensitive area.

OPRD would like to our register concern that the proposed mining operations may negatively impact the Rough and Ready State Natural Area, and to recommend that the USFS withdraw the area in question from mining. If the USFS decides to allow the mining activity, we request the following mitigating actions be required of the mining operation.

1. As a natural interpretive site, the truck traffic associated with a mining operation could be quite disruptive from both a site and noise perspective. We request that the number of truck trips per day be limited and that scheduling of these trips be tightly controlled through your permit process. We recommend that truck trips be limited to weekdays only.
2. Dust associated with both the truck traffic and overall mining activity could have negative effects on the highway traffic, recreational users of the site and the health of the plants in areas where dust would fall. Dust abatement should be strictly monitored and controlled.
3. Proposed stockpiles could significantly detract from the natural beauty and interpretive potential of the site. We propose that the piles be very low profile, used for short term storage only, be ~~located~~ well away from the creek, and be covered with either earthtone colored tarps or vegetation.



1115 Commercial St. NE
Salem, OR 97310-1001
(503) 378-5019
FAX (503) 378-8936

4. Clearing areas for future mining should be postponed as long as possible to limit the number of impacted areas at any one time.
5. Overall visual effects of the operation should be considered from the highway, the OPRD Natural Site and from other vantage points and corridors.

OPRD has had mining operations adjacent to its properties over the years, and our overall experience has been that the operations do negatively impact the recreational experience, unless the operation is adequately mitigated and managed to keep the visual, noise and dust intrusions to a very low level.

Thank you for your opportunity to comment.

Sincerely,



Robert L. Meinen
Director

c Andy LaTomme, Area 4 Manager
Brent Siebold, Valley of the Rogue State Park
Matt Craddock, Medford District Office, BLM
(3040 biddle Rd. Mdfd OR 97504)
Nan Evans, OPRD Policy and Planning
Kathy Schutt, OPRD Planning and Resource Management
Jay Schleier, OPRD Natural Resource Management Coordinator



Oregon

John A. Kitzhaber, M.D., Governor

Water Resources Department
942 SW 6th Street
Suite E
Grants Pass, OR 97526
(541) 471-2886
FAX (541) 471-2876

MEMORANDUM

TO: Mary Zuschlag, District Ranger
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction OR 97523

FROM: Bruce R. Sund *BRS*
Watermaster, District 14

DATE: March 20, 1998

SUBJECT: Nicore Mining Plan of Operations
Draft EIS

Thank you for the opportunity to comment on your Draft EIS. Just a few notes.

On page 2-3, Mitigation Included in Alternatives to the Proposed Action should read:

1) f) Oregon Water Resources Permit or Limited Licenses to withdraw water from Rough and Ready Creek (for use in dust abatement and other road activities).

On page 3-2, Water Quantity. Our department has made a number of streamflow measurements during 1997 and will be doing the same this year.

Thanks again. Please let me know if we can be of assistance.

BRS:ar



Oregon

John A. Kitzhaber, M.D., Governor

May 11, 1998

Department of Environmental Quality

Western Region

Salem Office

750 Front St. NE

Suite 120

Salem, OR 97310

(503) 378-8240

(503) 378-3684 TTY

Mary Zuschlag
District Ranger
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction, Oregon 97523

RE: Nicore Mining Plan of Operations - Draft Environmental Impact Statement

Dear Ms. Zuschlag:

As the Department of Environmental Quality, Western Region, Water Quality Senior Hydrogeologist, I was requested to review the **Nicore Mining Plan of Operations - Draft Environmental Impact Statement (EIS)**. I have refrained from discussing the merits of the report, except as they refer to policies outlined in the State's Groundwater Protection Act (ORS 468B.150-190) and Groundwater Quality Protection Administrative Rules (OAR 340-40).

Due to other commitments, I was not able to review the specific guidelines delineated in the Siskiyou National Forest Plan, the Medford BLM District Resource Management Plan, or the Northwest Forest Plan, as they refer to the Nicore Project location. Nor did I have an opportunity to review files at the district ranger station in Cave Junction.

From my perspective as a hydrogeologist, the primary default issue with the EIS was that the plan failed to delineate those activities required to insure groundwater quality would be protected. In particular:

1. The five acres set aside for ore drying will require enhanced institutional controls to prevent spills, an impermeable surface pad, leachate collection and treatment, and groundwater monitoring to assure and confirm no adverse impacts at these locations.
2. Those areas designated for ore and overburden removal require hydrogeologic characterizations to evaluate potential adverse impacts to groundwater quality due to infiltration and seepage.
3. The delicate balance between groundwater recharge from streams, as well as discharge to streams along select areas of the project was not investigated.

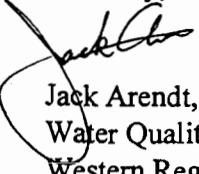
Mary Zuschlag
May 11, 1998
Page 2

4. The proposed seasonal method of operation and the annual bridge and culvert installation and removal activities imply that surface water quality could be aggravated by this methodology, as opposed to more permanent structures. A correlation of the options would be advantageous.

Albeit some of these issues may be addressed later, as a function of Nicore's NPDES or WPCF permit requirements, the likelihood of adverse groundwater impacts should be referenced in the EIS.

Thank you for the extended opportunity to submit these comments. Please feel free to call or write me to discuss any specifics relative to Oregon's Groundwater Quality protection rules, regulations or guidelines as they pertain to this (or any other) project. I can be reached in the Salem office at (503) 378-8240, extension 240.

Sincerely,


Jack Arendt, R.G.
Water Quality Senior Hydrogeologist
Western Region - Salem Office

JJA:jjc
x:jarendt\Nicore EIS comments

cc: Dennis Belsky - DEQ, Medford Office
Jon Gasik - DEQ, Medford Office

Congress of the United States

Washington, DC 20515

May 20, 1998

Mr. Mike Dombeck
Chief
USDA - Forest Service
14th and Independence Avenue, S.W.
Washington, D.C. 20090

Dear Chief Dombeck:

We are writing to ask that you take a number of actions with regard to mining claims in the Rough & Ready Creek Watershed on the Siskiyou National Forest. We are convinced that this outstanding natural area is inappropriately threatened by the proposed Nicore mining proposal.

First, we request that the Forest Service discontinue public funding of the Nicore Environmental Impact Statement until such time as the mining claims are subject to a validity examination.

And second, we ask that the area encompassed by the South Kalmiopsis roadless area, the Rough and Ready Botanical Area, and the Rough and Ready Area of Critical Environmental Concern be withdrawn from mineral entry.

As you know, in January the Forest Service released a Draft Environmental Impact Statement for the Nicore mining proposal to mine nickel and chromium for the manufacture of stainless steel. How or where this processing would take place has thus far not been disclosed.

Rough & Ready Creek flows into the Illinois Wild and Scenic River, and the Creek itself was found eligible for Wild and Scenic River status in 1993. The Outstanding Remarkable Values identified on Rough & Ready Creek include hydrological, geological, wildlife, and botanical characteristics. The watershed is renowned for its botanical diversity and high concentrations of rare plants. Both the Forest Service and Bureau of Land Management have documented the unique nature of this public land with their designations of the Rough & Ready Botanical Area and the Rough & Ready Area of Critical Environmental Concern (ACEC) respectively.

Indeed, the Forest Service has already acted to protect this unique landscape by establishing this area as off limits to timber harvest in the National Forest Plan. In addition, residents living next to the project obtain drinking water either directly from Rough & Ready Creek or via ditch recharge of shallow wells. Clearly, a mine of this character threatens the exact resources the agency has already found critical to protect.

The proposed plan of operation would build some 14 miles of road through the Botanical Area, ACEC, roadless area, and riparian reserves. It would involve construction of six crossings of the mainstem Rough & Ready Creek, and 10 crossings of its tributaries. It proposes to stockpile the ore in the Area of Critical Environmental Concern. It would initially excavate 35 acres at four separate pit sites all in the South Kalmiopsis roadless area, with the possibility of future

Mr. Mike Dombeck
May 20, 1998
Page 2

development and expansion of these sites due to the massive extent of the mining claims.

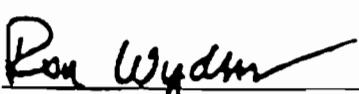
Again, we ask you to withdraw this remarkable area from mineral entry. A watershed analysis completed by the Forest Service for the West Fork subbasin, which includes the Rough & Ready Creek watershed, found that this area ranks number one in the State of Oregon for botanical diversity.

We were surprised to learn that the Forest Service decided to proceed with the environmental review of this proposal at public expense, especially when the project so clearly conflicts with the management priorities already established, and where there has been no validity examination. These costs should be paid by the mining claimant, not the taxpayer. At a time when the Forest Service is actually requiring people to pay for the privilege of hiking on a National Forest trail, it is indefensible that money can be found to expedite an environmentally disastrous mining proposal.

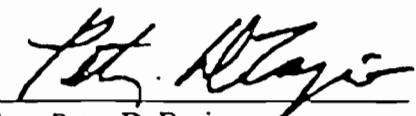
As you know only too well, the mining law puts the agency in the difficult position of treating mining as a use which must be accommodated at the expense of whatever public or ecological values exist at the same place. That does not, however, prevent you, and for that matter, us, from using every possible authority to prevent this project from going forward. That is our intent, and we ask that it be the Forest Service's, as well.

Thank you for your attention to our request. We look forward to hearing from you.

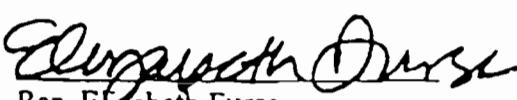
Sincerely,



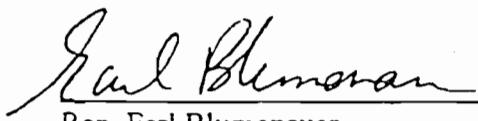
Senator Ron Wyden



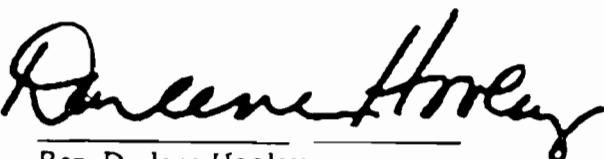
Rep. Peter DeFazio



Rep. Elizabeth Furse



Rep. Earl Blumenauer



Rep. Darlene Hooley



UNITED STATES DEPARTMENT OF COMMERCE
Office of the Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

December 10, 1998

Mr. Joel T. King
District Ranger
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction, Oregon 97523

Dear Mr. King:

Enclosed are comments on the Draft Environmental Impact Statement for Nicore Mining Plan of Operations Siskiyou National Forest, Josephine County, Oregon. We hope our comments will assist you. Thank you for giving us an opportunity to review this document.

Sincerely,

Susan Fruchter

Susan B. Fruchter
Acting NEPA Coordinator

Enclosure



Printed on Recycled Paper



MEMORANDUM FOR: Susan B. Fruchter
Acting NEPA Coordinator

FROM: Charles W. Challstrom
Acting Director, National Geodetic Survey

SUBJECT: DEIS-9811-05 - Nicore Mining Plan of Operations Siskiyou
National Forest, Josephine County, Oregon

The subject statement has been reviewed within the areas of the National Geodetic Survey's (NGS) responsibility and expertise and in terms of the impact of the proposed actions on NGS activities and projects.

All available geodetic control information about horizontal and vertical geodetic control monuments in the subject area is contained on the NGS home page at the following Internet World Wide Web address: <http://www.ngs.noaa.gov>. After entering the NGS home page, please access the topic "Products and Services" and then access the menu item "Data Sheet." This menu item will allow you to directly access geodetic control monument information from the NGS data base for the subject area project. This information should be reviewed for identifying the location and designation of any geodetic control monuments that may be affected by the proposed project.

If there are any planned activities which will disturb or destroy these monuments, NGS requires not less than 90 days' notification in advance of such activities in order to plan for their relocation. NGS recommends that funding for this project includes the cost of any relocation(s) required.

For further information about these monuments, please contact Rick Yorczyk; SSMC3, NOAA, N/NGS; 1315 East West Highway; Silver Spring, Maryland 20910; telephone: 301-713-3230 x142; fax: 301-713-4175.



United States Department of the Interior

OFFICE OF THE SECRETARY
Office of Environmental Policy and Compliance
500 NE Multnomah Street, Suite 356
Portland, Oregon 97232-2036

IN REPLY REFER TO:

ER 98/0773

February 2, 1999

J. Michael Lunn, Forest Supervisor
Siskiyou National Forest
P.O. Box 440
Grants Pass, Oregon 97528

Dear Mr. Lunn:

The Department of the Interior (Department) has reviewed the Supplemental Draft Environmental Impact Statement (SDEIS) for the Nicore Mining Plan of Operations (Project), Siskiyou National Forest, Josephine County, Oregon. The following comments are provided for your information and use when preparing the Final Environmental Impact Statement (FEIS).

Page 28. Alternative 9 - Preferred The Department believes the preferred alternative would result in the minimum amount of disturbance from road construction.

The FEIS needs to demonstrate that nickel can be economically recovered from Project ores using existing metallurgy and facilities.

Page 57. Slope Stability Since the proposed pits are small, their six-foot deep depressions are unlikely to destabilize large amounts of slope. Thus, proper mitigation should not be difficult to provide as a Project feature.

Page 60. Stream Crossings, Paragraph In the first sentence, the words "are likely" is incongruent to the preceding context. They should be changed in the FEIS to read: "...are not likely to meet state standards."

Pages 81 and 82. Economic Viability The FEIS needs to use a rigorous model to estimate the economic viability of the Project. The citation of a few general references in the SDEIS, which suggest the Project is uneconomic, is insufficient as metal prices are difficult to predict. The U.S. Geological Survey (USGS) believes the AME Minerals Economics 1998 quote in the SDEIS that cobalt may fall to \$10 per pound is speculative and weak evidence that the Project lacks economic viability. However, other references which have not been cited, predict that cobalt prices will rise. For example, some analysts assert that if the Republic of the Congo situation continues to deteriorate, cobalt prices could increase significantly.

In addition, the comments about global resources needs to be expanded. The implication that the world has plentiful supply of nickel and, therefore, this deposit should not be mined, needs to be rigorously supported in the FEIS. The FEIS also needs to complete the reference to the expanding production capacity at Voisey Bay by noting that Project has no current production and some serious development issues has been encountered.

Even with the revisions in the above paragraphs, the USGS believes it is extremely unlikely that these deposits are economically viable because 1) the tonnage of ore is significantly less than any operating laterite deposit, 2) the ore grades are below those of virtually all operating laterite deposits, and 3) the critical infrastructure needed to develop these deposits is not present. The FEIS should provide a realistic economic model prior to development. It is needed to access that the ore deposits are sufficient for a successful Project.

Thank you for the opportunity to review this DEIS.

Sincerely,



Preston Sleeger
Regional Environmental Officer



United States Department of the Interior



FISH AND WILDLIFE SERVICE
Southwest Oregon Field Office
2900 NW Stewart Parkway
Roseburg, Oregon 97470
541/957-3474 FAX: 541/957-3475

Reply To: 8330.0102 (99)
Log#: 1-5-99-TA-010
X.Ref.: 1-7-98-SP-153

January 28, 1999

Joel T. King, District Ranger
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction, Oregon 97523

RE: Comments on the Nicore Mining Plan of Operations (Plan) Supplemental Draft Environmental Impact Statement (SDEIS)

Dear Mr. King:

Thank you for the opportunity to comment on the Plan SDEIS. These comments are provided to help identify issues associated with the project that may affect species that have been federally listed as threatened or endangered pursuant to the Endangered Species Act of 1973, as amended (Act).

General Comments:

The U.S. Fish and Wildlife Service (Service) sent a species list dated March 31, 1998 for the proposed SDEIS project area in response to a request from the Forest Service. The SDEIS found, based on the species list and other information, that alternatives proposed by the Plan "may affect or are likely to adversely affect" a federally listed species, *Arabis McDonaldiana* (flower). As such, the Forest Service should initiate Section 7 consultation pursuant to the Act (consultation) prior to issuing the final Environmental Impact Statement.

Specific Comments:

Chapter 4, page 70, paragraph 6. "Cumulative Impacts are not precisely known since the population distribution on all laterite deposits have not been inventoried." A complete inventory of the flower needs to be indicated on a map showing the general locations of the two newly discovered populations as well as the previously recorded populations so that an estimate of the cumulative effect to the species can be adequately assessed.

Chapter 4, page 70, paragraph 7. "[The table], Figure 19 displays the number of sites documented within 100 feet of the haul routes, or within the mine sites themselves." The Environmental Consequences section should, at some place, address the specific nature of direct and indirect effects to the flower by alternative as was done in the discussion of the federally listed fish species. This discussion is not presented in the document except to say that there may be adverse effects. The table, Figure 19, does not specifically address the flower. A map should accompany a table that displays the general locations of the flower in relation to the haul routes. It should be accompanied by a detailed discussion of the potential impacts to the flower.

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Chapter 4, page 71, paragraph 4. The Environmental Consequences section of the document needs to explain what kind of direct, indirect and cumulative impacts are specific to individuals and populations of the flower.

Appendix B, page 5, line 2 (below 1st table). Information from The NICORE Sensitive Plants Biological Evaluation of January 26, 1998 should be included in the SDEIS Biological Assessment.

Appendix B, page 13, line 1: "The proposed action and alternatives 6,7,8 and 10 **May Affect - Likely to Adversely affect individuals or habitat...**" This section proposes measures to reduce effects to a level of "may affect - not likely to adversely affect" by rerouting the roads in alternatives 6, 7 and 8 from mining site C to mining site A. "May affect" actions still require consultation with the Service. The Service must evaluate those measures and the Forest Service's Biological Assessment should provide information regarding how occupied and unoccupied suitable habitat will be avoided.

Appendix B, page 16, line 4. "Suitable habitat for *Arabis McDonaldiana* will be identified and no impacts allowed." This is in conflict with the statement from Appendix B, page 13 (above) stating that the plant "may be affected". The Forest Service will need to explain what kind of impacts may adversely affect the plant and the details of the proposed avoidance measures in the Biological Assessment and Appendix to the SDEIS so that the Service can assess the possible impacts to these species.

Appendix B, page 18, row 1. The table indicates that alternatives 6,7, and 8 would each impact 5 populations of the flower and alternative 10 would impact 3 populations of the flower. The Environmental Consequences section of the SDEIS should indicate the number of plants in each population that would be impacted and what kind of impact the plants and population as a whole is likely to incur under each specific alternative.

Appendix B, page 24, row 1. The table lists three populations of the flower that potentially may be impacted. This appears to conflict with the table in Appendix B, page 18 that indicates that three of the alternatives would impact 5 populations of the flower.

Thank you for providing the opportunity to comment on this SDEIS. You may initiate consultation for the flower by written request to Russ Peterson, State Supervisor, at the Service's Oregon State Office at 503/231-6179. If you have any further questions please contact me, Craig Tuss at 541/957-3470.

Sincerely,



Craig Tuss
Field Supervisor

cc: Andy Robinson, FWS-OSO, Portland, OR (e)
Office Files, FWS-OSO, Portland, OR (e)
Merle Richmond, FWS-RO, Portland, OR (e)



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, Washington 98101**

February 4, 1999

Reply To
Attn Of: ECO-088

Joel T. King, District Ranger
Illinois Valley Ranger District
Siskiyou National Forest
26568 Redwood Highway
Cave Junction, OR 97523

Re: Nicore Mining Plan of Operations Supplemental Draft Environmental Impact Statement

Dear Mr. King:

We have received and reviewed, in accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act (CAA), the Nicore Mining Plan of Operations supplemental draft environmental impact statement (EIS) for mining of nickel laterite on 35 acres of land over the next 10 years in the Rough and Ready Creek Watershed.

We have rated the EIS as EC-2, (Environmental Concerns - Insufficient Information). We are concerned with mining in the Rough and Ready watershed because of the unique ecological values of the area. We understand this is one of the most botanically diverse areas in Oregon. We also understand that many scientists and visitors come to study and enjoy this area. This area is eligible for Wild and Scenic River designation, has high visual quality and roadless characteristics. In addition, we are concerned about the cumulative impacts should the mine prove successful. The miner says, he may develop hundreds of more acres within the 4000 acre patent (p. 88). Information is needed in the draft EIS on monitoring plan, mitigation plans

We are concerned with a mining project in such an environmentally sensitive area, especially if it is determined that this will not be an economically viable project because of the low price of nickel on the world market. Although not stated in the EIS, an underlying Purpose and Need for this project is to mine nickel ore to supply a nickel demand. If there is insufficient demand, the need for the project is low and must be weighed against the environmental costs to this biologically diverse area. We believe the economic viability of the project and the need for the project must be ascertained and presented to the public before a decision to allow the mine to proceed. Therefore, in light of the uncertain economic viability of this project, the preferred alternative (alternative 9) is a reasonable and cautious approach if the laws, regulations, and policies governing the development of such a mining claim truly prohibit the Forest Service (FS) and Bureau of Land Management (BLM) from denying outright the plan of operation (no action).

An explanation of the EPA rating system for draft EISs is enclosed for your reference. This rating and a summary of these comments will be published in the Federal Register. If you have questions, please contact Andy Smith in our Office of Ecosystems and Communities at (206) 553-1750.

Sincerely,



Richard B. Parkin, Manager
Geographic Implementation Unit

enclosure

Environmental Protection Agency (EPA) Detailed Comments on
Nicore Mining Plan of Operations Supplemental Draft Environmental Impact Statement

General Comments

The supplemental draft EIS does an adequate job displaying impacts from the various access/mine development alternatives and the range of alternatives appears to cover the reasonable access options quite well. However, it is lacking some information as indicated below. We prefer the No-Action alternative but support the preferred alternative if the FS and BLM give rationale on why they can not select the No-Action alternative.

Please be more specific with the statement on page 28 for the preferred alternative. "Once the miner completed the sampling, he could submit a new Plan of Operations, with additional economic and operational analysis based on the findings of the sample processing. That plan would be subject to appropriate environmental analysis." We would like to be sure that the appropriate environmental analysis would be done under NEPA with the requisite public involvement and environmental impact analysis.

Specific Comments

Reclamation and Monitoring Plans - The reclamation plan is a required part of the Plan of Operation and will be included prior to final approval (p. 21). A full monitoring plan would be developed for the final plan or operation (p. 24). Both of these plans need to be in this supplemental draft EIS. It will be too late for public review by the time the Plan of Operation becomes final.

Water Quality - The supplementary draft EIS points out that Rough and Ready Creek exceeds State water quality standards for temperature during the summer when the flow is low. For completeness, expand on this point in the final EIS. Explain that not only does it exceed the water quality standard for temperature but that it has been legally listed as impaired under Section 303(d) of the Clean Water Act. This listing sets into motion legal requirements for Oregon to take actions, such as the development of Total Maximum Daily Loads (TMDLs), that will bring the Rough and Ready Creek back into compliance to the standard. Withdrawing water for dust abatement may degrade the water quality further. The EIS should state that the mining operation for each alternative will comply with the TMDL when it is completed and in the meantime will not further degrade the water quality. The EIS must explain the steps that will be taken to avoid further degradation of temperature conditions in the stream. We are pleased to read that Nicore intends to obtain the necessary permits from the Oregon Department of Environmental Quality. This should help ensure no further degradation of water quality and compliance with any future TMDL requirements.

Affected Environment - There is no discussion of rainfall or other forms of precipitation. In order to determine whether there might be a discharge from the mine pits (which would require an NPDES permit if the discharge was to waters of the U.S.), net precipitation should be determined for both average and extreme wet years (reasonable worst case over the life of the project).

Environmental Consequences - It is stated on p. 57 that the holding capacity of the pits could be exceeded. In addition to determining possible extreme precipitation events, consideration should be given to using such events for design purposes in sizing pits to contain storm water rather than allowing a discharge (assuming no or limited infiltration).

References - Other than the list of files available, there are no references cited in a bibliography. For instance, there is no citation for the reference on p. 82 to AME Mineral Economics 1998.

**U.S. Environmental Protection Agency Rating System for
Draft Environmental Impact Statements
Definitions and Follow-Up Action***

Environmental Impact of the Action

LO -- Lack of Objections

The Environmental Protection Agency (EPA) review has not identified any potential environmental impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC -- Environmental Concerns

The EPA review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce these impacts.

EO -- Environmental Objections

The EPA review has identified significant environmental impacts that should be avoided in order to provide adequate protection for the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no-action alternative or a new alternative). EPA intends to work with the lead agency to reduce these impacts.

EU -- Environmentally Unsatisfactory

The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the Council on Environmental Quality (CEQ).

Adequacy of the Impact Statement

Category 1 -- Adequate

EPA believes the draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis of data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.

Category 2 -- Insufficient Information

The draft EIS does not contain sufficient information for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the action. The identified additional information, data, analyses or discussion should be included in the final EIS.

Category 3 -- Inadequate

EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the National Environmental Policy Act and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

* From EPA Manual 1640 Policy and Procedures for the Review of Federal Actions Impacting the Environment. February, 1987.

Congress of the United States
House of Representatives
Washington, DC 20515-3702

February 8, 1999

Joel King
26568 Redwood Highway
Cave Junction, Oregon 97523

Dear Joel:

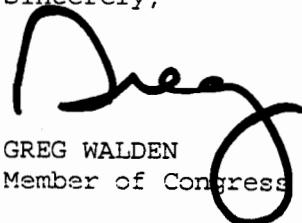
Thank you for contacting me regarding the Rough & Ready Creek controversy. I appreciate hearing your insights into this matter.

As you know, the proposed Nicore mine along the Rough and Ready Creek in the Siskiyou National Forest has inspired concern about the environmental impact of the project. The mine, which will draw nickel, chromium and iron ore from the soil, was first proposed in 1992, and will cover a total of 35 acres. If approved, Nicore will be the sole nickel mine in the United States.

I support a fair and responsible solution that will balance environmental concerns with the contract rights of the mine's owner. Further, I believe any decision regarding Nicore's proposal should be made in accordance with the General Mining Law of 1872 and current environmental regulations. Please rest assured that I will continue to monitor this matter as it continues to develop.

Thanks again for contacting me. Please keep in touch.

Sincerely,


Greg Walden
Member of Congress

GW/jte

RECEIVED

FEB 17 1999

ILLINOIS VALLEY
RANGER DISTRICT

APPENDIX C

SURFACE USE DETERMINATION

UNITED STATES
DEPARTMENT OF AGRICULTURE
FOREST SERVICE

SURFACE USE DETERMINATION
FOR THE PROPOSED PLAN OF OPERATIONS
OF WALTER B. FREEMAN FOR THE NICORE PROJECT
SISKIYOU NATIONAL FOREST

LANDS INVOLVED

T. 40 S., R. 9 W., WM, Josephine County, Oregon
Secs 4, 8, 9, 10, 11, 14, 15, 16, 22

Prepared by:

R.J. Gauthier-Warinner
Area Mining Geologist
October 1, 1996



Technical Review:

Reb Bennett

Regional Mining Engineer

Dec 13 1996
Date

Management Acknowledgement:

Mike Lunn

Forest Supervisor

Oct. 9, 1996
Date

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SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A request was made by the Illinois Valley District Ranger for me to conduct a Surface Use Determination of a proposal submitted in the form of a Plan of Operations by Mr. Walter B. Freeman on December 17, 1992 for two-phase development of a mine to remove nickel-bearing laterite. The proposal includes construction/reconstruction of approximately 14 miles of road for access and hauling the material to an offsite stockpile facility not on Forest lands. This entails crossing of Rough and Ready Creek in six locations and five crossings of its tributaries. Rough and Ready Creek has been determined eligible by the Siskiyou National Forest for inclusion to the National Wild and Scenic River System.

Selected items discussed in this Surface Use Determination are based on information provided by Mr. Freeman which I believe to be proprietary in nature; therefore, I have edited this copy of the report to delete reference to them.

I believe the proposal to remove a bulk sample of nickel-bearing laterite for use in developing an offsite pilot-prototype smelting facility for direct reduction to stainless steel is reasonable for this stage of Mr. Freeman's proposed operations.

The laterite within the subject lands appears to contain satisfactory nickel to meet specifications for a lower grade stainless steel; however, it appears to lack sufficient chromium for this purpose. This does not entirely discount the value of this material for production of stainless steel; but identifies an apparent need for additional sources of chromium.

Overall, the Plan of Operations submitted by Mr. Freeman does not provide an adequate basis for conducting a detailed analysis of the effects of the proposal on Forest surface resources. I recommend that the Plan of Operations be returned to Mr. Freeman for the following reasons accompanied by a statement of his right to appeal:

- There are no development plans for the four sites where the bulk laterite sample is proposed for removal.
- There is no plan discussing construction/reconstruction of roads on Forest lands.
- There is no road maintenance plan.
- There is no plan detailing construction and maintenance of proposed washed rock crossings of Rough and Ready Creek.
- There is no evidence of the existence of a facility to smelt 5,000-ton (4,535 tonnes) sample of nickel-bearing laterite. Alternately, there is no evidence of a signed contract with a smelter for this purpose.
- The incorporation of a proposal for large-scaled production is unreasonable for this stage of the operation and should not be included in the Plan of Operation. More properly, the Plan of Operation should be amended to address this proposal if the results of bulk testing are determined to favor development of a mine.

I recommend that Mr. Freeman submit a Plan of Operations addressing these deficiencies and limiting the scope to that of bulk sampling. Additionally, the amended Plan of Operations should address the following problems noted in the current Plan of Operations:

- Forest engineers believe that 6-wheel drive articulated haul trucks will require a

larger road width than 10 feet.

- How many 25-ton (22.7 tonne) articulated haul trucks will be utilized during Phase 1 of the proposed operation?
- How much material is expected to be excavated to obtain 5,000 tons (4,535 tonnes) of 1"-minus laterite material for smelting?
- Will a 1 cubic yard (0.75 cubic meter) or 2 cubic yard (1.5 cubic meter) excavator be utilized in the proposed operations?
- Petroleum products will be needed for excavation site equipment. There is no discussion of use and storage of fuel, lubrication, hydraulic fluid, etc. in Item H of the Plan of Operations. Will these be hauled to the site on a daily basis? A spill plan should be included as part of the Plan of Operations.
- Will nickel-bearing saprolite be scrubbed from +6-inch (+15.25 cm) boulders before discarding them. If so, presumably it would be done at the mine site. How will it be done?
- Can refinement of the metallurgical process for the available grade of laterite and determination of the feasibility of a production-scaled operation be achieved using a smaller than 5,000 ton (4,535 tonnes) laterite sample?
- What facilities will be utilized for reduction of the bulk sample of nickel-bearing laterite? Are they currently available?

When a Plan of Operations has been received from Mr. Freeman, I recommend that it be immediately reviewed by the Forest for satisfactory content of information. When the Plan of Operations is accepted by the Forest, I recommend beginning work on the EIS. Dependent on the success of Phase 1, Mr. Freeman may amend the Plan of Operations to address full-scale development of the mine.

In his original Plan of Operations dated March 16, 1992, Mr. Freeman proposed to remove 10,000 tons of nickel-bearing laterite from the single location in Section 22. In his current Plan of Operations, he proposes to remove 5,000 tons of this material from that location and three other locations. There appears to be ample sample data on the grade of the nickel-bearing laterite in all four locations and there is no proposal in Phase 2 to mine and reduce laterites from all four sites simultaneously, so it does not appear that the material from the four locations will be blended before reduction. I recommend that he substantiate the need to remove laterite from the added three locations in such an environmentally sensitive area.

There is no information to suggest that Mr. Freeman currently has a pilot-prototype direct reduction facility for smelting 5,000 tons (4,535 tonnes) of nickel-bearing laterite. Forest approval of any activities associated with road construction/reconstruction, excavation of the sample, and hauling of the sample to the stockpile facility is based on the assumption that the sample will be smelted within a reasonable period of time after excavation. If smelting of the sample does not occur, there is no need for its removal. Consequently, I recommend that the Forest require information in the Plan of Operations regarding the location of this facility and when it will be constructed and available for the proposed use. I recommend, that prior to acceptance of the Plan of Operations and beginning work on the EIS, the Forest consider the likelihood that the facility will be available for this purpose. I recommend that the facility be available and ready for reduction of nickel-bearing laterite or a signed contract with a smelter be executed as a condition for approval of the Plan of Operations.

I recommend that the proposed leg of the Alberg Road that parallels and is nearly level with the creek be relocated higher onto the hill to the east. As evident in Photo 4, this leg of the road

almost entirely consists of boulders and no fine material. To make this leg of road usable for travel would entail annual incorporation of a large amount of fine material into its surface. Because the road appears to be within the high-water channel of the creek, any introduced fine material would be flushed during high water events and increase the amount of scouring and sedimentation in downstream Rough and Ready Creek.

I recommend that the Forest consider authorization of any activities under the Plan of Operations be limited to beginning work within one or two years of issuance of the Decision Notice. After that, the authorization would no longer be effective.

INTRODUCTION

The purpose of this report is to determine whether surface disturbing activities proposed by Mr. Walter B. Freeman in his Plan of Operations dated December 17, 1992 are reasonably incident to the overall development of a mine to remove nickel-bearing laterite for production of high-nickel, high-chrome steel.

The Plan of Operation is twofold in purpose. In Phase 1, Mr. Freeman proposes to remove 5,000 tons (4,535 tonnes) of nickel-bearing laterite and haul it to an offsite stockpile area not on Forest lands. He proposes to remove this material from four sites, each approximately 0.2 acres in size, located within the Chance 13 (ORMC 020327), Chance 83 (ORMC 020396), Ace 3 (ORMC 020207), Ace 72 (ORMC 020274), and Ace103 (ORMC 020298) placer mining claims, part of a 9,840-acre (98.4 hectare) claim group. The material will be excavated and stockpiled utilizing a 1 cubic yard (0.75 cubic meter) hydraulic excavator, then loaded by a five cubic yard rubber-tired loader into a diesel-powered portable screening plant. It will then be hauled over a period of 20 days by one or two 25 ton (22.7 tonne) six-wheel-drive articulated dump trucks to a millsite on nearby BLM land and stockpiled for use in developing a pilot-prototype operation. Access to the excavation sites, as proposed by Mr. Freeman, will entail construction/reconstruction of approximately 14 miles (22.5 km) of road suitable for hauling nickel-bearing laterite, crossing of Rough and Ready Creek in six locations, and five crossings of its tributaries. All will occur on Forest lands.

Contingent on the success of Phase 1, Phase 2 would entail mining 40,000 tons (36,287 tonnes) of nickel-bearing laterite per year between June 15 and October 15 from at least one of the four locations over an unidentified amount of time.

Mr. Freeman was notified by the District Ranger in a letter dated July 12, 1993 that the preparation of an Environmental Impact Statement is necessary to analyze the affects of his proposal on: 1) Wild and Scenic River eligibility of Rough and Ready Creek, 2) numerous rare or sensitive plant species that occur in the area, and 3) fisheries habitat and water quality of Rough and Ready Creek.

Opinions and conclusions in this report are based upon a review of available literature as well as upon field observations. This report should not be used for purposes other than that for which it was prepared.

LANDS INVOLVED

The proposed activity will be conducted within the the following described lands of the Illinois Valley Ranger District, Siskiyou National Forest and are depicted in the Buckskin Peak and O'Brien 7½' quadrangles:

T. 40 S., R. 9W., WM, Josephine County, Oregon
Secs. 4, 8-11, 13-16, 22

The subject lands, located approximately 3 miles (4.8 km) northwest of O'Brien, Oregon, are presently accessed by unimproved road beginning at U.S. Highway 199 immediately south of the bridge over Rough and Ready Creek and crossing BLM, Forest Service, State, and private lands. There is no right-of-way across private lands and general travel over them is restricted by locked gates.

General land uses are residential, recreation, and timber management.

In 1993, a Wild and Scenic River Eligibility Study of Rough and Ready Creek was completed by the Siskiyou National Forest. The mainstem Rough and Ready Creek from the National Forest boundary in Section 13 to the confluence of North Fork Rough and Ready Creek and South Fork Rough and Ready Creek was determined to be free-flowing. Botanical, ecological, wildlife, geological, and hydrologic resources were identified to be its Outstanding Remarkable Values. The segment from the National Forest boundary to the junction of roads 441 and 442 was determined to be eligible for a highest level of classification of Recreation. The segment from the junction of roads 441 and 442 to the confluence of North Fork Rough and Ready Creek and the South Fork Rough and Ready Creek was determined to be eligible for a highest level of classification of Scenic.

North Fork Rough and Ready Creek from its confluence with the mainstem upstream to its headwaters including both unnamed forks and Rough and Ready Lakes was determined to be free-flowing. Botanical and ecological resources were identified to be its Outstanding Remarkable Values. A one-quarter mile (0.4 km) segment just upstream from its confluence with South Fork Rough and Ready Creek was determined to be eligible for a highest level of classification of Scenic. The remainder of the North Fork Rough and Ready Creek was determined to be eligible for a highest level of classification of Wild.

A Wild and Scenic River Suitability Study of Rough and Ready Creek has not been prepared.

STATUS RECORD DATA

The following information regarding the subject lands was taken from BLM records:

October 2, 1975	Location of Chance #83 (ORMC 020396)
September 14, 1974	Location of Ace #72 PMC (ORMC 020274)
September 4, 1974	Location of Ace #3 PMC (ORMC 020207)
September 3, 1974	Location of Chance #13 (ORMC 020327)
September 1, 1974	Location of Ace #103 PMC (ORMC 020298)
December 27, 1961	PL 167 determination completed, OR 011506. Surface managed by U.S. Forest Service.
October 5, 1906	Proclamation withdrawing Siskiyou National Forest
April 29, 1903	GLO Order Temporary Withdrawal of Forest Reserve

PYSIOGRAPHY

From the apex of the fan to a point about 3.4 miles (5.5 km) upstream, the subject lands are characterized by a well-confined, relatively wide flood plain in which the stream is moderately sinuous. Upstream the channel straightens as its grade significantly increases. Lateral drainages are generally straight and range in grade from about 10% to 20%. Confining slopes tend to gradually steepen as they rise from the valley floor to about 35% to 45% in the steepest segments and quickly taper to elongated narrow ridges. Elevations range from approximately 1,570 ft (480 m) above mean sea level (MSL) where Rough and Ready canyon opens into the Illinois River plain to approximately 4,000 ft (1,220 m) above MSL to the north on the divide between Rough and Ready Creek and Josephine Creek. Steep canyons flattening to broad deeply weathered ridges with lateritic soils suggest relatively rapid uplift of a mature erosion surface formed under humid conditions.

The area is located in the rain shadow of the coastal Klamath Mountains. The climate is characterized as maritime with fairly hot, dry summers and warm, wet winters. It has a mean winter temperature of about 39°F (4°C). During the summer and early fall, maximum daily temperatures often exceed 98°F (37°C). Annual precipitation averages 30 in (75 cm) - 45 in (115 cm).

Rough and Ready Creek is one of the most diverse areas of the Forest in terms of rare plants, hosting about 22 sensitive plants and an additional 8 plants on the watch list. The Illinois Valley District Botanist reported that several rare plant sightings near the creek crossings and along the proposed haul route have been documented. *Hastingsia bracteosa*, the rarest plant found on the Siskiyou National Forest has been observed in this area.

GEOLOGIC SETTING

The subject lands are situated within the Western Jurassic terrane of the Klamath Mountain geologic province. This province is a west-facing arcuate region spanning a distance of approximately 320 km from near Red Bluff, California to near Roseburg, Oregon. It is the result of tectonic accretion of Paleozoic-aged and Mesozoic-aged fragments of oceanic crust and island arcs forming a series of eastward-dipping imbricate slices of marine arc-related meta-volcanic and meta-sedimentary rocks intermingled with ultramafic and other ophiolitic rocks. This is depicted in Figure 3.

The Klamath Mountains originated as an island archipelago that extended from British Columbia through Washington, Idaho, Nevada, and into California during the upper Paleozoic and into Early Jurassic (175 Ma). They were accreted to the North American continent during the Middle Jurassic (165 Ma). At that time, a subduction zone between the oceanic plate and the continental plate created a series of volcanoes atop of the older accreted terrains and subsequent development of the Western Hayfork Terrane and related plutons. About 160 Ma, the active volcanic arc began to shift westward, leaving a remnant arc. This was followed by a period of strong extensional tectonics and emplacement of a mafic dike swarm within the remnant arc. Continued rifting opened a narrow back-arc basin and subsequent formation of the Josephine ophiolite within it (157 Ma). The Rogue Formation and Chetco mafic intrusive complex developed on the active arc as it continued to migrate westward from the remnant arc. Contemporaneously, the Galice Formation, the product of erosion of the remnant arc and its basement rocks, was deposited as a submarine fan which prograded across the basin and

out onto the flanks of the active volcanic arc. At approximately 153 Ma, arc magmatism began to migrate eastward, resulting in widespread emplacement of calc-alkaline dikes and sills in the Josephine ophiolite and overlying Galice Formation and intrusion of the Bear Mountain plutonic complex east of the back-arc basin. At approximately 150 Ma to 145 Ma during the Nevadan Orogeny, the active arc, back-arc basin, and the remnant arc were accreted to the North American continent and imbricated into a series of east-dipping underthrust sheets accompanied by intense deformation, regional metamorphism, and the intrusion of four northeasterly-trending belts of granitic plutons (Harper, et al, 1984). Until about 140 Ma, the end of the Jurassic Period, extensive erosion nearly leveled the province, exposing the Galice metasediments and intrusive rocks (Broeker, 1994).

During the Cretaceous Period, the sea transgressed eastward, covering much of Oregon. In the Klamath province, this is represented by deposition of the clastic sediments of the Humbug Mountain Conglomerate, Rocky Point Formation, and Hornbrook Formation. This defines a major unconformity with the underlying Late Jurassic rocks. About 70 Ma, there was a rapid northwestward regression of the Cretaceous seas.

By early Eocene time (55 Ma) the southern end of the shoreline lapped against the northern edge of the Klamath Mountains. Well-developed river systems carried sands and silts into the forearc basin along the margin of the mountains. Rejuvenated uplift during Miocene times (25 to 5 Ma) and continuing to the present has caused intensive erosion of the province, creating the steep landscape visible today.

LOCAL GEOLOGY

The subject lands are underlain by harzburgite of the Josephine ultramafic sheet. Along the east face of Rough and Ready Ridge the peridotite has been completely serpentined and somewhat sheared. Soils occur as residual patches of an uplifted mature erosion surface formed under humid conditions. Slumping is common.

MINERAL DEPOSITS

Nickel-bearing laterite deposits have formed in many of the residual soils on ridge tops and on benches and generally increase in grade with depth. Deposits on the steeper slopes are generally more rocky and lower in grade.

The laterite is a soil that is reddish at the surface, becoming a dark brown mottled clay at depth and finally an olive-colored or blue gray-colored clay and saprolite at greater depth. It is comprised of heavily iron-oxide stained fine soil and loose boulders with surface accumulations of hematite-magnetite pellets, quartz boxwork at depth, and the nickel-enriched mineral garnierite. Generally, the nickel content increases with depth to the saprolite; then rapidly decreases when reaching fresh peridotite.

Deposits proposed for sampling by Mr. Freeman in his Plan of Operations are on Parker Ridge, on South flank Rough Mountain, in the Rough and Ready Creek area, and on Rough and Ready Ridge. According to Ramp, 1978, the deposit on Parker Ridge comprises an area of 37 acres (0.37 hectares) having an estimated maximum depth of 16 ft (4.9 m) and an estimated average depth of 6 ft (1.8 m). Average arithmetic grade of soil and saprolite based on limited

sampling by Oregon Department of Geology and Mineral Industries is about 1.00% Ni, 0.1% Co, and 2.0% Cr. Estimated quantity of unweathered rock in soil is 45% by volume.

The deposit of south flank Rough Mountain comprises about 135 acres (1.35 hectares) having an estimated maximum depth of 40 ft (12 m) and an estimated average depth of 10 ft (3 m). Average grade of soil and saprolite is about 1.17% Ni, 0.10% Co, and 2.27% Cr. Estimated quantity of unweathered rock in soil is 40% by volume.

SUMMARY OF ACTIVITIES

Nickel exploration in the subject area began in the early 1950s; however, systematic exploration did not begin until 1968 when Cominco-American, Inc. claimed the area. It maintained an interest in the area until 1970. During this period, the company mapped the area based on interpretation of color aerial photographs combined with results of trenching, augering, and churn drilling.

In 1973, Inspiration Development Company acquired the property. Until 1978, the company's work consisted of systematic seismic surveying to determine depth to unweathered bedrock, drilling, backhoe sampling, screening and weighing of samples to determine weight percent of unweathered rock larger than 6 in (15.2 cm) in the laterites, and metallurgical testing of bulk samples of soil and saprolite.

Currently, Walter B. Freeman owns and maintains the claims. He has performed road maintenance and some sampling as assessment work.

FIELD INVESTIGATION AND SAMPLING PROCEDURES

I visited the area of the subject lands on two occasions with John Nolan, Illinois Valley Ranger District Minerals Technician. On November 9, 1995, we were unable to ford Rough and Ready Creek at the stream crossing in the NE $\frac{1}{4}$ of Section 15 with a 4x4 vehicle because the channel was too deep; therefore, we only visited the proposed excavation site located in Section 22. I observed the occurrence of metallic material that had the appearance of iron shot at several of the locations where prior sampling had been done near the road. On August 1, 1996, we again visited the subject lands and were able to successfully ford Rough and Ready Creek at the stream crossing in the NE $\frac{1}{4}$ of Section 15 with a 4x4 vehicle. We attempted to ford the creek again at the stream crossing near the center of Section 15 to visit the proposed excavation site located in Section 16, but were unsuccessful because the channel was too deep (see photos 1, 2, and 3). We then attempted to drive the Alberg road to the proposed excavation site located in Section 8. Not far into Section 10 we had to stop because the roadbed was comprised almost exclusively of large boulders which had become difficult to traverse by vehicle (see photo 4). We then drove to the proposed excavation site located near the boundary between Section 11 and Section 14. From this location, I was able to get a good perspective of most of the area of proposed operations (see photos 6, 7, and 8). No samples were taken during either visit to the subject lands.

ANALYSIS AND EVALUATION OF SURFACE USE

Mr. Freeman's immediate proposal (Phase 1) is to remove 5,000 tons of nickel-bearing laterite over a span of 20 days and haul it to an offsite stockpile area not on Forest lands. As stated in his Plan of Operations, his long-range proposal (Phase 2) is to mine and transport to an offsite stockpile facility 400 tons of laterite per day from Jun 15 - Oct 30 of each year for an unspecified number of years. Phase 1 would be considered reasonable to attain the objective outlined in Phase 2. The question is: Can this material alone be directly reduced to high-nickel, high-chrome stainless steel?

In his Plan of Operations, Mr. Freeman also discusses the need to improve approximately 14 miles (22.5 km) of primitive roads on Forest lands suitable for hauling laterite, crossing Rough and Ready creek in six locations on Forest lands, and crossing tributaries of Rough and Ready Creek in five locations on Forest lands. He estimated a cost of \$40,000 to do this, which is significantly less than the actual cost because he doesn't consider the added cost of Forest Service road construction standards. In June, 1993, Siskiyou Forest engineers estimated construction/reconstruction and haul costs of \$84,580 for constructing approximately 6 miles (9.7 km) of road proposed by Mr. Freeman in his original Plan of Operations dated March 16, 1992 for access to the single excavation site in Section 22. Based on these cost estimates, I expect estimated construction/reconstruction and haul costs for the current road proposal to be in excess of \$160,000. Siskiyou Forest engineers also considered four alternatives in addition to Mr. Freeman's March 16, 1992 proposal. Construction/reconstruction and haul costs ranged from \$51,194 for approximately 5.6 miles (9 km) of road requiring partial access through private lands without an easement to \$103,481 for approximately 11 miles (17.7 km) of road over Lone Mountain Road and Forest roads 4402, 4402019, and 4402445. These costs could double under the present proposal.

Overall, the Plan of Operations submitted by Mr. Freeman does not provide an adequate basis for conducting a detailed analysis of the affects of the proposal on Forest surface resources. There are no development plans for the four sites where laterite is proposed for removal. There is no plan discussing the proposed improvements of existing primitive roads on Forest lands. There is no road maintenance plan. There is no plan detailing construction and maintenance of proposed washed rock crossings of Rough and Ready Creek. There is no plan of overall mine development and no mine reclamation plan. This inadequacy is not surprising considering that the objective of Phase 1 is to determine the feasibility of producing high-nickel, high-chrome steel from this grade of laterite and, until this determination has been made, no serious consideration would ordinarily be given to mining the deposit. Additionally, the required Plan of Operations should address the following problems identified in his current Plan of Operations:

1. There is a reference on page 2a to a need for access roads having an approximate width of 10 feet (3 m). Forest engineers believe that 6-wheel drive articulated haul trucks will require a larger road width.
2. There is a reference on page 3 to the use of two 25-ton (22.7 tonne) articulated haul trucks during Phase 1 of the proposed operation; however, use of one haul truck is identified on page 4.
3. How much material is expected to be excavated to obtain 5,000 tons (4,535 tonnes) of 1"-minus laterite material for smelting?
4. There is a reference on page 3a to use of a 2 cubic yard (1.5 cubic meter) excavator in the proposed operations; however, use of a 1 cubic yard (0.75 cubic meter) excavator is identified on page 4.
5. Petroleum products will be needed for excavation site equipment. There is no discussion of storage of fuel, lubrication, hydraulic fluid, etc. in Item H, page 6. Will these be hauled to the

site on a daily basis? There is no spill plan.

6. There is no discussion of scrubbing of nickel-bearing saprolite from +6-inch (+15.25 cm) boulders before discarding them. Will it be done? If so, presumably it would be done at the mine site. How will it be done? What equipment is necessary? Will water be used?

7. What facilities will be used for smelting the 5,000-ton (4,535 tonnes) sample of laterite material? Are they currently available? The purpose of 36 CFR 228, Subpart A is to assure that mining activities be conducted so as to minimize adverse environmental impacts on National Forest System surface resources. According to Mr. Freeman's NICORE Project Plan dated December 1, 1992 given by him to Reb Bennett, Regional Mining Engineer, the purpose for removing 5,000 tons (4,535 tonnes) of nickel-bearing laterite from National Forest lands is for use in developing a pilot-prototype facility suitable for direct reduction of the material to high-nickel, high-chrome steel. Consequently, the Forest should require information in the Plan of Operations regarding the location of this facility and when it will be available for the proposed use. The Forest should also require that it be constructed and available for the proposed use or a signed contract with a smelter be executed for this purpose as a condition for approval of the Plan of Operations.

8. The purpose of a pilot facility such as this is to refine the metallurgical process for the grade of laterite available and to determine whether a production-scaled operation is feasible. Can this be achieved using less than 5,000 tons (4,535 tonnes) of laterite?

9. What is the reason for wanting to remove laterite from four locations in such an environmentally sensitive area for use in the pilot facility? There appears to be ample sample data on laterite grade in all of the four chosen locations. Why can't feasibility determination and metallurgical refinement be achieved utilizing nickel-bearing laterite from the location in Section 22 as proposed in the original Plan of Operations dated March 16, 1992? There is no proposal in Phase 2 of the proposal to mine and reduce laterite from all four sites simultaneously, so it does not appear that the material from the four locations will be blended before reduction. This would be considered a sensible alternative to the proposal because it would entail four crossings of Rough and Ready Creek on Forest lands rather than six crossings on Forest lands and one crossing of a tributary on Forest lands for sampling purposes.

According to BLM Medford District Geologist, Gerry Capps, there is no Plan of Operations for use of the millsite as a stockpile or reduction facility. Mr. Freeman has a patent application on file with BLM for numerous mining claims on the deposit; however, first half final certificate has not been issued. According to Dean Delavan, BLM Oregon State Office, the patent application does not appear to include millsites.

In evaluating this proposal, I also examined a copy of Mr. Freeman's NICORE Project Plan dated December 1, 1992. It was not submitted by Mr. Freeman as part of his Plan of Operations. I consider the NICORE Project Plan to contain information of a proprietary nature. Several items discussed in this Surface Use Determination are based on what I believe to be proprietary information and have been removed from this copy of the report.

The NICORE Project Plan discusses delineation of reserves, metallurgy of the laterite, project development, production and marketing of final product stainless steel, and a discussion of environmental considerations. Two reports of metallurgical analysis of samples of lateritic material submitted for testing are attached to the report as appendices. One was prepared by Ralph H. Nafziger, U.S. Bureau of Mines, Albany, Oregon on September 10, 1992 and entitled *Preparation of a master alloy from a southern Oregon laterite*. The other was prepared by INTERPRO, Denver, Colorado on August 14, 1990 and identified as Project No. 902001, *Stainless steel production by direct smelting of nickel laterite ore*. I have several comments

with regard to statements made in the NICORE Project Plan. They are:

1. As reported by Nafziger, nickel and chromium contents of laterite samples submitted by NICORE for direct smelting feasibility testing by Bureau of Mines were in excess of 1% of each element; yet reserves are reported by Mr. Freeman to grade 0.80% nickel and ore cutoff grade is reported by him to be 0.50% nickel. Specifications for nickel content in stainless steels range from 3.50 to 22 weight percent. Alloys produced during testing met specifications for nickel at the low end of the range. Specifications for chromium content in stainless steel range from 11.5 to 26 weight percent. Addition of FeCr would be required to attain suitable chromium levels; therefore, reported reserves containing 1.2% chromium do not contain a sufficient amount of the element to produce the desired grade of stainless steel discussed by Mr. Freeman under MARKETS on page 7 of the NICORE Project Plan. In his conclusion Mr. Nafziger states, "After refining, it is possible that the product alloys could find some applications based on their 'as produced' metal content. In a refining operation, supplementary additions of nickel-bearing and chromium-bearing materials, such as FeNi and FeCr, also could be added to achieve the desired stainless steel compositions." (emphasis added) Note: Mr. Nafziger's analysis is based on treatment of a material fraction that is -20 mesh; significantly smaller than the 1"-minus (2.5 cm minus) material fraction proposed by Mr. Freeman in the Plan of Operations.
2. INTERPRO's conclusion has been edited from this copy of my report because it contains proprietary information. Where will additional FeCr be obtained? These facts would not seem to support the viability of direct smelting the grade of stainless steel, as proposed by Mr. Freeman under MARKETS on page 7 of the NICORE Project Plan, from the laterite material in the identified project area.
3. A second test of laterite samples submitted by NICORE was performed by INTERPRO. INTERPRO's conclusion has been edited from this copy of my report because it contains proprietary information. I presume that the firing of mined laterite in a rotary kiln, as proposed in the Plan of Operations, will have the same effect.
4. INTERPRO states in the last paragraph of page 1 of their report: "The fired ore was mixed with _____ and fed directly to the 50 KVA electric arc furnace for the second test." The identity of this component appears to have been intentionally masked. This sentence has been edited from this copy of my report because it contains proprietary information. What is the component? Was it made a part of the samples submitted later to Nafziger for testing? Was the cost of this component accounted for in the cost of production on pages 8 and 12 of the NICORE Project Plan? If so, where? At Riddle, Glenbrook Nickel Company adds ferrosilicon to the reaction ladle as molten nickel ore is being poured from the furnace into the ladle to promote a rapid exothermic reduction reaction, allowing for greater recovery of the nickel.¹ Is this the component that was later masked in their report?
5. This sentence has been edited from this copy of my report because it contains proprietary information. He describes *Inferred Reserves* as those where sufficient sample data exists to make reasonable projections of tonnages and grades based on geologic factors. He describes *Possible Reserves* as those based on geologic probability and are not verified by conclusive sample data. These terms are not in conformance with the U.S. Geological Survey Classification of Mineral Resources described in USGS Bulletin 1450-A and illustrated in Figure 4 of this report.

Measured resources describe resources of a particular deposit for which quantity is computed

¹Spickelmier, K., *Glenbrook Nickel - Can New Caledonian ore save the only US nickel producer?*: Mining Engineering, September, 1993, p. 1143.

from dimensions revealed in outcrops, trenches, workings, or drill holes; grade is computed from the results of detailed sampling. Sampling sites are spaced so closely and the geologic character is so well defined that size, shape, depth, and mineral content of the resource are well established. *Proven reserves* is a term commonly used by industry to refer to measured resources. *Indicated resources* describe resources of a particular deposit where quantity and grade are computed from information similar to that used for measured resources, but sample sites are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for measured reserves, is high enough to assume continuity between sample points. *Probable reserves* is a term commonly used by industry to refer to indicated resources. *Inferred resources* describe resources based on assumed continuity beyond measured and/or indicated resources, for which there is geologic evidence. They might be supported by samples. *Possible reserves* is a term commonly used by industry to refer to inferred resources.

I believe that Mr. Freeman's use of the term indicated reserves is consistent with that described by USGS as indicated resources because the samples are too widely spaced at 250-foot centers to afford the degree of assurance associated with measured resources, as depicted in Figure 4. For this reason, I do not believe that he has demonstrated the existence of measured resources. His use of the terms inferred (USGS classification) reserves and possible reserves (industry classification) is confusing and suggest different levels of geologic assurance; however, they refer to the same degree of geologic assurance as represented by the term inferred resources in Figure 4. Also, because there is a question as to whether the nickel and chromium grades of the laterite are sufficient to produce the desired product, I do not believe that he has demonstrated that these laterites have a higher degree of economic feasibility than that associated with conditional resources, as depicted in Figure 4.

6. I calculated laterite grades based on information provided in the NICORE Project Plan. While I disagree with Mr. Freeman's resource classifications for reasons stated above, I will use it here to avoid confusion. These laterite grades are:

	Grade of Indicated Reserves	Grade of Inferred Reserves	Grade of Possible Reserves	Overall Grade
Fe				
Ni				
Cr				
Co				
Total tons	This table has been edited to delete reference to proprietary information.			

7. On page 5 of the NICORE Project Plan, stated inferred reserves located in the Woodcock Mountain and Free and Easy Pass areas are based upon a very limited amount of sampling done by Bureau of Mines and Oregon Dept. of Mines and Geology. Again, while I disagree with Mr. Freeman's resource classification for reasons stated above, I will use it here to avoid confusion. When Inferred Reserves located in the Woodcock Mountain and Free and Easy Pass areas and Possible Reserves are not considered, grades calculated on information provided in the report are:

Grade of Indicated	Grade of Inferred	Overall

	Reserves	Reserves	Grade
Fe			
Ni			This table has been edited to delete reference to proprietary information.
Cr			
Co			
Total tons			

8. This clause has been edited from this copy of my report because it contains proprietary information; yet there is no discussion of the range of grades available in the deposit. Presumably the cutoff grade was determined based on the grade range of the laterite and the amount of material that has been determined to be above the target grade. It should be noted that when stated Inferred Reserves located in the Woodcock Mountain and Free and Easy Pass areas and stated Possible Reserves are not considered, the grade of remaining Inferred Resources appears to be less than the cutoff grade.
9. On page 6 of the NICORE Project Plan under the heading METALLURGY, Mr. Freeman stated that the furnace tests confirm that the project laterites can be directly reduced to high-nickel, high-chrome steel. Contrarily, the conclusion of these tests performed by INTERPRO and Nafziger is that the amount of chrome in the ore is not sufficient for this purpose.
10. On page 7 of the NICORE Project Plan under the heading MARKETS, Mr. Freeman's statement has been edited from this copy of my report because it contains proprietary information. In the metal analysis for laterite smelting tests reported by Nafziger, the average Ni content was 3.62 weight percent and the average Cr content was 2.43 weight percent. Alone, these cannot sustain the target requirements.
11. In the Glenbrook operation at Riddle, ore moisture control is critical for minimizing smelter energy costs. Free moisture is reduced to zero and loss of ignition moisture is reduced from a range of 7 - 11.5% to less than 2%. Are these a problem in the subject proposal and, if so, are the costs considered on page 12 of the project plan?
12. On page 10 of the NICORE Project Plan, there is a statement that it should be possible to make 304-grade stainless steel. This cannot be done by direct reduction of this laterite alone. This grade of stainless steel is comprised of about 8% Ni and 18% Cr.
13. On page 10 of the NICORE Project Plan, there is a statement that the slag will be granulated and crushed or, if possible, cast into some usable form. Assuming there is no usable form, how will slag be disposed? Can it pass the Environmental Protection Agency toxicity test? Is this cost accounted for on page 12 of the NICORE Project Plan?
14. The primary purpose of the pilot facility is to determine whether a production-scaled operation is feasible and to refine the metallurgical process for the grade of material available; not to sustain a profit. The revenue figures stated on page 8 of the NICORE Project Plan really have no bearing on this phase of the project and are probably not very reliable. It also gives the impression that this pilot phase of the operation will span a period of years. When is the pilot phase of the operation scheduled to end and the mining phase of the operation scheduled to begin?
15. Taxes, depreciation of equipment, plant amortization, marketing costs, shipping costs, and overhead costs are not identified as costs of production on page 12 of the NICORE Project Plan. Reclamation costs are probably not adequate. I have not verified the accuracy of the stated operating costs.
16. I have not verified the accuracy of the estimated capital costs on page 13 of the NICORE Project Plan; however, the sum of capital costs is not correct. This sentence has been edited from this copy of my report because it contains proprietary information. It should be noted that

no working capital has been identified. It should also be noted that the stated capital costs are only start-up costs. Capital and amortization costs to be recovered over the life of the mine would also include replacement of equipment and renovation of facilities.

I believe that the proposal to remove a satisfactory amount of nickel-bearing laterite for use in developing an offsite pilot-prototype smelting facility for its direct reduction to stainless steel is reasonable for this stage of Mr. Freeman's proposed operations. I question the need for 5,000 tons of ore to accomplish this.

The laterite resource within the subject lands appears to contain enough nickel to meet specifications for a lower grade stainless steel; however, it appears to lack sufficient chromium for this purpose. This does not entirely discount the value of this material for production of stainless steel; but identifies an apparent need for additional sources of chromium.

In his original Plan of Operations dated March 16, 1992, Mr. Freeman proposed to remove laterite for this purpose from the single location in Section 22, believing this to be sufficient for his purposes. In his current Plan of Operations, he now proposes to remove this material from four locations instead of the one location. I question the need to remove this material from four locations in such an environmentally sensitive area because there appears to be a sufficient amount of sample data on grade of the nickel-bearing laterite in all the locations and he does not propose to blend the material from the four locations in the smelter feed.

To my knowledge, Mr. Freeman does not have a facility for smelting 5,000 tons (4,535 tonnes) of nickel-bearing laterite. The Forest has the responsibility to assure that mining and related activities are conducted so as to minimize adverse environmental impacts to National Forest System surface resources. This means that Forest approval of any activities associated with road construction/reconstruction, excavation of the sample, and hauling of the sample to the stockpile facility is based on the assumption that the sample will be smelted within a reasonable period of time after excavation. If smelting of the sample does not occur, there is no need for its removal. Consequently, the Forest should require as part of the Plan of Operations information regarding the location of this facility and when it will be constructed and available for the proposed use. The Forest should consider the likelihood that the facility will be available for this purpose prior to acceptance of the Plan of Operations and beginning work on the EIS. The facility should be available and ready for reduction of nickel-bearing laterite or a signed contract with a smelter be executed as a condition for approval of the Plan of Operations.

The EIS should consider a reasonable scenario of development to be presented by Mr. Freeman. The scenario of development presented thus far is not reasonable because in addition to proposing bulk-sampling for determining the feasibility of the metallurgical process for direct reduction of the laterite to the desired grade of stainless steel, he proposes full-scale mine production which is not certain to occur. The Plan of Operations should be limited to addressing bulk-sampling associated with determining the feasibility of the metallurgical process for direct reduction of the laterite to an acceptable grade stainless steel. This would entail analysis of the effects associated with access, excavation, and transportation of the bulk sample to the stockpile facility.

Dependent on the success of Phase 1, submission of a comprehensive mine development and reclamation plan is warranted. For this later comprehensive mine development and reclamation plan to be considered acceptable for analysis of its environmental effects, it should adequately discuss the long-range plans for depleting the deposit. It should identify an amount of mineable

material based on reasonably foreseeable demand projections for the product. It should identify how the deposit will be depleted and over what span of time. It should address in sufficient detail how reclamation is to be conducted. This is the basis for calculating a sufficient reclamation bond.

It is possible that the proposed activity will not occur subsequent to approval of the Plan of Operations. Consequently, approval of the Plan of Operation should be limited to beginning work within one or two years after issuance of the Decision Notice.

Geologist
October 1, 1996

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APPENDIX D

SELECTED CORRESPONDENCE BETWEEN NICORE AND AGENCIES

APPENDIX D

SELECTED CORRESPONDENCE

Author	Date	Page #
Walter B. Freeman	November 19, 1993	D-1
Mary Zuschlag	November 23, 1993	D - 11
Richard M. Stephens	July 21, 1994	D - 13
Mary Zuschlag	September 13, 1994	D - 14
Mary Zuschlag	January 23, 1997	D - 16
John Nolan	January 31, 1997	D - 18
Richard M. Stephens	February 10, 1997	D - 19
Walter B. Freeman	February 10, 1997	D - 22
Robert C. Korfhage	February 10, 1997	D - 25
Mary Zuschlag	March 3, 1997	D - 27
Walter B. Freeman	March 19, 1997	D - 28
Richard M. Stephens	March 21, 1997	D - 31
Mary Zuschlag	November 6, 1997	D - 33
Richard M. Stephens	December 10, 1997	D - 35
Richard M. Stephens	January 29, 1999	D - 38
Richard M. Stephens	April 1, 1999	D - 47

November 19, 1993

Mary Zuschlag
Siskiyou National Forest
Illinois Valley Ranger Station
Cave Junction, OR 97523

Dear Ms. Zuschlag,

I am submitting some modifications to my plan of operation on the NICORE Project. In the eleven months my operating plan has been under consideration, several issues relating to the plan's workability have been raised. The purpose in amending the plan is to address those issues.

1. Testing (Phase 1) to satisfy requirements relating to metallurgical feasibility, the initial 5000-ton tests must be performed on more than one site. Therefore we have chosen four sample locations that will allow the selection of the most profitable area, which would be mined first.
2. Access: The proposed test work will require the use of the existing road network. I hereby formally reject the various alternative access proposals made by the District Ranger. If the use of the existing road network as outlined in the Plan of Operation and the amendment is held by the District Ranger to require an EIS, I hereby formally request that such EIS be completed in a timely fashion.
3. Phase II: If the metallurgical testing is successful, mining would proceed at the rate of 40,000 tons/year. All aspects of the operation would be identical to those in the testing phase except that the length of the operation would go from 20 days under testing to 120 days/year under production. Any contemplated EIS should consider both testing and production phases.
4. Timing: It has been suggested by Mr. John Nolan that concerns about stream-crossings in Rough & Ready Creek could be reduced if crossings were made after the flows were at a minimum starting about June 15. We feel that this is a worthwhile suggestion and have modified the plan accordingly.
5. Botanical values: We hereby request the assistance of the USFS and its staff in designing both access and pit development so as to minimize impacts to botanical values.

Sincerely,



Walter Freeman
NICORE

PLAN OF OPERATIONS
FOR MINING ACTIVITIES
ON NATIONAL FOREST LANDS

Submitted by Walt B. Freeman Signature Title Date
modifed 11/19/93
Dec. 17, 1992

Plan Received by _____ Signature Title Date

I. GENERAL INFORMATION

- A. Name of Mine/Project NICORE Project
- B. Type of Operation Development
(lode, placer, mill, exploration, development, production, other)
- C. Is this a (new/continuing) operation? (CIRCLE ONE)
If continuing a previous operation, this plan (replaces/modifies) a previous plan of operation. (CIRCLE ONE)
 This plan supersedes previous notices of intent.
- D. Proposed start-up date of operation May 1, 1993
- E. Proposed duration of operations _____
- F. Proposed seasonal reclamation close-out date November 15

II. PRINCIPALS

- A. Name, address and phone number of operator Walt Freeman P.O. Box 344,
Cave Junction, OR 97523 503-592-2078

- B. Name, address, and phone number of authorized field representative (if other than the operator). Attach authorization to act on behalf of operator.

None

- C. List the owners of the claims (if other than the operator)

None

(If more space is needed to fill out a block of information, use additional sheets and attach to form.)

with the operation, if applicable:

None

III. PROPERTY OR AREA

Name of claim and the legal land description where the operation will be conducted.

MMC #	Name	Section	Township	Range
DRMC 20327	Chance 13	22	40S	9W
DRMC 20396	Chance 83	"	"	"
DRMC 20298	ACE 103	11	"	"
DRMC 20274	ACE 72	16	"	"
DRMC 20207	ACE 3	8	"	"

added
Nov 19,
1993

IV. DESCRIPTION OF THE OPERATION

- A. **Access.** Show on a map (USGS quadrangle map or a National Forest map, for example) the claim boundaries and describe and show on the map all access needs, on and off the claim. Specify what Forest Service existing roads will be used, where maintenance or reconstruction is proposed and where any new construction is necessary. For new construction, include construction specifications such as widths, grades, etc. Show location and size of culverts. Describe maintenance plans. Describe the type and sizes of vehicles and equipment that will be traveling the access routes.

* Please see attached sheet detailing access.

- B. **Attach map, sketch or drawing showing location and layout of the area of operation.** Include names and locations of any streams, creeks, and springs. Describe and explain on the map the type of operation, method or techniques you propose (examples: drilling, open pit mining, dredging, milling, etc.; include locations, capacity, size, amount, etc.). Show on the map and describe below the size and kind of all surface disturbance, such as trenches, pits, settling ponds, stream channels and run-off diversions, waste dumps, drill pads, timber disposal or clearance, etc. Include sizes, capacities, acreage, amounts, locations, materials involved, etc.

* Please see attached explanation of operation.

(If more space is needed to fill out a block of information, use additional sheets and attach to form.)

Access:

All access will be over existing roads, with the present "Cat trail" in Sec. 13 T40S R9W being upgraded for vehicular traffic. All roads will be graded and rocked as necessary to a width of approximately 10 ft. Native stone will be used as required.

Six crossings of Rough and Ready Creek will be required with some grading of the approaches being necessary. Construction of washed rock crossings is proposed. These crossings would be rebuilt annually after winter high water.

Modification of the steepest portion of the road leading to Sec. 22 will be necessary to allow for safe travel of the haul truck. Approximately .25 miles of road will need to be rebuilt to reduce gradients to safe levels.

Reconstruction of the "Alberg" road will be required to access the test pit site in Section 8. The worst portion of this road lies in the draw leading to the first switchback. Proper design of water bars and ditches will help reduce erosion that has been associated with this road in the past:

Phase 1:

A total of approximately 5,000 tons of ore will be removed from Chance 13 and 83 mining claims in Sec. 22; Ace 103 in Sec. 11; Ace 3 in Sec. 8 and Ace 72 in Sec. 16, T40S R9W. This ore will be screened on site using a portable screening plant and then hauled to a stockpile area in Sec. 18, T40S R8W in 2 off-highway ore trucks. The excavation of 5,000 tons of ore would require the construction of four (4) pits covering less than .20 acres each.

Phase II:

Phase II is contingent on the success of Phase I. It is essentially a continuation of Phase I, in that one or two of Phase I sample sites would be selected as mine sites. The pits would be expanded to produce ore at the rate of approximately ~~4,000~~ 40,000/year

~~4,000~~ The equipment used and the access would be the same as in Phase I. The time of conducting mining operations would be expanded from approximately 20 days in Phase I to 120 days (June 15 - Oct. 15). The pit size would be expanded from less than .20 acres to about 2 acres, with 2 acres being mined and reclaimed annually for the duration of the project. Reclamation procedures would be the same.

Mining:

During the wet months, the laterite deposits such as the one that is the subject of this plan of operation, become "red bogs"; making it imperative that all mining operations be conducted from about June 15 - October 30. During this period, ore would be mined and transported to the stockpile site at the rate of 400 tons per day or about 10,000 tons per month.

Ore would be dug at the mine site using a 1 cu. yd. excavator. It would be screened at the pit using a mobile screening unit. Minus 1-inch material would be stockpiled and subsequently loaded into the haul truck using a 5 cu. yd. front loader. The plus 1-inch oversize produced in the screening operation would be used to backfill the pit. The trucks used to haul the ore to the stockpile in Sec. 18, will be a 25-ton capacity articulated dump truck with "rough terrain" capability and a tight turning radius. The use of this type of truck would allow for road construction to be kept to a minimum, with haul road widths averaging about 12-15 feet.

As mentioned before, all mining operations would be conducted during the dry season. This would insure that little if no run-off would be produced to cause stream degradation.

Site reclamation:

All oversized rock produced by the screening operation would be graded back into the pit after ore removal. In addition, all mined areas would be mulched with a mixture of wood waste and soil produced on site during clearing and overburden removal. Wood waste would be prepared to allow proper mixing of the mulch. Mined areas that had been graded and re-soiled would be planted with indigenous trees.

- D. Describe the Equipment and Vehicles you propose to use in your operation (Ex: truck, van, etc.). Include: sizes, capacity, frequency of use, etc.

Equipment: 1-1 cu. yd. hydraulic excavator, 1-5 cu. yd. front loader, rubber tired, 1-portable diesel-powered screening plant, 1-25 ton 6-wheel-drive articulated off-road dump truck, 1-4x4 pickup, 1-50M lb. track type dozer. The excavator, loader, dozer and screening plant would be moved on and off site once during the operating season. The haul truck would make 1 round trip/1-1.5 hrs.

- E. Structures. Describe and include justification for the structures or facilities planned for the operation. Include such things as storage sheds, mill buildings, thickener tanks, fuel storage, powder magazines, pipe lines, water diversions, trailers, sanitation facilities, etc. Include justification and calculations for sizing of tanks, pipelines and water diversions. The fuel storage facilities should include containment structures that will hold the volume of the largest storage tank in case of a tank failure or leak. Show the locations on the sketch map.

None

V. ENVIRONMENTAL PROTECTION MEASURES (SEE 36 CFR 228.8)

- A. Air Quality. Describe measures to be taken to minimize impacts on air quality such as obtaining a burning permit for slash disposal or dust abatement on roads.

No burning would be required in that all slash will be processed into chips to be used in mulching the reclaimed areas. Dust on haul roads will be controlled using a water wagon pulled by the haul truck on an as needed basis.

(If more space is needed to fill out a block of information, use additional sheets and attach to form.)

Water Quality. State how applicable state and federal water quality standards will be met. Describe what measures or management practices will be used to minimize water quality impacts and meet applicable standards.

1. If water is to be used in the operation (processing ore, washing ore, solution make-up, etc.) state how the water will be stored, treated and disposed of. If ponds of any type are proposed, such as for storage or settling, state how they will be designed and built. Provide storage capacities and water balance calculations. State how ponds will be maintained on an annual basis.
2. Describe methods to control runoff and erosion to prevent entry into surface water for all disturbed areas, including waste and tailings dumps.
3. Describe proposed surface water and groundwater quality monitoring, if required, to demonstrate compliance with federal or state water quality standards.
4. Describe what measures will be used to minimize potential water quality impacts during winter closure, if applicable.
5. If land application is proposed for wastewater disposal, the location and operation of the land application system should be described.

No water will be used in the mining operation. Mining will be conducted in the dry months and winter run-off from haul roads etc. would be controlled by establishing proper drainage during the annual reclamation program.

C. Solid Wastes. State how any tailing, dumperage, or other waste produced by operations will be disposed of or treated so as to minimize adverse impacts. Include a statement that all unburnable garbage and refuse will be hauled off-site to a sanitary landfill.

No tailings will be produced on site in that ore will be processed off-site. Oversized rock produced by the screening operation will be graded back into the pit as outlined previously. The work area will be "policed" weekly to prevent refuse accumulation.

D. Scenic Values. State how scenic values will be protected. Examples are screening, slash disposal, timely reclamation, etc.

Mining operations will not be visible from any major road or populated area. Slash will be chipped and used as mulch for site reclamation. Each phase of reclamation will be completed with the seasonal close of operation.

(If more space is needed to fill out a block of information, use additional sheets and attach to form.)

Fish and Wildlife. All practice measures to maintain and protect fish and wildlife habitat affected by the operations must be taken, and should be defined. Most of those measures involve avoidance of critical habitat such as along streams and bogs when planning roads, dumps, etc. Opportunities during reclamation to prevent erosion or plant browse or forage species should be described.

There are low fish and wildlife population densities in the access and operation areas due to the harsh, rocky terrain. Design of roads and excavated sites (such as constructing animal "escape trails" from pits), as well as adherence to an annual reclamation schedule will minimize habitat impacts.

Cultural Resources. Describe procedures for protection of historic and archeological values. The Forest Service is responsible for insuring that the area to be covered by the operating plan is inventoried prior to plan approval to determine the presence of significant cultural resources and will specify protective and/or mitigation measures to be taken by the operator. If previously undiscovered cultural resources (historic or prehistoric objects, artifacts, or sites) are exposed as a result of operations, the operator shall not proceed until he is notified by the District Ranger that he has complied with provisions for mitigating unforeseen impacts as required by 36 CFR 226.4(e) and 36 CFR 800.

None

- G. List all hazardous substances (by name and quantity required) which you intend to use or generate during the proposed operation. Operations USING or GENERATING HAZARDOUS SUBSTANCES must attach copies of other Federal and State agency permits, including all stipulations and conditions pertaining to the permit.

None

- H. With regard to hazardous substances, discuss handling, storage, security (fencing), identification (signing), or other special operations requirements necessary to conduct the proposed operation.

None

Close-out Reclamation. This section should describe the removal of structures and facilities, and the reclamation of the access road. It should specify that roads no longer needed, (1) be closed, (2) bridges and culverts be removed, (3) cross drains, dips, or water bars be constructed, and (4) the road surface be shaped to as near a natural contour as practicable and be stabilized. Show the expected date for completion of all reclamation.

Pit roads will be reclaimed as mining operations are completed

in each area. All major access roads are permanent.

VI. FOREST SERVICE EVALUATION OF PLAN OF OPERATIONS

A. Recommended Changes/Modifications for Plan of Operations:

- B. Bond - As a further guarantee of faithful performance with the reclamation requirements agreed upon in the plan of operations, the operator delivers herewith and agrees to maintain a surety bond, cash bond, irrevocable letters of credit in the sum of _____ (\$______).

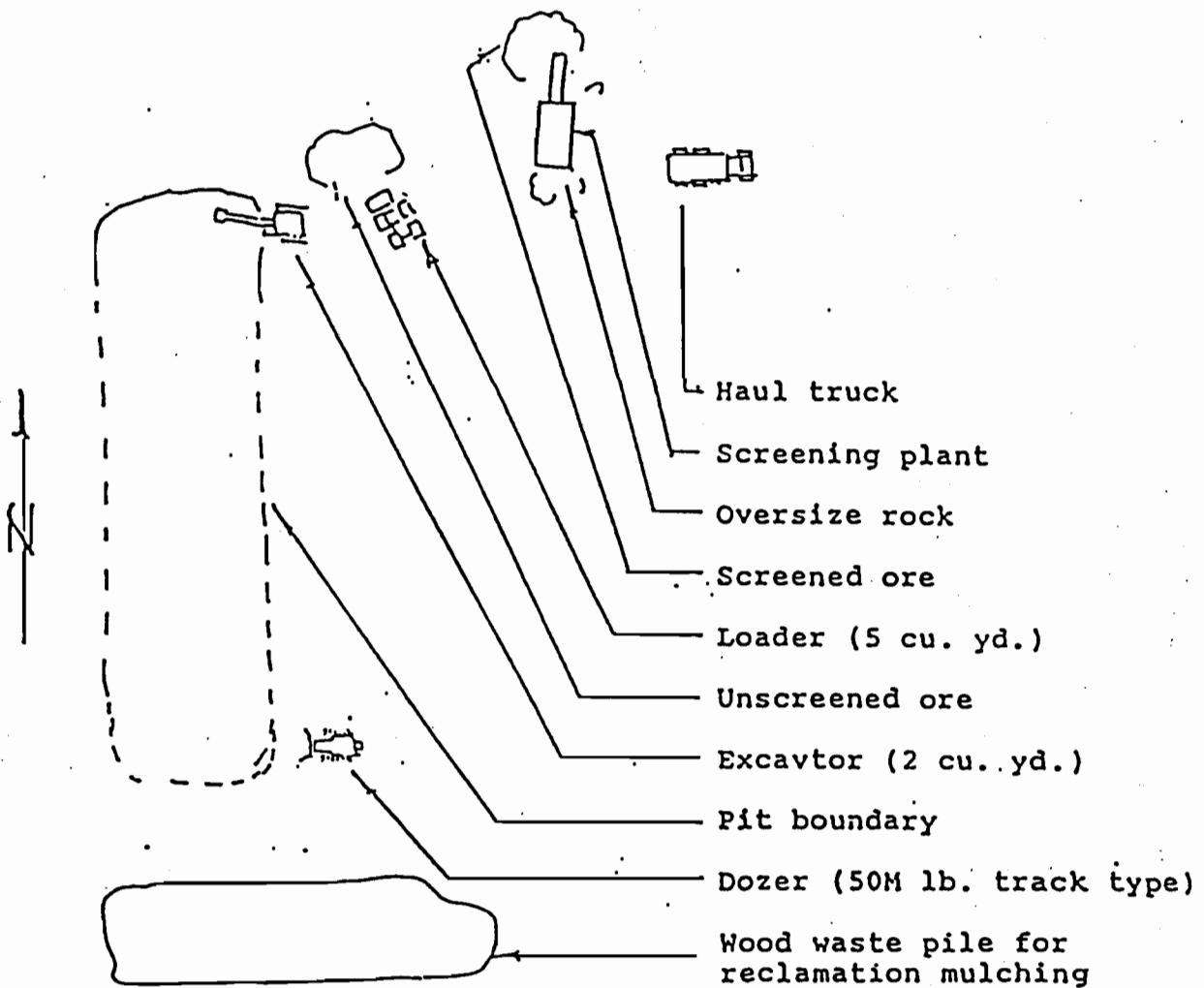
ACKNOWLEDGEMENTS

- A. It is understood that should the nature of the operation change a modified or supplemental plan of operations may be required.
- B. It is understood that approval of this plan of operations does not constitute: (1) Certification of ownership to any person named herein; and (2) Recognition of the validity of any mining claim named herein.

(If more space is needed to fill out a block of information, use additional sheets and attach to form.)

PROPOSED MINE LAYOUT

Scale: 1 in. = 50 ft.



1. Excavator digs ore and stacks it.
2. Loader picks ore up and hauls it to the portable screening plant.
3. The screening plant separates the 1-in. minus.
4. The screened ore is loaded into an articulated 25-ton dump truck and is transported to the ore stockpile in Sec. 18, T40S R8W.
5. Oversize rock is returned to backfill pit.

United States Forest Service **Siskiyou National Forest** **Illinois Valley RD
Department of Service** **National Forest** **26568 Redwood Highway
Agriculture** **Cave Junction OR 97523**

Reply To: 2810

Date: November 29, 1993

Walt Freeman
P.O. Box 334
Cave Junction OR 97523

Walt:

This letter will serve to acknowledge receipt of your amended Plan of Operations Dated November 19, 1993 for the NICORE Project.

Your modified plan indicates that you will need to test three additional sites. These test sites each have different access needs. If testing is successful, you propose that mining would proceed with similar methods for up to 120 days per year. Your annual starting date would move from April 15 to June 15.

This additional information will be considered during the Environmental Impact Statement (EIS). A copy of your amended proposal will be circulated to the team of specialist who will be preparing the EIS when funding becomes available. You will be contacted in writing, if any of the specialist have questions regarding this proposal.

In the cover letter to your amended Plan of Operation you have raised the following three issues in addition to amending your mining proposal:

1) You state that the proposed test work will require the use of the existing road network, and that you hereby formally reject the various alternative access proposals made by the District Ranger.

Our policy is to ensure that exploration, development, and production of mineral resources are conducted in an environmentally sound manner and that these activities are integrated with the planning and management of other National Forest resources. To do this we need to look at all access alternatives and choose the most reasonable and environmentally sound route. The existing road network may, in fact, be the least impacting and most reasonable route. Without checking all existing access possibilities we would not know that.

2) If the use of the existing road network as outlined in the Plan of Operation and the amendment is held by the District Ranger to require an EIS, you hereby formally request that such EIS be completed in a timely fashion.

The amended proposal and the original proposal generate similar issues and concerns, therefore, an EIS is still required and will be completed when funding becomes available.

3) You have requested the assistance of the Forest Service in designing both access and pit development so as to minimize impacts to botanical values.

Because of the unique botanical values within your claim area, I have requested eight weeks of funding for a Botanist to survey and evaluate the effects of your proposal. The best time to observe the plant species in the Rough and Ready Creek area is in the early spring. I recommend that you contact our Botanist to arrange an on site review of the access roads and test pits this spring.

If you have any questions or concerns, please feel free to contact me at this office.

Mary Zuschlag

MARY ZUSCHLAG
Acting District Ranger

LAW OFFICES OF
RICHARD M. STEPHENS
800 BELLEVUE WAY, SUITE 400
BELLEVUE, WASHINGTON 98004-4229

ADMITTED ALSO IN OREGON
AND CALIFORNIA

TELEPHONE (206) 462-2082
FACSIMILE (206) 588-0285

July 21, 1994

Ms. Mary Zuschlag
District Ranger
Siskiyou National Forest
Illinois Valley Ranger District
26568 Redwood Highway
Cave Junction, OR 97523

Dear Ms. Zuschlag:

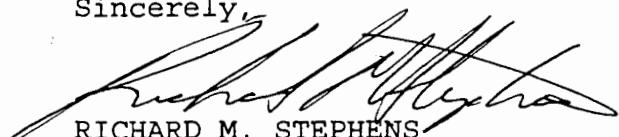
Re: Nicore Project

My client, Walter B. Freeman, asked me to contact you to see if there is any aspect of his plan of operations which he could change which would change your determination that an Environmental Impact Statement needs to be prepared and an Environmental Assessment written instead. For instance, do you think you could subject his plan of operations to an Environmental Assessment if he made changes to the haul routes or if he eliminated any particular stream crossing(s) or avoided any particular rare plant populations? We are looking for any feasible ways we can expedite the review of his plan of operations.

This letter is also a Freedom of Information Act request for copies of all documents showing your estimate of the cost of conducting an Environmental Impact Statement for the Nicore Project and copies of all letters or other communications your office has had in regard to requesting the funds to conduct the EIS for this project.

Thank you for your attention to this request.

Sincerely,



RICHARD M. STEPHENS
Attorney

cc: Walter B. Freeman

United States
Department of
Agriculture

Forest
Service

Siskiyou
National
Forest

Illinois Valley RD
26568 Redwood Highway
Cave Junction OR 97523

Reply To: 2810

Date: September 13, 1994

Richard M. Stephens
800 Bellevue Way, Suite 400
Bellevue, WA 98004-4229

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Dear Mr. Stephens:

This letter is in response to your letter dated July 21, 1994, requesting the following information:

1) All documents showing our estimate of the cost of preparing an Environmental Impact Statement (EIS), for the NICORE Project, and copies of all letters or other communications our office has had in regard to requesting the funds to conduct the EIS for this project.

(Response #1)

Enclosed are two documents requesting funding for an EIS for the NICORE proposal.

2) You have asked if any aspect of the Plan of Operation for the NICORE proposal could be changed to avoid preparing an Environmental Impact Statement.

(Response #2)

As you are aware, the three major issues that effect the analysis of the NICORE mining proposal are: 1) Wild and Scenic River Eligibility, 2) Sensitive Plants, and, 3) Water Quality. The access route proposed by the NICORE plan of operations parallels Rough and Ready Creek for more than one mile and includes 6 low water crossings. This portion of the access has driven the majority of concerns relating to the 3 major issues. By accessing the claim area via the existing access road, (past the Jim Wood residence), and minimizing the stream crossings, most of the concerns relating to the 3 major issues would be significantly reduced. This does not mean that other concerns would not surface, such as dust, noise, traffic ect.

There is no guarantee that an EIS can be avoided by minor changes in the proposal. However the access route appears to be the most controversial portion of the proposal, and a choice of access that avoids impacts to the three major issues would definitely reduce the need for an EIS.

Mary Zuschlag

MARY ZUSCHLAG
District Ranger

United States
Department of
Agriculture

F st
Service

Siskiyou
National
Forest

Il ois Valley R.D.
26568 Redwood Hwy
Cave Junction, OR 97523

Reply To: 2817 NICORE

Date: January 23, 1997

Walter B. Freeman
P.O. Box 344
Cave Junction, OR 97523

CERTIFIED LETTER RETURN RECEIPT REQUESTED

Dear Mr. Freeman:

On December 17, 1992, you submitted for our review and approval a Plan of Operations summarizing your proposal to develop access to laterite resources within Forest System lands, remove a 5,000-ton bulk sample of the material from four locations within those lands, and full-scaled development of the laterite resource within those lands. On July 12, 1993, I informed you of the need for an Environmental Impact Statement (EIS) for reasons stated in that letter. On November 19, 1993, you amended your Plan of Operations to clarify issues regarding the testing phase, access and timing of creek crossings, the production phase, and to include a request for Forest assistance in the design of access and pit development to minimize impacts to botanical resources. On May 11, 1994, you appealed my decision to require an EIS to the Siskiyou Forest Supervisor. He affirmed my decision in a letter to you dated July 29, 1994. On August 12, 1994, you appealed the Siskiyou Forest Supervisor's decision to the Regional Forester. He affirmed the decision of the Forest Supervisor in a letter to you dated November 20, 1994. In addition, he informed you that the Forest Service has the authority to disapprove unreasonable Plans of Operation. Consequently, he directed the completion of a determination of the reasonableness of your Plan of Operations by a certified mineral examiner. A Surface Use Determination (SUD) was completed by a certified mineral examiner on October 1, 1996 and received technical approval on December 13, 1996. You received a copy of it on January 7, 1997.

The conclusion of the mineral examiner in the SUD is that your proposal to remove a bulk sample of nickel-bearing laterite for use in determining the metallurgical feasibility for smelting is reasonable for this stage of your operations, but lacking in some information necessary to conduct the full analysis of the proposal. That information is detailed later in this document.

The mineral examiner further found that incorporation of a proposal to include full-scaled production is not reasonable at this time and should not be included in the Plan of Operations. You state in your Plan of Operations that this phase of the operation is contingent on the success of the bulk sampling phase, therefore, it is dependent on the outcome of sample testing and not certain to occur at this time. The Plan of Operations must be limited only to those activities associated with bulk sampling of the resource. It can be amended at a later date to include full-scaled production should the results of bulk sampling support development of a mine.

I am requesting the following information to enable us to begin our analysis:

1. Site development plan for each location where you propose to remove the bulk sample(s).

2. A plan detailing construction/reconstruction of roads on National Forest System lands.
3. A plan detailing construction and maintenance of proposed washed rock crossings of Rough and Ready Creek.
4. A road maintenance plan.
5. Can the same information be obtained from a smaller-sized sample? There is no substantiation of the need for a 5,000 ton sample.
6. Information regarding the location of the facility to be used for smelting the sample and whether it is currently available for this use.

Your proposal to remove ore for the bulk sampling from more than one site does not appear to be adequately justified at this time. I understand that you are hoping to determine the most profitable area to be mined first. However, there appears to be sufficient sample data already available on the grade of laterite in all four locations to make this decision. Reference is made to the information in Appendix C of the NICORE Project Plan dated December 1, 1992. The four sites greatly increase the complexity of considerations and potential for damage to surface resources with little apparent gain in operational economics. I request either more concrete justification or modification of your operating plan on this point.

We have received funding for this current fiscal year to allow us to begin work on an Environmental Impact Statement, and we will appreciate your cooperation in providing the requested information. I give you my personal assurance that we are committed to prepare the Draft EIS this year. I will incorporate the proposal you submitted as an alternative in the EIS. However the proposed action will be based on the findings and determinations in the SUD. We will need to resolve the issues raised in the SUD before the EIS is completed.

We gladly offer to meet with you at your convenience to discuss the Surface Use Determination and the analysis needs for the EIS.

Sincerely,



MARY ZUSCHLAG
Illinois Valley District Ranger

enclosure

cc: J.Gauthier-Warinner, M.Cooley, R.Bennett:R6, A.Reifenberg:R6, EIS team

United States Forest
Department of Service
Agriculture

Siskiyou
National
Forest

Illinois Valley RD
26568 Redwood Highway
Cave Junction OR 97523

Reply to: 2800

Date: January 31, 1997

Subject: Nicore pre EIS meeting.

To: The file.

0900, January 31, 1997, Forest Service representatives John Nolan and Don McLennan met with Walt Freeman to discuss the Plan of Operation proposed for the Nicore mining project.

Prior to the meeting Ranger Zuschlag talked with Walt and assured him that she was committed to preparing an EIS for his mining proposal. Walt said that he was willing to cooperate with the Forest Service to supply more detailed information to support his proposal, but as far as the Surface Use Determination recently prepared by the Forest Service, he was letting his lawyer respond to all questions and or responses to the SUD. Walt said that he understood that he was going to be able to work with us in preparing the SUD, but this did not happen. He claims that because he was not involved in the completion of the report, that errors were made that need to be corrected. Ranger Zuschlag asked Walt to meet with Jim Gauthier-Warinner to resolve the differences. Walt replied that he would leave that to his lawyer.

Walt seems to feel strongly that the only access alternative reasonable to him is the current proposal as written. He is willing to prepare better detailed plans of the construction and maintenance of the proposed washed rock crossings of Rough and Ready Creek. Walt agreed to also prepare a detailed site development plan for each mine location. In order to detail the construction and reconstruction needs of roads we agreed to arrange a meeting with Bob O'leary and Walt to prepare a work map that indicates all proposed access needs. Following the map work, all new construction and relocation sites would be field reviewed and marked on the ground when the area becomes accessible.

Walt thought that he would be able to submit the mine pit site development plan and stream crossing information by late next week. We have a tentative date set for February 6, 1997 to meet with Walt to prepare a working map showing access needs.

John Nolan
Minerals Tech

GROEN & STEPHENS

ATTORNEYS AT LAW

ONE BELLEVUE CENTER

411 108TH AVENUE NE

SUITE 1750

BELLEVUE, WASHINGTON 98004-5515

JOHN M. GROEN
RICHARD M. STEPHENS

ALSO ADMITTED IN
ALASKA, OREGON & CALIFORNIA

TELEPHONE
(206) 453-6206

FACSIMILE
(206) 453-6224

February 10, 1997

Mary Zuschlag
Illinois Valley District Ranger
26568 Redwood Highway
Cave Junction, OR 97523

Dear Ms. Zuschlag:

Thank you for your letter to Walt Freeman dated January 23, 1997. He has and will continue to be meeting with people from your office to discuss some of the items that will help the Forest Service prepare the Environmental Impact Statement (EIS) on his Plan of Operations. We hope to be able to provide whatever information we have relevant to the environmental impacts of his operations.

We need to respond to a couple of points in your letter and in the Surface Use Determination (SUD) that we received from J. Gauthier-Warriner. Your letter states the following:

The mineral examiner further found that incorporation of a proposal to include full-scaled production is not reasonable at this time and should not be included in the Plan of Operations. You state in your Plan of Operations that this phase of the operation is contingent on the success of the bulk sample testing and not certain to occur at this time. The Plan of Operations must be limited only to those activities associated with bulk sampling of the resource.

Mr. Freeman had one meeting with Mr. Gauthier-Warriner. At that meeting, Mr. Gauthier-Warriner assured him that Mr. Freeman would be involved in the preparation of the SUD. Information would be requested and Mr. Freeman agreed to provide whatever he had. At that meeting, Mr. Freeman gave Mr. Gauthier-Warriner a 1992 presentation document which was designed to outline the project's potential as an investment opportunity. That document was not intended to be an exhaustive economic analysis. The document was given to Mr. Gauthier-Warriner because it showed ore maps with assay values.

Because Mr. Gauthier-Warriner did not avail himself of additional resources Mr. Freeman offered, the SUD is partially based on out-of-date information.

Mary Zuschlag
Illinois Valley District Ranger
February 10, 1997
Page 2

Mr. Freeman has reduced a one ton sample by using the direct alloy reduction technology (DART). The sample was removed from the claims at issue by hand. The result was 600 lbs of alloy. Using this process, Mr. Freeman has produced "414" stainless steel. Consequently, the need for a bulk sample is not as significant because we already know the quality of steel that can be produced from this ore. None of this information is in the SUD because Mr. Gauthier-Warriner never contacted Mr. Freeman after the initial meeting. We would be happy to provide you with the metallurgical information derived from that sample upon the recognition that it is proprietary and cannot be disclosed outside your agency.

Therefore, we strongly disagree that the Plan of Operations should be limited to a bulk sample. As long as the work on an EIS is being done, it should be done for full-scale production because we already know that the metallurgical testing indicates that full-scale production is economically feasible.

The other issue relates to one I have already raised with Mr. Gauthier-Warriner. He recommends that Mr. Freeman have a signed contract with a smelting facility before the EIS is completed. Mr. Freeman cannot sign any contract because he cannot promise any smelting facility that he will have a certain amount of ore delivered on any particular day. He cannot make such a contractual obligation unless the Forest Service is willing to guarantee that approval of his Plan of Operation will occur on a certain date in order to allow Mr. Freeman to guarantee delivery of the ore to the smelting facility. I am sure the Forest Service will not promise approval by a date certain or be willing to indemnify Mr. Freeman if he signs a contract and is unable to deliver the ore because the Plan of Operations has not yet been approved. If I am wrong, please let me know.

This requirement for a contract seems to make little sense because it suggests that Mr. Freeman will go to the trouble and expense of removing the ore without a processing facility. While we have no signed contracts with facilities and cannot have a signed contract without a guarantee by the Forest Service that the Plan of Operations will be approved by a particular date, there are several options available. One is the processing facility in Riddle, Oregon. Other processing facilities exist around the country and overseas. There is also the possibility of building a processing facility to handle the production from this mining operation.

We also disagree with the idea that there is no need to remove ore from all sites. Mr. Freeman is not hoping to determine the most profitable area to be mined first. To the contrary, ore needs to be removed from all sites and mixed. The various sites have ore composed of different percentages of nickel.

Mary Zuschlag
Illinois Valley District Ranger
February 10, 1997
Page 3

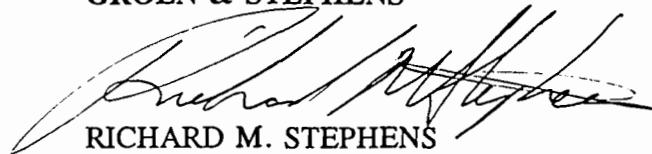
We realize that access to the four sites may add to the complexity of the EIS. However, limiting the EIS to only one site has big implications for the economics. As I explained above, this Plan of Operations is for full-scale mining production because a sample removed from the site by hand has already confirmed the economics of the project. As you know, the ore at all four sites belongs to Mr. Freeman and access to all four sites cannot be denied.

Finally, toward the end of your letter, you indicated that "[w]e will need to resolve the issues raised in the SUD before the EIS is completed." I am not sure whether this is a conclusion of your letter and the "issues in the SUD" refer to the issues you already specifically addressed, or other issues in the SUD.

Please let me know if you have other issues in the SUD that have not yet been addressed in your letter that you believe need to be addressed. We look forward to working with you in completing your EIS this year.

Sincerely,

GROEN & STEPHENS



RICHARD M. STEPHENS

RMS:AI

Walter B. Freeman
P.O. Box 344
Cave Junction, OR 97523

February 10, 1997

Mr. Don McClellon
USFS Siskiyou National Forest
Illinois Valley Ranger District
Cave Junction, OR 97523

Dear Mr. McClellon,

The following are points of clarification relating to the NICORE Project that you requested in our meeting of January 31, 1997.

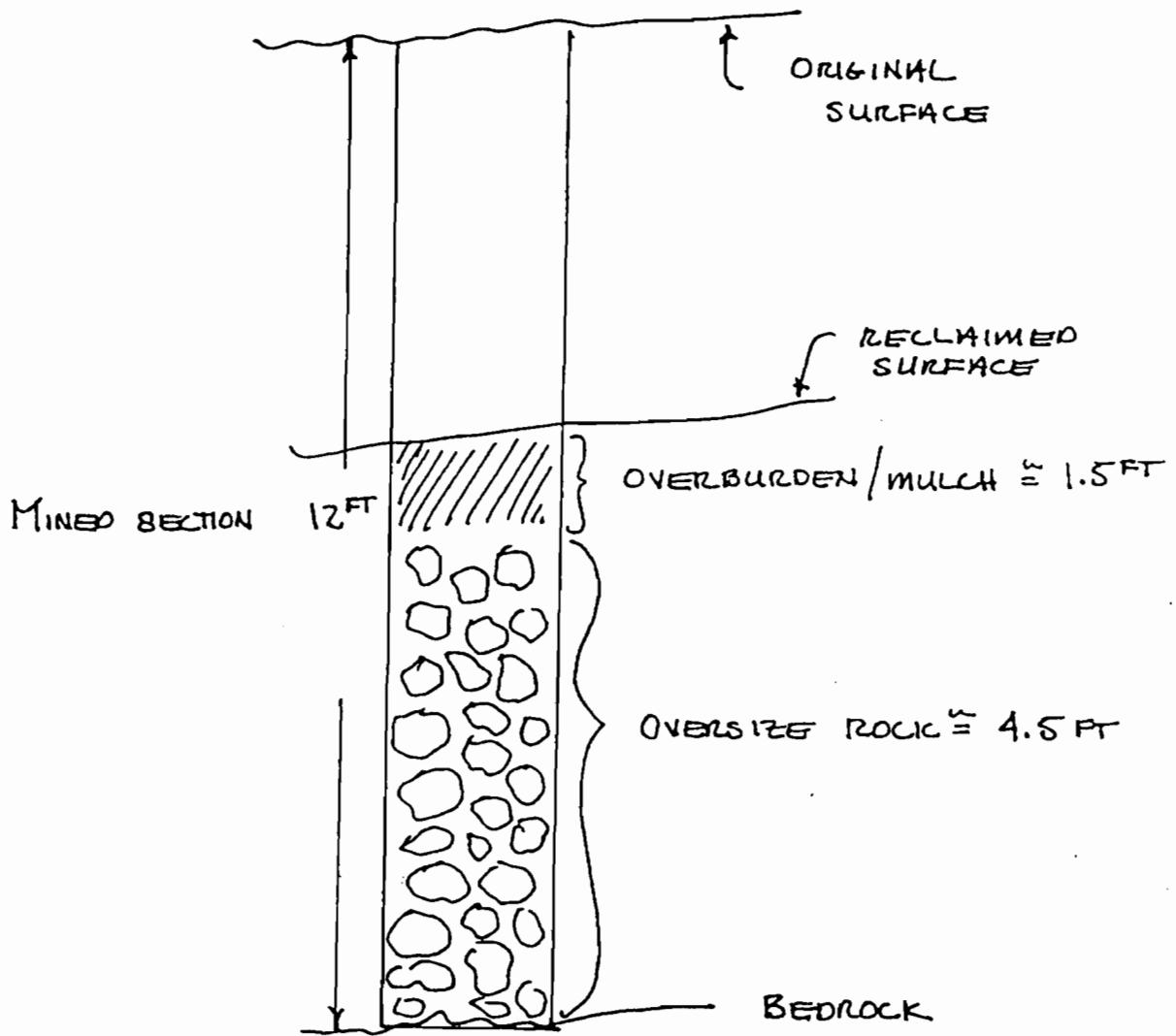
1. Mining and haulage of ore would be restricted to a period between May 15 and October 15 annually.
2. Mining rates during the 5000 ton test period and the contemplated production phase would be 400 to 500 tons of screened ore per day utilizing a mobile rotating grizzly screening plant.
3. The pit area for 5000 net tons of screened ore would be .38 acres. Annual pit size required to produce 40,000 net tons of screened ore would be 3.1 acres, based on an average mining depth of 12 feet. Pit reclamation will occur concurrently with ore extraction (Fig.1).

Sincerely,

Walter B. Freeman

Walter B. Freeman

FIG 2. PROJECTED RECLAIMED SITE
CROSS-SECTION.

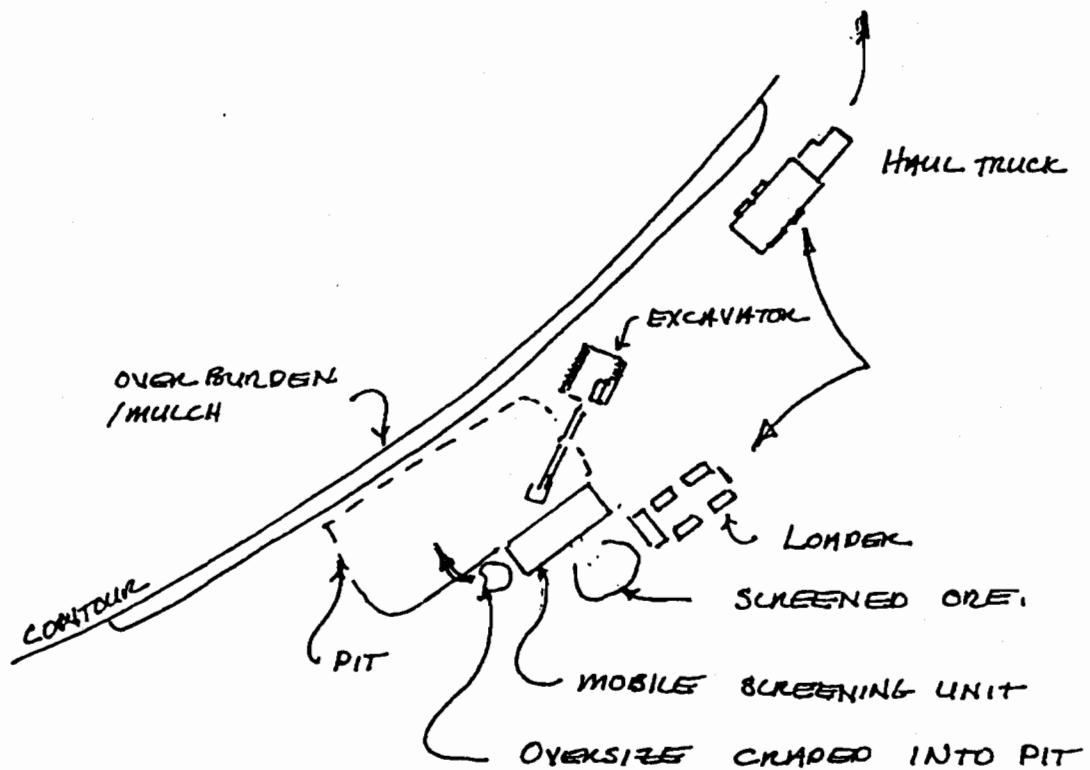


NTS.

FEB. 10. 1997

Fig. 1.

MINING & RECLAMATION PROCEDURE



NTS.

FEB. 10. 1997

OR 48362
OR 48415
OR 49890
OR 53033
3809(11784)
S3583(MC:jmw)

CERTIFIED MAIL - RETURN RECEIPT REQUESTED (P 280 973 388)

Mr. Walt Freeman
P.O. Box 544
Cave Junction, Oregon 97523

Dear Mr. Freeman:

We have recently been in contact with the Siskiyou National Forest, Illinois Valley Ranger District, regarding a mining plan of operations submitted by you to the Forest Service outlining your plans to test several areas on National Forest lands and subsequently transport the material to the location of your claims on public lands administered by the Bureau of Land Management (BLM).

I have discussed your plans with the Forest Service. We have agreed to work jointly in the development of the Environmental Impact Statement (EIS) which will be written to analyze your proposed activities. The Forest Service will take the lead in writing the EIS that will be written to address activities occurring on both Forest Service and BLM administered lands.

I understand the Forest Service has asked you to submit additional information to assist them in analyzing your proposal. In addition to the above information requested by the Forest Service, you need to submit information to this office regarding your planned activities on the BLM administered lands to be utilized during, and after, the testing is completed. If you desire, you may combine the information into one document and send us a copy. Maps outlining the location of all roads, stockpiles, and facilities must be included.

The information we require must be in the form of a plan of operations. As we indicated to you in the past, you are required to submit a plan of operations instead of a mining notice for any proposed mining activities on the BLM lands that are designated as Area's of Critical Environmental Concern (ACEC). In this particular case, these BLM lands proposed for inclusion in your proposed operations have been designated as the Rough and Ready ACEC.

Information that should be addressed in your plan of operations includes:

- road construction, upgrade, and maintenance plans.
- milling plans including type of mill operation, size of area utilized, stockpile sizes, location of mined tailing piles, etc.
- measures you will take to minimize unnecessary or undue degradation of the public lands.
- contingency plans for fuel spills and a plan for the storage and handling of hazardous materials.
- needs for occupancy of the site, structures needed for milling and storage, and type of equipment on site.

- needs for signing and gates.
- time frames for each phase of the operation, including periods of non operation, and the date operations are estimated to be completed.
- water needs and sources.
- measures taken during periods of non operation to ensure the area is maintained in a safe and orderly manner.
- measures taken to ensure bare lands are adequately protected from erosion during wet periods.
- type of vegetation that may be used on site as ground cover.
- reclamation plans.

Please be aware that other questions regarding your operations may arise at a later date as the analysis of your operations proceeds. Once the EIS is completed and a decision letter signed we will issue a separate approval letter for your proposed operations on BLM administered lands.

In addition to your current plans, you have four mining notices filed with this office for past activities located on mining claims on BLM lands within ACEC's. Three are filed for activities at the location of the Rough and Ready ACEC (OR 48342, OR 49890, and OR 53033) and one is filed for activities on your claims located within the French Flat ACEC. Since these areas are now designated as ACEC's, as discussed above, these mining notices are no longer applicable for mining activities at those locations. I will be terminating these notices soon since they are no longer applicable for mining within ACEC's. If you desire to mine at the above locations in the future, you need to file a mining plan of operations with this office.

I know this is a lot of information for you to compile, however, you must submit this to our office so that we may assist the Forest Service in the analysis of your plans. My staff will assist you in any way possible. If you have any questions or needs, please feel free to contact Matt Craddock at (541) 770-2272.

Sincerely,

ROBERT KORFHAGE

Robert C. Korfhage
Grants Pass Area Manager

United States
Department of
Agriculture

Forest
Service

Siskiyou
National
Forest

Tillinois Valley RD
2068 Redwood Highway
Cave Junction OR 97523

Reply To: 2800

Date: March 3, 1997

Groen & Stephens
Attorneys At Law
One Bellevue Center
411 108th Avenue NE
Suite 1750
Bellevue, Washington 98004-5515
Att. Richard M. Stephens

Dear Mr. Stephens:

This letter is our response to your letter dated February 10, 1997, concerning the Nicore mining project Environmental Impact Statement (EIS), and Surface Use Determination (SUD).

After working with Mr. Freeman over the last few weeks, we are very close to having all the information necessary to present the Proposed Action to the public and to proceed with the analysis. As a result of gathering this information and working with Mr. Freeman, it has become apparent that there has been a major change in the scope of the project. The original Plan of Operation proposed to remove a 5,000-ton bulk sample from four locations in order to evaluate the laterite deposits. We now understand that the proposal is a full-scale mining operation of the four sites. Mr. Freeman must submit an amended Plan of Operation, in writing, to fully define and describe his proposal for mining and hauling on National Forest System Lands.

I would be happy to meet with you, Mr. Freeman and Mr. Gauthier-Warinner to discuss problems Mr. Freeman has with the SUD.

We are committed to moving forward with the analysis of the Nicore project and look forward to working with Mr. Freeman throughout the process.

Sincerely:

Mary Zuschlag

MARY ZUSCHLAG
District Ranger

cc: Reb Bennett, Regional Mining Engineer
Mike Cooley, Forest LRM Staff
R.J. Gauthier-Warinner, Area Mining Geologist

NICORE
P.O. Box 344
Cave Junction, OR 97523

March 19, 1997

Mr. Robert C. Korfage
Grants Pass Area Manager
Bureau Of Land Management
3040 Biddle Road
Medford, OR 97504



Dear Mr. Korfage,

The purpose of this letter is to respond to your letter to me dated February 19, 1997, and to assist you in your joint effort with the Forest Service to develop an EIS for the planned mining operation (Known as the NICORE Project). I will assume that you have access to the information previously delivered to the Forest Service and will not repeat it here.

1. Activity: The proposed activity relative to BLM administered land will be to establish a stockpiling and/or ore processing site on 5 to 10 acres in Sec. 18. T40S R8W WM. proximate to existing facilities and structures (please see attached map). The exact location of this site has not yet been determined but its selection will be made with input for BLM technicians in an effort to minimize and mitigate impacts. Although a significant amount of ore has been proven on the BLM portion of the project, mining and/or processing of this material is not planned for the first phase of the proposed operation.

2. Roads: The main access system will utilize the existing road (located under the Pacific Power & Light power lines) to transport ore from the mine site to the storage/processing area. Depending on the area chosen, construction of a short spur from the power line road to the site may be necessary.

Road construction will consist of proper grading and ditching with the application of approximately 6 inches of crushed rock. On site rock will be used so as to avoid the introduction of non-native materials or plants. Road maintenance will be appropriate to use.

3. Milling Plans: The ore processing plan has not yet been finalized. Two possibilities exist. A. Transportation of ore to an off-site processing facility. B. On site ore reduction. Option "A" would involve only ore stockpiling with a maximum of approximate 25,000 tons being stored at any given time. Option "B" would involve processing ore on site utilizing a proprietary process known as Direct Alloy Reduction Technology (DART™)

which was developed for specific application to the NICORE Project. The essence of the DART™ process is direct production of stainless steel (or other high-alloy steel) from the ore utilizing an electric arc furnace. Emissions will consist of water vapor and carbon dioxide mainly from the ore-drying phase of the operation. Approximately 10 to 12,000 tons of metal and similar amount of slag products (in the form of crushed rock, building stone or artificial stones, etc.) would be produced annually.

4. Measures To Minimize Undue Degradation: No undue degradation of public land is contemplated or foreseen. On going employee training would be perhaps the most useful tool in safe guarding the environment.

5. Fuel Spills, Hazardous Materials: All fuel storage will be in compliance with applicable regulations established by DEQ, EPA and the fire Marshall. No hazardous materials will be used in association with either operating option.

6. Site occupancy: Site occupancy will continue at the existing level. Additional structures needed for the stockpiling option are minimal in that stored ore would be kept under tarps during wet months. Under the processing option buildings for housing the processing equipment would be required (10 to 15,000 sq. ft.). On site equipment (in addition to the processing facility) would be limited to a front end loader and a small dozer.

7. Signs, Etc.: Gates and signs would be posted and installed as necessary to control access and provide for public safety.

8. Time Frame: The operation time frame is contingent on approval of the Plan of Operation (the plan was originally filed in 1992). It is contemplated the first year of the project will be devoted to development of necessary access to the ore and acquisition of the 5000 ton sample for the prototype operation. Therefore, it is anticipated that ore mined during the summer months will be either shipped or processed on a year round basis. In that the acquisition of project finance is contingent on approval of a plan of operation, we could be more definite as to the time frame when we receive plan approval.

9. Water: Under the off site processing option no water would be used other than for dust control on the haul roads. On site processing might require as much as 10 GPM which would be acquired from an on site well.

10. Orderly Manner: Public safety will be maintained by restricting access to the work site. The proposed operation will be designed to be as safe as possible for project employees. Hazards during both operation and shut down will be minimized through implementation of an operation safety plan.

11. Erosion: In that the project site is virtually flat, serious erosion is unlikely. The possibility of minor erosion will be minimized through proper drainage and grading of the site.

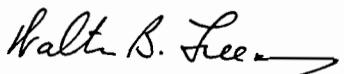
12. Ground Cover Vegetation: No use of vegetation ground cover is contemplated on the site for the duration of the operation.

13. Reclamation Plans: The site will be reclaimed at the end of the project by 1. Removal of all equipment, structures and related items. 2. Regrading the site to approximate original contour. 3. ripping any compacted areas. 4. Revegetating the site with native plants.

It is our intention to operate in compliance with all appropriate and applicable federal, state and local regulations.

I trust this information will prove helpful in assisting the Forest Service with the EIS.

Sincerely,



Walter B. Freeman

GROEN & STEPHENS

ATTORNEYS AT LAW

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ALSO ADMITTED IN
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March 21, 1997

Ms. Mary Zuschlag
District Ranger
Siskiyou National Forest
26568 Redwood Highway
Cave Junction, OR 97523

Re: NICORE Project Plan of Operations

Dear Ms. Zuschlag:

Thank you for your letter dated March 3, 1997. I am glad your agency is having success in obtaining the information necessary to prepare the EIS on this Plan of Operations.

In your letter, you indicated that there has been a major change in the scope of the project to include full-scale mining on the sites. I realize this plan has been pending a long time and it may have been easy to forget some of the details. In a letter to you dated November 19, 1993, Mr. Freeman explained that the pending Plan of Operations included two phases. Phase 1 was the 5,000 ton bulk sample. Phase 2 was the full-scale mining operation, but approval of the plan was sought for both phases. In fact, we believe the EIS may not be adequate if it did not include an analysis of all related phases of the plan.

The only difference in the plan now is that Phase 2 is not dependent on Phase 1. As I explained in my letter to you dated February 10, 1997, a sample has already been successfully reduced to a high quality alloy. In light of this successful testing, there is no likelihood that Phase 2 will be abandoned. As long as the Forest Service is preparing an EIS, I believe it is obligated to analyze both phases of the Plan of Operations.

Because the full-scale mining phase was addressed to the Forest Service in November of 1993 and the Surface Use Determination recognizes that the Plan of Operations includes two phases, it is unnecessary to file an amended Plan of Operations to include a phase already addressed. However, I realize your office may have been focussing on only the first phase

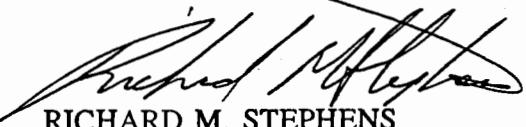
Ms. Mary Zuschlag
March 21, 1997
Page 2

and we are more than willing to provide any additional information you need regarding Phase 2.

Please let us know what information you may need.

Sincerely,

GROEN & STEPHENS



RICHARD M. STEPHENS
Attorney

cc: Walt Freeman

United States Forest Service **Siskiyou National Forest** **Illinois Valley RD
Department of Service** **National Forest** **26568 Redwood Highway
Agriculture** **Cave Junction, OR 97523**

Reply To: 1950 NICORE

Date: November 6, 1997

Groen & Stephens
Attorneys at Law
One Bellevue Center
411 108th Avenue NE, Suite 1750
Bellevue, WA 98004-5515

Dear Mr. Stephens:

I am pleased to inform you that substantial progress has been made on the analysis for the NICORE Proposal signed by Walter Freeman on March 19, 1997; however, we still have questions about the scope and nature of the Nicore Plan of Operations. The information we have regarding the proposed Plan of Operations and subsequent revisions were used as the basis for analysis in the Draft EIS, but is insufficient for a complete analysis of the proposal. The existing "paper trail" has some vague and confusing statements, and is difficult to follow. Thus, we request that you (or your client) provide us a complete and detailed Plan of Operations, including suitably-scaled maps, information requested in this letter, and any other information that may be pertinent to the proposal. The enclosed form can be used for your convenience or it may be used as a guide for preparing a personally designed Plan of Operations. The need for a Plan of Operations that provides complete, accurate and timely information is critical to the approval process. Failure to provide this information can render the analysis insufficient or ineffective and can create an unnecessary time lag and increased costs. New information may drive the need for further analysis; however, all aspects of the Plan of Operations must be analyzed prior to approval. Mr. Freeman's interest will be best served by an accurate and clear Plan of Operations.

The NEPA analysis is a joint effort of the Siskiyou National Forest and Medford District BLM; therefore, the Plan of Operations should include the full scope of the operation, including facilities, access, mining, and any other activities that may occur on BLM or Forest System lands. Following is a list of specific information that must be included in the Plan of Operations:

1. A detailed mine development plan accompanied by suitably-scaled maps to graphically depict the proposal and dimensions of mine sites. The development plan should include a description of the processes proposed to occur at the mining and stockpile sites, the timing of site development, depiction of fuel storage sites, if applicable, and a description and identification of locations of disposal or storage of any unwanted material. Based on an estimate of reserves and the rate of production, the plan must identify the life of the proposed operation. It must identify an estimate of the amount of material that will be excavated from each site during each year of the proposed operation. It must identify of the types, capacities, and numbers of all equipment to be used in the operation. Any equipment proposed to be left on site during periods of non-operation must be identified. It must identify the days and the hours during which excavation and hauling will occur. It must identify an estimate of the expected number of annual and daily haul trips between the mine and stockpile site.

2. A detailed description of the stockpile operations, improvements (including surfacing) and equipment needed. It must include a suitably-scaled map depicting the stockpile site and all associated facilities including locations of dry and wet piles, location of drying facilities, location of fuel storage facilities, location of parking areas, location of watchman's quarters and sanitary facilities. The map should include dimensions of all facilities. Please include an estimate of how much and how long ore would remain at the site.

3. A discussion of the need for the 5,000 ton sample, if applicable. Depiction on a suitably-scaled map of the location(s) where the sample will be taken.

4. A fuel use, transportation and storage plan. Please included the estimated amount of fuel needed annually. It should include a discussion of the construction of fuel storage facilities, depiction of their locations, method of transporting fuel to work sites, amount of fuel to be transported to work sites in any one trip, how often fuel will be transported to work sites in a season, and a discussion of emergency measures to be taken in the event of any type of accident involving a fuel spill.

5. A transportation plan. The Plan of Operations must include a transportation plan discussing measures to be taken regarding routine road maintenance, maintenance of adequate drainage of roads and mine sites, dust abatement, construction and maintenance of proposed stream crossings, and seasonal road stabilization and closure. Mr. Bob Oleary, Project Engineer, has prepared this information for the DEIS; please contact Mr. Oleary (541-471-6562) if you or Mr. Freeman wish to use his information in the plan.

6. A reclamation plan. The Plan of Operations must include a reclamation plan to address concurrent reclamation of mine sites during mining and how many acres would remain disturbed at any one time during the operation, stabilization and revegetation of the stockpile site and all mine sites at closure, and disposal of all unwanted materials.

7. A monitoring plan. The Plan of Operations must identify the techniques to be used to monitor and assure compliance with state and federal laws and standards and guidelines, including air quality, water quality, etc.

To assure accuracy of the Draft EIS, the Plan of Operations must be submitted by December 10, 1997. A number of issues related to the NICORE proposal have been identified. The Interdisciplinary Team has considered several options to resolve these issues. Examples include limitations on seasonal operation, closure of the area to the public, stream crossing designs that assure fish passage, an alternate stockpile site that minimizes visual and other impacts, dust abatement, etc. You and your client will have the opportunity to comment on these and any other issues during the DEIS comment period.

Thank you for your cooperation,

Mary Zuschlag

MARY ZUSCHLAG
District Ranger

cc: Walt Freeman
cc: Mike Lunn

enclosures

GROEN & STEPHENS

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December 10, 1997

Ms. Mary Zuschlag
District Ranger, Illinois Valley District
Siskiyou Redwood Highway
Cave Junction, OR 97253

Re: 1950 NICORE

Dear Ms. Zuschlag:

Thank you for your letter dated November 6, 1997, requesting additional information regarding the Nicore Project. Mr. Freeman has been and will continue to be fully cooperative in providing your agency with pertinent information regarding this proposal.

To that end, he signed a project summary on March 19, 1997, and was assured that this document in conjunction with previously submitted information was adequate for the needs of your agency in its work on the DEIS. Thereafter, he met with your staff on numerous occasions to answer any questions that they had. That the Forest Service is asking some of the same questions again in your letter after they were addressed in face to face meetings with Forest Service staff suggests that these meetings were a waste of time. I hope that is not true and that the Draft EIS accurately depicts what was explained by Mr. Freeman to be the answers to the Forest Service's questions in those meetings.

We are also concerned about your request for this information by December 10, 1997 after you personally informed Mr. Freeman that the DEIS was to be sent to the printer on November 24, 1997. If that is true, it appears that a response to your letter is not necessary for preparing the DEIS. However, I hope all issues can be resolved during the public comment period.

I am a little concerned about the reference in your letter to substantial progress on the "NICORE proposal signed by Walter Freeman on March 19, 1997" and your request for another Plan of Operations, either one that is "personally designed" or one that uses the form which you sent with your letter. The NICORE Plan of Operations was filed in 1992 and included the maps which you are requesting. On March 19, 1997, Mr. Freeman signed a proposal summary, but that was not his Plan of Operations. The Plan of Operations, which is awaiting approval and which is subject to the EIS, is the one submitted in 1992.

Your letter contains seven requests for information. This letter is intended to respond to those seven items.

1. A detailed mine plan with maps was submitted with the original Plan of Operations in 1992. That Plan of Operations included processes at the mine site. Processes involved at the stockpile site (as well as fuel storage) were discussed with Don McClendon in September 1997. Timing of site development is contingent on the approval of the Plan of Operations. Site development would have occurred in 1992 had the Plan of Operations been approved then. Production rates and project life were specified. No equipment will be left on site during non-mining periods. Operating times and haul trip frequency were submitted to Mr. McClendon and were included in the project summary prepared by Forest Service staff and signed by Mr. Freeman on March 19, 1997.
2. Stockpiling operations have been discussed with both Don McClendon and John Nolan of your staff. It has been specified that the stockpile area will require five acres. We have discussed several alternative locations on BLM land, but BLM has not determined which site is best. It is impossible to determine the exact site location of dry and wet piles, drying facilities, fuel storage, parking areas, watchman's quarters, sanitary facilities until the site is determined from the range of reasonable alternatives. However, all operations will be conducted in compliance with applicable regulations and ordinances. The site will be designed to handle 40,000 tons and continue until production of the mine is completed.
3. In regard to the need for a 5,000 ton bulk sample, Mr. Freeman explained in a letter to you dated November 19, 1993, that the 5,000 ton bulk sample was Phase 1 of the entire Plan of Operations. Phase 2 is the full-scale mining operation. In my letter to you dated March 21, 1997, I explained that the need for Phase 1 to precede Phase 2 no longer exists. This was also addressed in my letter to you dated February 10, 1997. A sample from the mine has already been successfully reduced to a high quality alloy. Hence, the 5,000 ton bulk sample is no longer a separate phase and full-scale mining is not contingent upon results of that sample.
4. Questions regarding fuel use, storage, and transportation were answered by Mr. Freeman in meetings with your staff. Your request for this information again suggests that meetings with your staff were completely unnecessary. Nothing has changed in regard to fuel since those meetings. Additionally, all handling of fuel, including emergency measures regarding any type of fuel spill, will be taken consistent with state and federal laws regarding fuel use, storage, transportation and emergency measures.
5. Similarly, Mr. Freeman discussed with your staff all aspects of the access roads. Some of the details were included in the project summary referred to above. Maintenance of the roads, maintenance of adequate drainage of the roads and mine sites, dust abatement, construction and maintenance of stream crossings and seasonal road stabilization will be conducted in compliance with all applicable Forest Service regulations.

Ms. Mary Zuschlag
December 10, 1997
Page 3 of 3

6. A reclamation plan was submitted in the original Plan of Operations. Details regarding reclamation have been discussed on numerous occasions with your staff.
7. For every federal and state law regulation which requires monitoring, Mr. Freeman will comply with the monitoring techniques required by that law or regulation. As stated above and in previous correspondence and as required by 36 CFR, the NICORE Project will be conducted in compliance with all applicable regulations.

Sincerely,

Groen & Stephens



A handwritten signature in black ink, appearing to read "Richard M. Stephens".

Richard M. Stephens

RMS:hkh
I:\Clients\Freeman\Zuschlag - 04.doc

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(425) 453-6224

January 29, 1999

Mr. Joel King, Regional Forester
Illinois Valley District
Siskiyou Redwood Highway
Cave Junction, Oregon 97253

Re: Mr. Freeman's Comments on SDEIS for NICORE Project

Dear Mr. King:

These comments on the Supplemental Draft Environmental Impact Statement (SDEIS) are offered on behalf of the Project Proponent, Walter B. Freeman. They are intended not to replace but rather to add to previous correspondence with the Forest Service regarding Mr. Freeman's Plan of Operations, including comments made in regard to the Forest Service's decision to draft an Environmental Impact Statement.

As a preliminary matter, several statements in the SDEIS are either inaccurate or misleading and should be corrected before the document is finalized. For instance, the Project History section fails to recognize that the project started many years earlier than 1992. The development of these claims has been ongoing on a continuous basis since 1970. The SDEIS fails to mention that these claims were subjected to extensive testing in the 1970s. It also fails to recognize that many of the mining roads in the Proposed Action are currently in existence. In order to give a complete picture, the SDEIS should include a recognition that many of the roads in the Proposed Action were developed for mining purposes and are currently in existence.

The Project History also refers to a Surface Use Determination (SUD). This SUD was prepared based on partial data, out-dated information, and by personnel unqualified to judge whether a particular private business proposal is worth pursuing from an economic perspective. Mr. Freeman offered to provide additional information and data, but the preparer of the SUD was not interested in the information Mr. Freeman offered to provide. A SUD based on incomplete information should not be relied upon by the Forest Service.

The Project History section of the SDEIS also states that the Nicore Plan of Operations was modified in 1996, although it does not state how it was modified. We are unaware of how the

Plan of Operations was modified in 1996.¹ Mr. Freeman has always been willing to work with Forest Service personnel to take steps to make the project better, but the project was not modified in 1996.

The section entitled "SDEIS Issues" also contains a number of inaccurate and misleading statements which should be corrected before the document is finalized.

1. Soil Productivity. The SDEIS states that "[r]oad development and use, pit development, and ore storage would disturb ultramafic soils and lead to a loss of productivity. The more road development and acreage mined, the greater the risk of loss of productivity." The implication is that the soil is productive and that loss of productivity would be significant. However, no where is there any explanation of the level of productivity of the soils or the level of risk of reducing the productivity, or the level of loss of productivity to which the risk relates. Due to the high mineral content of the ore in the mining area, the soil's productivity is quite low and, regardless of the level of risk, the level of reduction applied to such risk is practically meaningless.

2. Stream Crossings. The original proposal included "washed rock crossings" because the Forest Service suggested that this form of crossing was the Forest Service's preference. It is unfair to criticize the proponent for including within the proposal a condition required by the Forest Service. Mr. Freeman has repeatedly expressed his willingness to install bridges or culverts or any other reasonable stream-crossing facilities.

A second paragraph refers to nine smaller tributary crossings. The SDEIS allows a false impression to be drawn from this paragraph by failing to mention that all but two of these stream crossings are dry during summer months, during the proposed haul periods. In other words, the tributaries will not be functioning as tributaries during the time when crossings will occur.

3. Stream flow and water temperature. The SDEIS states that use of water would lead to "lower flows and higher temperatures." This statement is misleading because summer flows are always low. That fact would not be altered whether or not the project is developed. The reference is also made to a comparative of *lower* flows and *higher* temperatures. However, there is no indication that the degree to which flows might be lower or to which temperatures might be higher would be significant.

4. Risk of hazardous fuel spills. This statement refers to "other hazardous substances" but fails to identify what such other substances are. Consequently, there is no way for one to know what this risk (if any) really is and whether the consequence of such a spill is or is not "significant."

¹ This mistake is repeated on page 10 of the SDEIS.

5. Proposed, Endangered, Threatened and Sensitive (PETS) Fish Species. The SDEIS states that “[t]he Proposed Action may adversely affect fish and their habitat by blocking fish passage at mainstream and South Fork crossings and degrading other habitat features.” However, no explanation is given of what other habitat features might be degraded and how. During the summer months when the Proposed Action utilizes these crossings, the interference with fish passage is nonexistent. Because the lower portion of Rough & Ready Creek goes dry in summer months, there will be no impact to fish passage.

6. Port Orford Cedar Root Disease. Mr. Freeman has agreed to disinfect *all* equipment going into the project area and limit vehicular access to disinfected vehicles. Moreover, the Proposed Action involves significantly less new road construction than alternatives 6, 7, 8, and 10. Because of the additional road work these alternatives require, they all create a greater risk of Port Orford Cedar Root rot than the Proposed Action.

7. Noxious Weeds. Mr. Freeman has agreed to work with the Forest Service to prevent the spread of these plants.

8. Botanical Diversity/Sensitive and Endangered Plants, Aquatic Conservation Strategy and Riparian Reserve Standards and Guidelines, Wild and Scenic River Eligibility. All of these designations were put in place subsequent to the submission of the Plan of Operations and cannot legally restrict access to the ore-body, unless the federal government chooses to pay just compensation for the loss of Mr. Freeman's rights. This is confirmed by a Solicitor's Opinion dealing with land potentially suitable for wilderness preservation.

A claimant with a valid mining claim under the Mining Law of 1872 may develop the claim even if this impairs the area's suitability for wilderness preservation.

Solicitor's Opinion, “The Bureau of Land Management Wilderness Review and Valid Existing Rights, 88 I.D. 909, 913 (1981). Similarly, the court in *Mountain States Legal Foundation v. Andrus*, 499 F. Supp. 383 (1980), came to a similar conclusion.

9. Economic Viability. The SDEIS claims that the “Proposed Action is associated with Present Net Values.” This conclusion is untrue. See following discussion at pages 4-7.

10. Effects on Residents. The main purpose of the original Proposed Action was to move the haul route away from residential uses along Rough & Ready Creek Road and Nauvoo Way. Three of the Forest Service Alternatives (6, 9, and 11) would impact those residential neighbors much more seriously than the Proposed Action.

11. Visual Quality, Recreation and Interpretative Development. “The Proposed Action may degrade scenic quality of the analysis area by developing roads and a stockpile site within direct view of Highway 199, the Rough and Ready Botanical Wayside and the BLM Area

of Critical Environmental Concern." This is simply untrue. Mr. Freeman has previously agreed to locate the stockpile out of view of Highway 199 and the Botanical Wayside. If the stockpile is out of view, it is difficult to imagine how the stockpile would "degrade scenic quality." Moreover, the SDEIS is incomplete because it fails to disclose that Pacific Power & Light was allowed to construct a major power substation on BLM land within view of 199 on property just across US 199 to the east.

12. Roadless character. This reference too is misleading. This area was inventoried for RARE II, but was congressionally mandated for multiple use. The plan of operations is within the South Kalniopsis Multiple Use Area. Moreover, Mr. Freeman's proposal includes areas that have existing mining roads and is not "roadless."

ECONOMIC ANALYSIS

Mr. Freeman objects to the Forest Service's claim that his Proposed Action has negative economic values and objects to the particular analysis of the economics on several grounds. First, an analysis of the economics of his proposal is not the proper subject of the SDEIS. Second, there is no independent authority to conduct an economic analysis. Third, the economic analysis is flawed.

The focus of NEPA is environmental analysis, not an analysis of the economics of the Proposed Action. NEPA does not require the agency to examine the economic consequences of its actions.

The theme of § 102 [of NEPA] is sounded by the adjective "environmental": NEPA does not require the agency to assess every impact or effect of its proposed action, but only the impact or effect on the environment. If we were to seize the word "environmental" out of its context and give it the broadest possible definition, the words "adverse environmental effects" might embrace virtually any consequence ... that some one thought "adverse." *Metropolitan Edison Co. v. People Against Nuclear Energy*, 460 U.S. 766, 772, 103 S. Ct. 1556, 1560, 75 L. Ed. 2d 534 (1983).

Association of Public Agency Customers, Inc. v. Bonneville Power Admin., 126 F.3d 1158, 1186 (9th Cir.1997).

In response to Mr. Freeman's request that the Forest Service articulate under what authority the SDEIS was expanded to include an analysis of the economics of his proposal, the Forest Service gave Mr. Freeman a copy of Chapter 1900 of the Forest Service Manual. Section 1970.1 lists seven different statutes or regulations which the Manual asserts authorizes or requires the Forest Service to engage in an economic analysis of Forest Service decision making.

Each of these requirements relate to the economics of proposals which lie within the economic discretion of the Forest Service. For instance, these regulations require the Forest Service to consider whether a sale of federal timber makes sense to the interests of the federal government from an economic perspective. After all, there is no federal right of someone to purchase timber from the Forest Service. If a sale is not in the best economic interest of the federal government, the Forest Service can say no. In the present case, however, Mr. Freeman has a right to access his ore and the Forest Service must allow him access regardless of what the Forest Service believes about the economics of his proposal. Not one of the statutes or regulations cited in the Forest Service Manual authorize rejection or modification of a private proposal based on the Forest Service's belief the private proponent will not make enough money.

Third, even if the economic analysis was relevant under NEPA, the economic analysis used in the SDEIS is flawed. One, it relies on two reports (Resource Strategies and Barrick), which were both paid for and submitted by the Nature Conservancy—an organization which has made quite clear that it is opposed to the project. These reports on which the SDEIS solely relies are biased in favor of the philosophical goals of the organization which paid for the reports. What is striking about the reference to the economics and current nickel prices² is that the SDEIS as well as the Barrick and Resource Strategies reports fail to recognize the full value of the nickel laterite ore. Instead, they focus only on the *nickel* content and ignore completely two other valuable materials which Mr. Freeman proposes to extract from the ore: both iron and chromium. No one who has concluded that the project is not economic has calculated the value of the iron and chromium content of the ore which will be extracted in addition to the nickel.

Several comparisons have been made of Mr. Freeman's proposal to the Riddle project. This too is faulty because that plant used an antiquated process from the 1920s which failed to use both the iron and chromium, but instead simply discarded those elements. Freeman's proposal will be able to take advantage of the iron and chromium, rather than discard them as waste.

The SUD and the SDEIS both reference the closing of the Riddle smelter. However, there are other smelters in the world and there is nothing to prohibit the reopening of the Riddle smelter. The amount of ore to be extracted in the Proposed Action and more economic reduction processes the choice of a smelter will be easily made. As long as the Plan of Operation is still pending, no smelting facility will contract to process the ore. The Forest Service's request that a smelter be identified first gets the cart before the horse. Mr. Freeman has no interest in stockpiling ore that cannot be smelted, but as has been pointed out to the Forest Service previously, arrangements for smelting cannot be made until the Plan of Operations is approved.

² The SDEIS recognizes that nickel prices have fallen since the Plan of Operations was first filed in 1992. If the Plan of Operations were approved in a timely manner when nickel prices were higher, Mr. Freeman's proposal would have had even more economic benefit which is denied only because the Forest Service took now seven years to reach a decision. If approval of the plan of operations is affected by lower nickel prices, the Forest Service should recognize that approval will place Mr. Freeman in a better position if nickel prices rise.

Moreover, the Forest Service has already been notified that a sample has already been taken from the mining claims and successfully (and economically) reduced. The theoretical assumption that the project is not economic ignores this previous successful sampling.

Economics are a function of both the cost of bringing the material to market and the market price. Mr. Freeman cannot give additional information publicly about expected income because such information is proprietary. In the past, such information given to federal personnel by Mr. Freeman has been illegally disclosed to opponents of his project. Nevertheless, even if the Forest Service's economic analysis were correct—that the Proposed Action is not economically viable, the result would be that the Proposed Action will have no environmental impacts. The Proposed Action will not ever materialize if it is not economically viable.

The SUD "evaluation" was performed by personnel who were not qualified to make such economic determinations. Their work was based on data and information that was in error, outdated, and supplied by individuals or groups opposed to the project. Information relating to favorable project economics was discussed with the Illinois Valley District Ranger on November 10, 1998, but this information was ignored.

As to the costs associated with removing the ore, the SDEIS has both faulty premises and gives false impressions. For instance, the comparison of the costs of the various alternatives assume that Mr. Freeman will be required to build fully engineered roads consistent with the Forest Service's practice for permanent roads associated with timber harvests. This is inappropriate for several reasons. One, the roads in the Proposed Action are not permanent, nor are they intended to be permanent. They will be reclaimed and they will not be used by the general public. Two, roads designed to be permanent such as those associated for timber harvests are more disruptive to the environment than the temporary roads in the Proposed Action. Three, and most importantly, the Forest Service's own records demonstrate that its practice is not to require fully engineered permanent forest service roads when approving mining plans of operation. Instead, it appears this requirement is being imposed on Mr. Freeman solely to make the Proposed Action appear more costly than it really is.

The SDEIS also gives a false impression. For instance, the table on page 81 shows the preferred alternative (#9) to have haul costs of \$840,000 and compares that to the Proposed Action's haul costs of \$2,080,000. At first blush, it appears that the Preferred Alternative is more economic than the Proposed Action, that is, until one remembers that the amount of ore being hauled in the Preferred Alternative is much smaller than in the Proposed Action. The Preferred Alternative has costs of \$840,000 for only 5,000 tons of ore, resulting in a cost of \$168 per ton. The Forest Service estimates the costs in the Proposed Action at \$2,080,00 for 400,000 tons of ore, resulting in a cost of \$5.20 per ton. Any middle school student can tell that the costs associated with the Preferred Alternative are over 32 times more costly per ton than Mr. Freeman's Proposed Action.

Mr. Freeman objects to the consideration of the Preferred Alternative and its selection as such on several grounds. First, the SDEIS fails to address several problems with the idea of removing

ore by helicopter. It fails to address the impacts of noise and vibration on nearby residences and wildlife. It fails to address the impacts of dust developed by the propeller at the mine-site, the stockpile, and points in between. It fails to analyze the risk of spread of fuel over large area in the event of a partial engine failure, or spread of hydraulic oil over large area due to line or gearbox leakage. It fails to address the risk of spillage of ore on the flight line and other potential catastrophic events such as a helicopter crash.

Alternative 9 also fails to explain how mining equipment is to be transported to the mine site. It is not enough to haul ore out with a helicopter if there is no way for equipment to load the ore to get to each of the sites.

Mr. Freeman also objects to the Preferred Alternative because it does not meet the purpose of the proposal, which is to mine all of Mr. Freeman's claims. A 5,000 ton sample is simply unreasonable given the Forest Service having taken seven years to approve the plan of operations and then allow only 1/80th of the project. The notion that Mr. Freeman may not access his ore until he takes a 5,000 ton sample is an unreasonable restriction on his access to his ore. He has already taken a sample and successfully reduced it. The SUD and the SDEIS completely ignores this fact. Further, the Preferred Alternative anticipates that the Forest Service will require a second Plan of Operations, which means additional delay.

Moreover, the law is quite clear that the federal agencies cannot segment a project when drafting an Economic Impact Statement under NEPA. See *Stop H-3 Ass'n v. Dole*, 870 F.2d 1419, 1427 & n. 13. (9th Cir. 1989)(numerous cases cited). Also, 40 C.F.R. 1508.25 requires connected actions to be considered together in one EIS

Alternatives 6, 7, 8, 10, and 11 are equally inadequate. Alternative 6 is less desirable than the Project Action because it places the haul road immediately adjacent to residential neighbors' yards. As stated above, one of the reasons the route in the Proposed Action was chosen was to avoid interference with residential use nearby.

Alternative 6 also inappropriately places part of the haul route on privately owned land. The Forest Service can neither require a private property owner to allow its property to be used for a haul route (absent the exercise of eminent domain), nor can the Forest Service condition Mr. Freeman's rights upon acquiescence by a private party. See *Washington ex rel. Seattle Title Trust Co. v. Roberge*, 278 U.S. 116 (1928). Also, Alternative 6 requires the construction of a completely new road, the "Ridge Road." Using existing roads has less impact on the environment than the creation of a completely new road where none existed before.

Similarly, Alternatives 7 and 8 are objectionable because they too require construction of a new "Ridge Road." Alternative 8 does not fulfil the project purpose because it denies access to Site D, where a significant portion of the ore body is found.

Alternative 10 and 11 are objectionable because they deny access to Site A where a significant portion of the ore body is found. These Alternatives also incorporate cable haulage without any documentation of whether such a system is reasonable.

The Proposed Action should be preferred for several reasons. Freeman's proposed use of existing roads is less disruptive of the environment than any of the Forest Service proposals suggesting fully engineered roads, as is the Forest Service's practice for permanent roads associated with timber harvests. The roads accessing Mr. Freeman's claims are not intended to be permanent and should not built as if they were.

All of the alternatives addressed in the SDEIS should be rejected because they constitute a denial of reasonable access to Mr. Freeman's ore. The law is clear that restrictions on access can be so extensive they constitute a taking of the mineral resource by the government which requires payment of just compensation. *Skaw v. United States*, 740 F.2d 932 (Fed. Cir. 1984), *on remand* 12 Cl. Ct. 7 (1987); *Yuba Goldfields, Inc. v. United States*, 723 F.2d 884 (Fed. Cir. 1983); *Freese v. United States*, 6 Cl. Ct. 1 (1984), *aff'd w/o opinion*, 770 F.2d 177 (Fed. 1985). Takings claims against the federal government are filed pursuant to the Tucker Act in the Court of Federal Claims.

The Court in *City and County of Denver v. Bergland*, 695 F.2d 465 (10th Cir. 1982), held that the amendment of access which existed prior to FLPMA, was required to be considered under the rules which existed at the time the access right was established. To the extent Mr. Freeman's existing access needs to be changed, such change must be governed by the rules that existed at the time the access road was established.

Mr. Freeman also has rights to use this particular access route to service his claims under the 1872 Mining Law. A 1959 Solicitor's Opinion held that roads built by miners without the grant of an express right-of-way were "roads constructed under clearly implied statutory authority as ways of necessity." Rights of Mining Claimants to Access Over Public Lands to Their Claims, 66 I.D. 361, 365 (1959). This Solicitor's Opinion was cited with approval and relied upon in Alfred E. Koenig, 4 IBLA 19, GFS-BLA-MIN-1971-34 (1971). In that case, the IBLA ruled that the owner of mining claims was entitled to construct and maintain an access road across public lands without prior authorization from the BLM. Likewise, this particular access route built by Mr. Freeman's predecessors for the purpose of accessing the same mining claims cannot be denied.

Mr. Freeman also has rights to access his claims by means of the existing roads pursuant to the Alaska National Interests Conservation Act. The court in *Montana Wilderness Association, Nine Quarter Circle Ranch v. United States Forest Service*, 655 F.2d 951 (9th Cir. 1981), *cert. denied*, 455 U.S. 989, held that the right of access provisions in that Act do not apply only to property within in Alaska as the name of the Act implies, but applies to property within the domain of the Forest Service nationwide.

In *United States v. 9,947.71 Acres of Land*, 220 F. Supp. 328 (D. Nev. 1963), the court explained:

If the builders of such roads to property surrounded by the public domain had only a right thereto revocable at the will of the government, and had no property rights to maintain and use them after the roads were once built, then the rights granted for development and settlement of the public domain, whether for mining, homesteading, townsite, mill sites, lumbering, or other uses, would have been a delusion and cruel and empty vision, inasmuch as the claim would be lost by loss of access, as well as the investment therein, which in many cases of mines, required large sums of money, before a return could be had.

Id. at 331.

CONCLUSION

The SDEIS attempts to make the proposed plan of operations appear to be unworkable while proposing alternatives which are clearly impossible to implement. None of the Forest Service's alternatives have been subjected to the same level of analysis as the Proposed Action. It is clear that the purpose of the alternatives analysis is to place insurmountable obstacles in the path of rational project development in continuing violation of the General Mining Law and the Minerals Policy Act of 1970.

Sincerely,

Groen & Stephens LLP



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April 1, 1999

Mr. Joel King, Regional Forester
Illinois Valley District
Siskiyou Redwood Highway
Cave Junction, Oregon 97253

Re: Nicore EIS

Dear Mr. King:

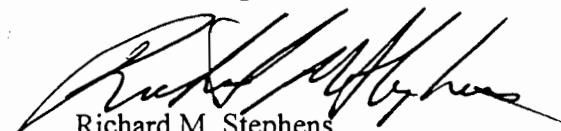
We are writing to ask when the EIS will be finalized and a final decision issued on the Plan of Operations. The last time frame I heard was that this process would be complete this spring.

As you know, we are eager to have this process completed so that Mr. Freeman can make some commitments for having the ore smelted. He cannot make arrangements for transportation and smelting until he has approval to remove the ore. For instance, he cannot promise a smelter to have ore in June, if the Forest Service has not finished its review of the Plan of Operations. Unfortunately, some opportunities to have that work done at very low cost have already passed by. Nevertheless, arranging for this work is complicated and we need a realistic timeframe for potential contractors, including a smelting facility, to begin work.

I look forward to hearing from you.

Sincerely,

Groen & Stephens LLP



Richard M. Stephens
rstephens@groen-stephens.com

RMS:lch

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APPENDIX E
ALTERNATIVE 9
SAMPLING REQUIREMENTS

SAMPLING OF THE NICORE PROJECT

Under the preferred alternative of the Final Environmental Impact Statement the proponent would remove a 5,000 ton bulk sample from his mining claims. This sample would be used to evaluate the feasibility of developing the nickel-laterite deposit on a full-scale basis. The next logical step in determining if it is reasonable to expect that a profitable mine may be developed and what will actually be involved in that full-scale development (ie, mining, stockpiling, milling, beneficiation, transport, power needs,etc) is pilot-scale testing.

Based upon the testing of a 1 ton sample, the proponent has shown evidence that implies the production of stainless steel may be feasible, but the bulk-sampling and pilot plant will be used to verify that the deposit can actually be mined, milled and smelted to produce stainless steel profitably. Results from the pilot plant will be used to determine the requirements for reagents and fluxes, additives, configuration of processing components, volume and composition of waste materials, and the grade and volume of products.

If this bulk-testing proves positive and shows a reasonable prospect of technically and economically developing the deposit, then the proponent can use results to design the full scale development of the deposit. Any plan for full-scale development must include specific information regarding drilling and clearing requirements, mining, hauling, milling and processing needs, waste disposal requirements, water and power needs, and requirements for other ancillary facilities and reclamation. A new or a supplemental detailed plan for full-scale development would be required for environmental analysis before approval could be given. Based on information obtained from bulk sampling and processing the Forest Service would determine if there is a reasonable expectation that the plan is technically and economically feasible. The Forest Service would verify sampling, testing and/or analyses; it may be done by FS personnel or by third-party contract.

SAMPLING

Bulk-sample material mined for this testing can be sampled to determine the metal content, grade and other characteristics of the feed material, of the waste and of products being generated by the processing facility. That information would be used to determine if the product is marketable and the operation appears profitable. A comparison of the ore, waste and products will make it possible to quantify the recovery of metals and the quality of the stainless steel produced by the facility. This will allow for a calculation of the volume of ore and other additives that are required to produce a given volume of the product. Based on information provided by the proponent, it is expected that a pilot plant would process between 20 and 60 tons of mined material per day and would require several months to process the entire sample. Forest Service check-sampling should be unannounced and done on an average of at least twice per month.

For consistency mined material, waste and product should be sampled at the same time to ensure that the sample reflects the entire process for any given time. If the sampling were to be taken at different times it may not accurately represent the process since it is expected that the operator will be making adjustments to optimize recovery and quality of product.

Check sampling of feed material should consist of two 20 pound samples, which would be split into 10 pound samples, one-half to be retained by the FS, and the other half to be sent to a qualified laboratory

for analysis for Ni, Cr and Fe content. Waste products of the processing (slag) would also be analyzed; a similar sample volume is recommended. The same analysis would be performed for Ni, Cr and Fe. The stainless steel product could be sent to a laboratory such as the Albany Research Center (Albany, Or) for testing to determine the metallic content and grade of stainless steel.

Any additives such as fluxes or reagents would not need to be tested if a manifest or other documentation from the producer is provided. Similarly, if additives of Ni, Cr, or Fe are used then their content can be ascertained by a manifest or bill of sale.

COSTS OF PRODUCTION

Any plan for full-scale mining and processing would need to be supported by an economic analysis provided by the proponent, base on data gathered from the pilot facility.

All elements of mining and pilot plant costs to produce the stainless steel product should be included. A partial list of those elements is listed below:

- Capitalization Costs of equipment
- Facility
- Haul
- Labor
- Power (electrical, petroleum)
- Additives and Reagents
- Maintenance
- Permits
- Reclamation

To make accurate estimates of these costs and to analyze the environmental impacts associated with development, the proponent will have to develop a detailed mining plan indicating excavation limits, excavation sequencing including topsoil removal and stockpiling, overburden removal and disposal, surface and groundwater containment and disposal, equipment and support vehicle needs, type and number of workers, proposed road construction, support facilities including the means by which water and power will be provided, mill location, ore stockpiling and mill waste disposal requirements, construction schedules and acquisition of the other required federal and state permits.

A detailed plan of a processing facility will need to be provided, which will be based upon the information gathered from as a result of this bulk sampling and pilot plant testing activity. The mill feed rate and production rate data generated by this testing, can then be used to determine and evaluate the mining rate, haulage requirements, water disposal requirements and mill waste disposal requirements for the project.

If the proponent chooses to not build his own facility and elects to use an existing facility elsewhere, then he should be able to provide the Forest Service some instrument that shows what price that facility will pay for his ore. In this situation an economic analysis of the mining, transportation and storage costs should be performed to show the potential profitability of transporting the mined material to that facility.

APPENDIX F

PHYSICAL SCIENCE REPORT

APPENDIX F

Physical Science Report

Judith McHugh

September 12, 1998

April 15, 1999

June 4, 1999

I. Chapter 3 - Existing Condition

A. Soils and Geology

Ninety three percent of the Rough and Ready watershed is underlain by ultramafic peridotites and serpentenites (West Fork Watershed Analysis, (WF WA) pg 12). These rocks are part of the larger Josephine Peridotite Sheet (Hotz, 1964). The Josephine sheet is one of the largest mapped and is approximately 75 miles long, 11 to 16 miles at its widest and tapers to 0.5 to 3 miles near its southern extent in Northern California (Hotz, 1964). The remaining 7 percent of the watershed is underlain by granitic intrusions in the headwaters, by metasediments of the Galice Formation along the eastern boundary, and by undifferentiated alluvium that forms a large fan near the mouth (WF WA, pg 12).

The soils of this watershed fall into the general association 'Dubakella, Pearsoll, Eightlar' as mapped in the Josephine County Soil Survey (1981). This association is noted for its well drained, stony character and variable depths that range from shallow to deep (*ibid*, pg 9). Generally, the Pearsoll soils occupy the ridges and are more shallow and more stony than the Eightlar and Dubakella. Depth to bedrock will vary with location and follows the soil depth. This variable is important in that the soil ground waters likely move largely independently of the deeper ground waters moving through bedrock.

Permeability is slow in all soils. Organic content ranges from 3 to 10%. The surface layer (topsoil) is a stony clay loam and generally very shallow (2-10"). This topsoil contains a high percentage of rocks greater than 3" in diameter (25-75%). The sub-soil in these associations is generally even more rocky than the surface layer.

The West Fork watershed analysis displays a map that characterizes the parent material and estimated soil depths for the watershed (WF WA, pg 13). A second map that displays the fine fraction content of the sub-soils is also displayed; this map is intended to help locate those places in the watershed that may supply fine sediment in the event of disturbance. The very high magnesium content and very

low calcium content of these soils limits plant growth (*ibid*, pg 9; Coleman and Krukebeg, 1998 unpub).

Of particular interest to this analysis are the nickel, chrome and cobalt -rich soils known as laterites. These residual soils lie on an old 'upland weathered surface and in lower slump and benches as well as in outwash deposits mixed with sand and gravel on the valley floor' (Ramp, 1978). Laterites are generally formed under warm, wet conditions over many, many years (Bates and Jackson, 1979).

The proposed plan of operations that is driving this analysis includes four locations for pit development. These areas were sampled by the Inspiration Development Company from 1973 to 1978 (Ramp, 1978). The data obtained by Inspiration are proprietary and not available. Very limited sampling was conducted by the State of Oregon and the US Bureau of Mines in the vicinity of the proposed pits. These data are presented here to give some representation of the area, but may not reflect actual site conditions.

Location	Maximum depth to Bedrock (ft)	Average depth to Bedrock (ft)	Percent rock in laterite soil
Near Site A	40	10	40
Near Site B	25	8	45
Near Site C	16	6.5	45
Near Site D	20	7	35

The nickel content in the soil varies by site but ranges from 0.57-1.23%, cobalt from 0.07 to 0.14%, and chrome from 1.06-2.56%. Review of Ramp's map suggests that the proposed pits have been placed in the locations that have the higher of the known nickel contents. Ramp notes that there are several hundred more acres in bench soils as well as over a 1000 acres of outwash that also contain nickel, chrome and cobalt.

The presence or absence of asbestos in the project area has been the subject of some concern. Weathering of periodite into serpentinite and serpentine minerals can very commonly include chrysotile (asbestos), lizardite, brucite, and magnetite (Coleman, 1998). "Epidemiological studies show that the chrysotile asbestos free of amphibole fibers are not ...linked to mesothelioma" (McDonald and McDonald, 1995 in Coleman, 1998). The presence or absence of amphibole in the serpentinites of Rough and Ready Creek is not known. Telephone conversations with Dr.'s Gregory Harper and David O'Hanley, both experts in the geology of SW Oregon and in Serpentines overall were conducted in the late Winter of 1999.

Dr. O'Hanley suggested that sheared zones be surveyed for the presence or absence of fibrous serpentine minerals. Field samples have shown largely platy, not fibrous minerals in these shear zones, but this small amount of sampling can not be construed as representative. Dr. O'Hanley did not believe that conditions in the area were present such that large quantities of asbestos could form. He did find one exposure down on the Smith River near Patrick's Creek Lodge. Exposure to the asbestos occurs not in the laterite soils, but in the altered peridotites (serpentines). Serpentinites are present throughout the watershed.

The presence or absence of sulfides in the project area has been the subject of some concern. Sulfides are a concern because of the interaction of sulfur with water that produces acidic conditions often referred to as 'acid mine drainage'. The massive sulfide deposits in Josephine County are generally associated with basaltic or more silicic volcanic rocks (Ramp, 1979). These conditions are not met on the periodites of the Josephine Sheet. There are no known sulfide deposits in the Rough and Ready watershed (Koski and Derkey, 1981).

The dominant erosion process in this watershed over long time scales is large landslides (WF WA); gullying and rill erosion are more important on shorter time scales. There are at least 16 miles of road within the project area, most of which can not be driven. There are two places on Rough and Creek mainstem and six places on tributaries that can be forded by high clearance vehicles. These roads and crossings contribute small, but generally not measurable quantities of sediment to the stream system. The dominant erosion processes on these surfaces are surface wash and rilling.

B. Channel Form, Riparian Ecosystems

Rough and Ready creek tumbles out of its headwaters at steep gradients down through a relatively narrow and incised canyon. This pattern gives way to a more meandering pattern before finally spilling into a braided channel as it crosses its alluvial fan (WF WA, physical science report, pg 3). The channel bed is dominated by cobbles and boulders. Deep pools cut into resistant bedrock alternate with much more extensive lengths of riffle and shallow pools.

The role of large wood in this watershed figures far less prominently than it does in other local watersheds. Large wood is generally only found growing in a narrow riparian strip (WF WA). Once it falls, it does meter the flow of sediment in tributaries, but the water power in the mainstem reduces its function and simply carries the wood along as it does the rocks. Accumulations of wood are seen where it has become entangled with riparian vegetation on channel banks and gravel bars. Likely it improves local growing conditions at these locations. Port-Orford Cedar is present in this watershed and is one source of large and rot-

resistant wood. It too is most important for metering the flow of sediment in the tributaries. Any stream side vegetation that blocks or limits solar radiation from the water surface helps to prevent water warming during the critical summer months.

Numerous springs emerge along the length of the channel. Many of these spring from channel banks, others come as through-flow in the extensive gravels. These springs are often recognizable due to abrupt changes in vegetation that is localized to the effluent. The largest spring complex in the project area known to this author is located near the vicinity of proposed crossing 3. These springs appear at the edges of a large gravel bar and appear to be fed both by tributaries that go subsurface (No-name creek) and by throughflow from the main stem of Rough and Ready itself. There is another spring that is home to a population of yellow-legged frogs near crossing #6 (the most upstream of the 2 currently well-established fords). Flow into this wetland appears to have been disrupted by the presence of the road. It is not known exactly what effects this road may have had or still be having upon the area.

Other springs are located along hillslopes. These are likely fed by water percolating along shear and/or fracture zones in the bedrock (WF WA, physical science report, pg 4). The most notable of these is located just downstream of proposed crossing #3 on the hillslope above the creek. There are also several springs located on the east facing hillslope below proposed mine site B. These springs are likely fed by deeper groundwater recharge and are used for domestic water supply.

There are other streams that drain the project area, namely Rock Creek, Woodbury Creek and numerous unnamed tributaries in Section 27. These creeks drain to the West Fork of the Illinois River. There is little specific data about these creeks. Review of topographic maps and air photos suggests that they are steep, sparsely vegetated (similar to tributaries in Rough and Ready), very likely as 'flashy' in response to precipitation. There has been some historic road-building and prospecting in Rock Creek.

C. Surface and Ground Water Interactions

The term 'hyporheic zone' refers to that portion of the groundwater interface where a mixture of surface and groundwater can be found (Dahm and Valett, 1996). This area is important to stream ecologists and to those seeking to understand the transport of elements through stream systems. It is particularly relevant to this project in regards to concerns about hazardous materials that could enter the waters of Rough and Ready and be transported to users of ground and surface water.

The hyporheic zone in Rough and Ready Creek has not been studied. Observations of lower flow volumes near the mouth of R&R than those observed higher in the stream system have led many to consider R&R a 'losing' system (WF WA). This observation extends beyond the loss of water that can be attributed to diversions, which also reduce flow volume as one moves downstream. Observers believe that the surface waters of Rough and Ready are recharging the ground waters locally. There are no data about the depth of this hyporheic zone, its function during wet versus dry season, nor its relationship with the deeper groundwater.

The depth to groundwater will vary over the project area. The deeper recharge to regional groundwaters occurs through the bedrock. More shallow ground waters are also present in the soils, and are often 'perched' on the bedrock/soil interface. Depth to these water tables will vary seasonally and during storm events. Drainage from the soil waters into the deeper ground waters occurs, generally at rates that are slower than within-soil drainage rates. While these basic processes are understood to be taking place within the R&R watershed, there is no specific information about groundwater depth. One drinking well of a resident who lives on the alluvial fan is reported to be over 100' deep (WF WA).

D. Water Quantity - Flow

Streamflow varies by tributary and by season (WF WA, physical science report, pg 8). Generally, the area is noted for its 'flashy' nature, marked by a rapid rise and fall in stream flow in response to precipitation. Summer flows are often critically low, the stream goes sub-surface in several locations in many years.

There are very few flow measurements that have been taken on Rough and Ready Creek. In the summer of 1997, however, Oregon Department of Water Resources, Josephine County branch took the following data:

R&R near Mouth	May 16	48.7 cfs
	June 6	41.9 cfs
R&R below Seats Dam	May 16	39.3 cfs
	June 6	50.1 cfs
	July 2	16.6 cfs
	July 18	9.8 cfs
	Aug 15	3.6 cfs
	Aug 29	4.3 cfs

Stream flow is used to support numerous beneficial uses in the area. According to

data collected by the Oregon Department of Water Resources, there are recorded water rights for domestic use, stock, irrigation, and fish. The largest withdrawal occurs at Seats Dam, the right is for 2 cfs for manufacturing purposes. More than 1 cfs is allocated for the Wings and Ferron Ditch, purposes reserved for use are stock and irrigation. The ditch on the south side of R&R draws 1.03 cfs for irrigation use. One site for 0.005 cfs is issued for domestic use. An approximate estimate of allocated uses in this watershed totals a little more than 4 cfs.

E. Water Quality - Sediment

The most striking aspect of water quality noted by observers of R&R creek is its exceptional water clarity (WF WA). This is generally attributed to the rocky, well armored soils and relative lack of disturbance in the area. As discussed previously under section A. Soils and Geology, while large landslides supply the greatest amount of sediment to the channel over long time frames, gullying and sheetwash supply sediment over shorter time frames. Sediment is supplied to the channel via natural processes such as landsliding, bank erosion, sheetwash, and soil creep. Additional sediment is likely also derived from disturbed surfaces such as roads and trails in the watershed. Rates and volumes for these delivery mechanisms are not known.

Water quality in the West Fork is also generally good, although not as clear as observed in Rough and Ready. The exact sources of the sediment pollution in the West Fork is not known, but roads, stream side slides and channel bed and bank erosion are likely. It is not known if Rock, Woodbury and the tributaries in Section 27 are currently sources of sediment to the West Fork. The 4402-461 does show evidence of gullying and subsequent water and likely sediment delivery to the West Fork.

Existing rates of sediment transport along the bed of Rough and Ready were modeled in an attempt to characterize the existing situation. The location chosen for modeling was a stream cross-section located immediately down stream of the lowermost existing ford (proposed crossing #4). The simulated flow level for the modeling exercise was bankfull flows, or those flows expected to occur on average once every 1.5 to 2 years. These are the flows most linked to channel bed formation and maintenance. The model (wixspro) estimated that bankfull flows transport approximately 1860 tons per day through this cross-section. There has been no measurements of bedload sediment transport taken to validate this estimate.

F. Water Quality - Temperatures

Summer-time water temperatures in R&R and the West Fork exceed the 64 degree

(F) State standard for many days during the season. These high temperatures are likely a natural, background condition, although they are likely somewhat exacerbated by harvest in the headwaters of the South Fork of Rough and Ready (WF WA, physical science report, pg 9). It is not likely that the small amounts of sediment currently supplied to the creek from disturbed areas are affecting the stream temperatures in the mainstem. The sparse riparian forests likely block some incoming solar radiation and prevent even greater warming. The influence of Port Orford Cedar on stream temperatures is not quantified, but is not expected to be high given the sparse distribution of this species.

G. Water Quality - Hazardous Materials and Dissolved Elements (geochemistry)

Sources of hazardous materials in the watershed currently come from vehicles crossing at the existing fords, and from homes and industrial uses in the watershed. There are no known spills of hazardous materials nor dumps in the area. There is some existing risk associated with vehicles crossing the fords as they could leak hydraulic fluids and gas/diesel during the crossing.

The geochemistry of the surface waters (9 sites) and the chemistry of the bed sediments (8 sites) in R&R Creek was studied as part of a monitoring program established by the US Geological Survey. They found that pH values ranged from 7.63 to 8.58, conductivity from 120 to 277 uS/cm, and that alkalinity ranged from 75 to 182 ppm. Additionally, “the concentration of elements that may be a concern for aquatic and public health are generally low, particularly for Copper, Zinc, Arsenic, Cobalt, Selenium, Molybdenum, Uranium and nitrates” (Miller et al, 1998). “The only exception is Nickel...which is elevated relative to average fresh water” values (ibid). Nickel occurs in concentrations that exceed state ambient water standards (sample values 11-36 micrograms per liter, state standards 13.4 micrograms per liter; Table 20, DEQ, 1992) “High alkalinites...indicate good capacity for buffering acid generation from possible sources such as acid rain and acid-mine drainage”(Miller et al, 1998).

Several springs currently being used as domestic water supply were sampled at the request of landowners who live down grade of proposed mining site B. The results of those analyses are included in the project files. The majority of the elements sampled existed in concentrations so low that the equipment was unable to detect the element. Nickel, again is in concentrations higher than allowed under state drinking water standards (sample values 30-40 micrograms per liter, state standards 13.4 micrograms per liter).

II. Chapter 4 - Effects of Alternatives

A. Soils and Geology

The alternatives, including pit development and use, road development and use, and storage of ore, differ in their effects. The alternatives have been described elsewhere and only the points relevant to the following issues will be covered in this section:

1. Changes in local site conditions, including unique locales
2. Risk of slope instability.
3. Additional mine development
4. Toxicity of the Ore

Issue 1. Changes in local site conditions. Which pits are developed and the miles of road required to access those pits will vary by alternative. The amount of land disturbed to generate road surfacing rock is proportional to the number of road haul miles. Use of this land as a rock pit creates an irretrievable commitment of resources, once the rock is quarried and used, the rock pit can not be returned to its former configuration.

The locations and conditions at each of the mining pits and along the roads have many features in common, as well as a few that are unique to each locale. In general, the pits and the access roads traverse largely ultramafic-derived soils, although there are some road miles on the alluvium. Disturbance to the surface layer of these soils will expose the sub-soils, and displace the relatively organic-rich surface layer. This loss of soil structure and mixing of soil horizons will likely result in reduced productivity at these sites, as observed at disturbed sites in the area that have not revegetated quickly and are visible for many years following disturbance.

The mining pits will be filled back in with waste rock and covered with the reserved topsoil following excavation. The mining pits will remain as topographic depressions whose depth will be approximately 6' below current elevation. Mining pits will likely fill with water during some of the year, changing which plants will choose to colonize these sites, as compared to pre-disturbance conditions. The mining pits will be drained such that standing water levels will remain below the placed topsoil, see sketches below.

Mining pit drainage is contingent on the slope of the hillside into which the pits are dug. Drains on sloping hillsides will be able to be installed with a minimum of excavation (sites C and D). Drains on more level sites (A and B) are not feasible due to the great distances that would have to be excavated in order to 'lose'

enough elevation such that the pipes would flow downhill. These sites will likely be designed with a simple armored outflow. These sites are more likely to experience ponded conditions. I recommend that final designs be prepared by a certified engineer hired by the proponent prior to final approval of any plan of operation.

The following table displays the amount of disturbance by alternative. This table represents direct effects to local soil productivity and structure at each site. It is important to recognize that the disturbance associated with this proposal will ‘set back’ any recovery that is already occurring.

	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Miles of road in project area	15.7 (not all miles drive able)	14.3	15.5	15.4	13.3	0.0	14.3	9.6
Acres of Pit Developed	0	35	35	35	33	0.5	20	20
Acres of Storage Area	0	5	5	5	5	10	5	5
Total Disturbed Acres	48	83	87	87	73	10.5	85	58

The indirect and cumulative effects are that the total number of affected acres are at a lower level of vegetative production than undisturbed habitat. Given Hotz’s (1964) estimate that the Josephine sheet covers 400 sq miles (256,000 acres), none of the alternatives should dramatically affect the overall soil structure and productivity on the Sheet. Cumulative impacts to site conditions should the miner have access to the full 512 acres believed to be reasonably foreseeable are the additional disturbance at the pits and in the likely much larger size of the stockpile site. These increases would take more land out of vegetative production, as well as have additional impacts as discussed under each issue in the text that follows.

There are several ‘unique locales’ that will be affected by the alternatives. Specifically, the small wetland associated with a spring at crossing # 6 (colloquially referred to as yellow legged frog pond), and Alberg Creek are important to note. It is difficult to quantify effects to these sites, but raw acreage

counts as above may not adequately capture effects either. The wetland near crossing # 6 is discussed under section B. Channel Form and Riparian Ecosystems further on in this report.

The direct effects to local site conditions and soil productivity are the same in Alberg Creek under all alternatives *except* the PA. The currently degraded condition of the stream side road will persist for some time; although recovery (revegetation and armoring of the surface) will also begin to occur. This road occupies the riparian area and makes that land unavailable for production of riparian forests. It is badly eroded, water flow goes down the road or the creek dependant upon water levels and shifting bed elevations. Under the Proposed Action, this road would be re-built. This would further delay any recovery of riparian forest. It is also very likely that the road would be subject to failures in the future, an issue that is discussed in section E. Water Quality - Sediment.

Issue 2. Slope Stability. As previously noted, slope stability issues have not been identified as the dominant erosion process in Rough and Ready. However, the issue of hillslope stability associated with creation of the mining pits has raised concerns.

The potential accumulation of water in the newly created pits could result in mass failures. This accumulation will occur when the input of water from rain or surface runoff exceeds the infiltration rate in the pits. Infiltration in the newly created pits will be affected by many variables, most of which are not quantified. Those variables are: depth to bedrock, number, permeability and location of fractures in the bedrock, rainfall and runoff rates, and hydraulic head.

Ponded water will exert both downward and lateral stress on the soils (Sowers, 1979, pg 576). There is the greatest potential for site failure when the pits are located on steeply sloping lands such that there is a thin 'wall' of soil and rock that is serving as one side of the pit. None of the sites have been modeled for slope stability. At proposed pit locations A and B little risk is anticipated because the pits will be excavated into fairly level hillslopes such that no 'thin walls' will result. At site C, slopes are a bit more steep than at sites A&B, and are less steep than slopes at site D. Slopes at site C are expected to be stable both before, during and after the operation.

The slope steepness and proximity of mine site D to the South Fork of R&R has raised concerns regarding slope stability at this location. The risk associated with this issue has not been quantified, but is higher under alternatives PA, 6, 7, 10, and 11 than under the no-action alternative and alternative 8, where no development would occur. In terms of risk, alternative 9 lies intermediary to these end members, as some sampling would occur. The risk associated with alternative

9 is very low and mimics that associated with the no-action and alternative 8 with respect to slope stability. Local site productivity in the event of a failure would decrease as accumulated soils would be lost and the site would be converted to sub-soil and/or bedrock.

In addition to slope stability concerns developing directly adjacent to the pits, concern has been raised about the potential for changes in groundwater flow such that slope stability some distance from the pits is altered. This situation is possible, but is believed to represent a low risk. The anticipated low risk stems from the observation that this is a very ancient landscape with well-developed weathering that has been subject to much wetter conditions that occur today. Localized increases in groundwater that move beyond the pits are likely to simply be absorbed into the larger groundwater network and not result in mass failures.

Water that may accumulate in the pits could also exceed the holding capacity of the pits and spill out over the top. This would likely result in gullying of the hillslope at the point of exit. The sediment eroded from the gully might then be delivered to the stream system. This risk can be mitigated through the design of an exit point that is armored and does not drain toward any streams or unstable slopes. Additional mitigation will include an engineer-designed drainage system that will drain the pits such that there is no standing water in contact with the placed topsoil, save during those hours when precipitation rate exceeds the soils ability to absorb the water (infiltration rate). These drains may only be feasible at sites C and D where the ground slope will allow for the drain pipes to intersect the hillslope at a reasonable distance from the pits. The more level sites (A and B) would require very long pipes that would require extensive excavation to install. The outlet armoring is still necessary as the drainage system will be artificial and will have some risk of failure associated with it. See the sketch above that details the anticipated schematic design of the pits. All action alternatives run an equal risk of this occurrence.

The indirect and cumulative risks associated with slope stability and gullying are the potential introduction of sediment to the stream. Given the predicted low risk and low incidence of slope instability, it is very likely that the stream would sort and transport the failed material through the reach. The potential effects of mining a total of 512 acres (the estimated acres in the reasonably foreseeable cumulative effects) on slope stability are most notable at site D. Additional development on this slope would increase the risk of failure. There is also some potential that slope stability issues could be encountered at site C should the acreage expand into steeper slopes at that location. Overall, the risk of encountering additional slope stability related impacts is low, as the laterites by their very nature tend to reside on gentle sloping surfaces.

Issue 3. Additional mine development. As previously noted, there are additional lateritic soils that are relatively enriched in metals in the immediate vicinity. This area also resides within a larger regional context or which metals-rich sites are known. For purposes of this SDEIS, the hypothesizing regarding potential future development is limited to those areas that considered reasonably foreseeable. The 35 acres of pits are nested within larger areas explored by Ramp in 1978. The total area of these is approximately 512 acres.

Should the proponent be successful in establishing access, especially road access, to all four locations given under this proposal, it would be reasonable to conclude that the opportunity to mine the additional 477 acres (512 minus 35)would exist. Mining is, of course, a matter of the market, so timing is impossible to predict. The effects of mining an additional 477 acres would need to be studied on a site specific basis. It would be reasonable to conclude, however, that slight increases in risk to slope stability, increases in sediment production, and decreases in soil productivity would occur. Additionally, the effects of these upon water quality and quantity would likely be more dramatic than the effects that will be described in this analysis.

Issue 4. Toxicity of the Ore. The laterite ore is a product of deep weathering. These materials have been in contact with oxygenated surface waters for millennium. There are no chemical reactions in this physical extraction save increased weathering as a result of freshly fracture surfaces. Freshly exposed surfaces will not present any new elements to the environment that have not previously been present in this watershed. Total dissolved loads would increase as these fresh surfaces supplied Fe, Ni, Si and other elements

The no-action alternative provides the least risk to the environment in terms of increasing the availability for dissolved elements to enter the surface and ground waters of this watershed. The remaining alternatives pose a risk proportional to the number of mine pit acres they expose, as shown in the table below. "The mining of the laterite should present no problem to the chemical quality of waters within the watershed." (Miller et. al., 1998). However, due to concerns about the chemical breakdown of olivines within the peridotites, "...the use of peridotite as road material should be avoided." (Miller et. al., 1998). The risk is then also proportional to the miles of road surfacing on the haul route with peridotite materials, this is also given in the table below. Alternative 9 and the No Action will not increase nickel concentrations in the surface nor groundwaters. The Proposed Action, and alternative 6, 7, 8, 10, and 11 may result in increases in nickel concentrations. These increases may not be measureable, but the processes are present under these alternatives that would trend the watershed towards the production of soluble nickel. Those action alternatives that may result in increases in nickel may not be permitted under statutes of the Oregon Department of

Environmental Quality.

	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Acres of Pit developed	0	35	35	35	33	0.5	20	20
Haul Route Miles	0	14.3	15.5	15.4	13.3	0	14.3	9.6
Road Construction (miles)	0	0.55	3.8	4.2	4.2	0	1.4	1.25
Road Reconstruction (miles)	0	7.7	6.1	5.5	4.9	Minor	8.8	6.0

There are no known occurrences of sulfides in the project area (Koski and Derkey, 1981) such that the many, well-documented problems associated with sulfide mining such as acid mine drainage will occur.

The indirect and cumulative risks associated with toxicity of the ore should the proponent mine the full 512 acres would be contingent on both the volume processed and on how that ore is accessed. It is likely that more road development would occur, hence increasing the potential weathering of the road surfacing rock (especially if peridotite rock sources are used). Additionally, 512 acres while still not large compared to the size of the Josephine sheet, may be enough disturbance that dissolved element concentrations could become measurable. A detailed geochemical analysis would likely be required to analyze this possibility should the proponent propose this level of activity in the future.

B. Channel Form, Riparian Ecosystems

The alternatives, including pit development and use, road development and use, and storage of ore, differ in their effects. The alternatives have been described elsewhere and only the points relevant to the following issues will be covered in this section:

1. Changes in Channel Form, mainstem and tributaries
2. Direct Impacts to Habitat
3. Potential Loss of Port Orford Cedar from Riparian Ecosystems

4. Changes to wetlands and springs.

Issue 1, 2, & 3. Changes in Channel Form, and POC, mainstem. There are no anticipated changes to overall channel form from either the no action, nor any of the action alternatives in the mainstem of Rough and Ready Creek. This system is a high energy system with high stream power such that any material placed in channel or moved around in the channel by humans is relatively insignificant compared to the power of the creek itself. However, there will be localized direct effects to fish and invertebrate habitat that will be discussed under the aquatic biology section.

There would be localized impacts to bed and banks in the alternatives that construct road crossings. The channel that drains No Name creek migrates during storms, while this area would be avoided, some erosion could occur during events that overtop the banks.

Reductions in large wood due to the potential for mortality associated with root disease would not dramatically affect channel form. Changes to stream temperature are discussed under water quality -temperatures.

Issue 1, 2, & 3. Changes in Channel Form, and POC, tributaries. Changes to tributary channels will vary by alternative. There will be direct effects to habitat at all locations where fill is placed in channels. The re-construction of the Alberg road under alternative PA would further delay the recovery of this channel, and add sediment to the system when it inevitably fails during large storm events. The West Fork Illinois tributaries are not expected to change in channel form under any alternative , aside from direct impacts as a result of the one crossing in the headwaters of Rock Creek. The table below details the number of tributary crossings planned for each alternative.

	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11

Number of fills placed in tributaries	Existing Crossings: 4 in Ahlberg, 1 on No-name.	9	3	3	2	same as No Action, 1 round trip use crossing on Rock Creek in Section 33	1	3
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The direct effects of the potential loss of Port Orford Cedar in the tributaries could be two-fold: temperature changes and wood available for metering of sediment transport. Large wood is not transported out of the tributaries very easily, generally a debris flow is required to move material of this size from smaller drainages. Thus the residence time of the existing Port Orford Cedar in the tributaries is long. The real effects will be noted some centuries from now when the existing supply has finally rotted and no replacement stand has grown. At that time, an increase in sediment transport might be noted.

A review of floodplain mapping shows that neither the stockpile location suggested under the PA, nor the location proposed under the remaining action alternatives lies within the federally mapped 100 year floodplain. However, under the placement of the stockpile under the PA is adjacent to an overflow channel that is visible on air photographs, this area lies within the riparian reserve of Rough and Ready Creek. This concern is mitigated by moving the location under all other action alternatives.

The indirect and cumulative effects of channel changes and the loss of Port Orford Cedar to Rough and Ready Creek, as well as to the West Fork of the Illinois River are not expected to be measurable. These systems are large and wood is transported much like sediment. There will be a slight loss in the amount of wood available for micro-sites should the Port Orford leave the system and not be replaced. Should the operation expand to include the full 512 acres considered as the potential reasonably foreseeable cumulative acreage, changes in channel form are not expected. This is due to the fact that the sites lie well away from drainages, and that any additional road development required for the 512 acres is likely to occur on ridges.

Issue 4. Wetlands and Springs. The effects to wetlands and springs will vary by alternative. The wetland/spring complex near crossing #3 will be affected by alternative PA only. Re-construction of a road in this area will disrupt flow patterns, exact results can not be predicted, but it is likely that some wetland habitat will be displaced and some may be lost.

The direct effects to the wetland located near crossing #6 under the No-Action alternative and action alternatives 8, 9, 10, and 11 are that the habitat conditions are currently disrupted and will likely continue that way if no actions are taken. Under any action alternative than maintains road access to site D, a continued supply of fine sediment from road use and maintenance may affect this wetland. Further down-cutting of the road surface could change surface and groundwater distributions in the vicinity of the wetland. Alternatives that propose road access to site D include the PA, and Alternatives 6 and 7. The cumulative effects associated with this site are difficult to assess as the total population of small wetlands in the project area is not known.

Bedrock springs that are recharged by deep ground water sources are not expected to be influenced by this project. This assertion is made after reflecting on the relatively small size of the pits given the groundwater influence area for the springs. Because deep groundwater flow paths are not precisely known (nor is it possible to map them), this element must be assessed in terms of risk. The risk of change to spring water quantity and quality under the No-action alternative is slight, and is contingent on geologic process or perhaps the occurrence of wildlife and/or changed climatic conditions. Under the action alternatives, the risk of change is low, and is lowest under Alternative 9 due to the lowest levels of disturbance. Pre- and post- operation conditions could be monitored to validate or refute this assertion.

Changes in surface and groundwater flow as a result of road construction may also effect changes to wetlands. There are other locations on the district where road surfaces accumulate water and water-associated vegetation begins to occupy the site. It is not possible to predict exact locations where this might occur as often these waters are not visible until construction has begun. It is equally possible to ‘de-water’ some previously wet sites through road construction. There are no known sites, however where the planned road construction will cross wetlands. This statement does not include the crossings of Alberg Creek, those are discussed under section E. Water Quality - sediment further on in this document.

The indirect and cumulative risks associated with wetlands and springs should the proponent mine the reasonably foreseeably additional 512 acres are that potentially additional seeps and springs would be intercepted by a more extensive road system and that effects to groundwater may occur. The 512 acres are

clustered near the existing proposed sites, expanding the pits from 10's of acres to 100's of acres in size may disrupt local groundwater flow paths.

C. Surface and Ground Water Interactions

The alternatives, including pit development and use, road development and use, and storage of ore, differ in their effects. The alternatives have been described elsewhere and only the points relevant to the following issues will be covered in this section:

1. Changes in the hyporheic zone in mainstem Rough and Ready.
2. Changes in the hyporheic zone in tributaries.

Issue 1. Changes in the hyporheic zone in mainstem Rough and Ready. Changes to the hyporheic zone in R&R could result if there was large-scale channel aggradation or degradation, influx of foreign fluids or materials, or shifts in channel location. The analysis does not predict any broad changes to channel location nor bed surface elevation as a result of this proposal. The influx of foreign material and fluids is considered to be a low risk, although it is recognized there are important consequences should this risk become a reality (see section G. Water Quality - Hazardous Materials and Geochemistry). The risk to the hyporheic zone mimics the risk of spill and follows that analysis. The ranking of the alternatives from most to least risk is: PA, 6=7,8,10=11,9, no action.

Issue 2. Changes in the hyporheic zone in tributaries. Changes to the hyporheic zone in the tributaries to R&R and the West Fork could result if there was large-scale channel aggradation or degradation, influx of foreign fluids or materials, or shifts in channel location. With the exception of Alberg Creek under the PA, the analysis does not predict any broad changes to channel location nor bed surface elevation as a result of this proposal. The PA will continue to delay the recovery of this tributary. The influx of foreign material and fluids is considered to be a low risk, although it is recognized there are important consequences should this risk become a reality (see section G. Water Quality - Hazardous Materials and Geochemistry). Therefore the PA poses the highest risk to the hyporheic zone in Alberg Creek, no risk is anticipated in this drainage under the remaining alternatives.

Because the direct effects associated with this issue are so small and are not expected to be measurable, there are no anticipated measurable cumulative and indirect effects anticipated to the hyporheic zones of the West Fork of the Illinois River. This is anticipated to hold true even if the proponent mines the reasonably foreseeable 512 acres.

D. Water Quantity - Flow

The alternatives, including pit development and use, road development and use, and storage of ore, differ in their effects. The alternatives have been described elsewhere and only the points relevant to the following issues will be covered in this section:

1. Changes to Peak Flows.
2. Changes to Low Flows.

Rough and Ready Creek supplies approximately 36% of the flow volume in the West Fork Illinois at its point of entry into the West Fork. Overall, it supplies roughly 30% of the flow. These flow estimates are made substituting acreage as an estimator of flow, as no continuous flow data is available to base the relative contribution upon. Based on observations, surface water contribution to the West Fork is likely lower than 36%, but sub-surface contributions may ‘make up’ the observed difference.

Issue 1. Changes to Peak Flows. Changes to peak flows are generally not anticipated to be discernable either in the tributaries nor in the mainstem of R&R. This is due to the fact that the road system will be designed for drainage that does not concentrate flow and deliver it to the streams. While the risk is very low to non-existent any alternative, it is higher under those alternatives that reconstruct and use the greatest number of road miles. The ranking of the alternatives with regard to this issue , from lowest risk to highest is: No Action, #9,#11, #8, #10=PA, #7, and #6.

Compaction of the stockpile site may result in storm water runoff that will require engineering to properly disperse. Under any action alternative, this runoff will be designed to exit the site to a location that will minimize water and sediment delivery to the stream. There is a low risk associated with this issue under any alternative, but the ranking from least to highest risk is: No Action, #6=#7=#8=#10=#11, #9, PA. This is because the PA proposes a larger stockpile site that is closer to the mainstem of R&R than any of the other alternatives.

Issue 2. Changes to Low Flows. Changes to critical summer low flows could result if water withdrawals are associated with this project. One proposal for resolving the issue of dust on the roads has been to use water. The water source for that dust abatement could be R&R creek itself, or any number of other sources. The interdisciplinary team considered the use of other dust abatement techniques that would not require the use of water. These techniques might include paving, lignan, or various salts. The team felt that water use was the best of the choices in order not to introduce foreign materials into the watershed.

The estimated daily use of water will vary as a function of road use, air temperatures, soil moisture, humidity and road miles. For this analysis road miles are used as the basis of comparison as the other variables can be assumed to be relatively constant over a given day. Additional water (approximately 70 gallons per piece of equipment) would be required for equipment washing and for the stockpile site. Specific information on these items are not available from the miner and as such are not displayed here.

Roads are assumed to be 20' wide, and water use is 0.2 gallons per square yard. Watering is assumed to occur 2 times per day for all haul miles. Both the total estimated gallons of water and the percent of an August low flow value by alternative is displayed below. A water right would be required by State law if this water was taken from any stream in the area. None of the action alternatives appear to withdraw enough water that aquatic values would be significantly and directly effected. This statement is distinct from the recognition that any reduction in water flow **trends** the watershed toward a degraded condition with respect to flow and temperature. This trend, while not measurable is in conflict with the goals of State Water Quality standards and the TMDL process. The direct risk is clearly lowest with the No Action and Alternative 9. The remaining alternatives are all very similar in terms of risk.

	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Gallons per day	0	40264	43643	43362	37449	0	40264	27030
Percent of Low Flow (a 4cfs late August value)	0	1.56	1.69	1.68	1.45	0	1.56	1.05

One effect of decreasing low flows would be to trend toward exacerbating already high stream temperatures and potentially affecting aquatic organisms. The degree to which temperatures would be directly affected could be modeled, and would be

in proportion to the quantity of flow taken. Further exacerbating stream temperatures is in conflict with Oregon State Water Quality standards and therefore a violation of the Federal Clean Water Act.

The indirect and cumulative effects of increases to peak flows are not expected to be discernable at the scale of the West Fork of the Illinois River, nor any point downstream. Cumulative impacts to peak flows should the miner have access to the full 512 acres believed to be reasonably foreseeable are still expected to be negligible. This is because the additional road system development would likely occur largely on ridgetops and the pits would likely be designed to drain at a variety of locations, reducing the likelihood that a large volume of overflow would become available to stream system simultaneously.

The indirect and cumulative effects of decreasing low flows are more difficult to estimate. Alternatives that call for potentially more water withdrawal would result in that much less water being delivered to the West Fork through either surface or sub-surface pathways. This could effect the same issues in the West Fork that are critical with regard to low flow, temperature and aquatic habitat. Once again, our inability to measure those effects at such a fine scale is likely to obscure our ability to predict the consequences directly. The trend would not be favorable for aquatic health, however. Cumulative impacts to low flows should the miner have access to the full 512 acres believed to be reasonably foreseeable are expected to further continue the trend toward decreasing water quality. It is likely that the trend would be measurable due to the additional water needed for dust abatement, the larger stockpile site and the more vehicles that would require washing.

E. Water Quality - Sediment

The alternatives, including pit development and use, road development and use, and storage of ore, differ in their effects. The alternatives have been described elsewhere and only the points relevant to the following issues will be covered in this section:

1. Erosion from Hillslope roads
2. Erosion from Stream Crossing fills, mainstem and tributaries
3. Erosion from mining pits and stockpile site
4. Transport of bedload sediments, channel form
5. Sediment Supplied due to Helicopter Loads

The beneficial uses that are protected in Rough and Ready Creek are: Domestic water supply, industrial water supply, irrigation, livestock watering, anadromous fish passage, salmonid fish rearing and spawning, wildlife, hunting, fishing,

primary contact recreation (swimming), and hydro-power.

The beneficial use of domestic water supply is currently being met. Dissolved concentrations of nickel are elevated in surface and spring waters relative to state ambient water standards. As discussed elsewhere in this report, all action alternatives save Alternative 9 are expected to further degrade this condition.

The beneficial use of salmonids is discussed in the aquatic portion of the FEIS.

The beneficial use of 'swimming' is expected to be affected only under the PA with regards to sediment introduced during road construction. There is also some risk to 'swimming' under the helicopter alternative in the event that a bucket of mined material is dropped into a creek. This risk is believed to be low and is discussed elsewhere in this report.

Point source pollution from many mines are regulated through the National Pollution Discharge Elimination System (NPDES). Potential pollutants from this project are better understood as non-point source pollutants. Non-point sources are regulated through the use of Best Management Practices if the stream waters are meeting water quality standards. Those water quality parameters that exceed state standards (under the non-point source side of the equation) are subject to the TMDL process (total maximum daily load). The TMDL is an allocation process that sets definable methods and goals for recovery of affected parameters.

Issue 1. Erosion from Hillslope roads. As previously discussed, road construction and use is likely to generate sediment in two ways: loose material that is washed off the road surface during storms, and dust that is blown or carried off the road by vehicles. This sediment becomes relevant to water quality only after such time that it is delivered to the channel. Sediment delivery is likely to be much less than production for a variety of reasons; most importantly due to the relatively few number of places hillslope roads cross stream channels and to the proposed design criteria. In all cases it is recognized that erosion of roads is proportional to use, use considers ore trucks, service vehicles, administration vehicles and incidental trips by concerned citizens and other visitors to the sites.

Road segments that lie in proximity to stream channels pose the greatest risk of sediment delivery. Road fills placed directly in stream channels are covered under issue 2 in this section. The road segments that lie nearest streams are:

1. Road segment that accesses site D
2. Road segment that parallels the unnamed tributary in the w ½ of se 1/4 section 4, hereafter referred to as 'section 4' tributary.

3. Road segment that parallels Alberg Creek (Alberg road)
4. Road segment of 4402-461 that parallels unnamed tributary to Rock Creek in the w ½ of sw 1/4 of section 34, hereafter referred to as 'section 34' tributary.
5. New construction on the Bench Segment adjacent to Rough and Ready.
6. New construction between crossings 3 & 4

Of these six sections, the road segment that runs up Alberg Creek has the highest potential to deliver sediment due to its placement directly adjacent to the creek. Existing poor drainage conditions along the section 34 segment, and to a lesser degree along the section 4 segment, make these two sections second in terms of risk. Finally, the site D access poses the lowest risk within these 6 segments. The table below identifies those alternatives that will use these road segments. In all cases road designs will be such that sediment delivery is minimized. It is very important to recognize that these road segments all exist currently and are the locations where sediment is being delivered currently. Road use and reconstruction would disrupt the armor layer that develops under conditions of low or no use and delay the on-going recovery of these site.

Table xx

Road Segment (length)	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Alberg (5280')		x						
Section 34 (2800')						x	x	
Section 4 (2200')		x						
Access to Site D (1000')		x	x	x				
Between crossings 3 & 4 (1580')		x						
Bench Road (2000')				x	x		x	

Estimated MAXIMUM Sediment Delivery from road segments above current levels		193 cubic yds	19 cubic yds	119 cubic yds	100 cubic yards	1-5 cubic yards	154 cubic yds	
Estimated sediment delivery from Crossings (see Issue 2)		585 cubic yds	35 cubic yds	39 cubic yds	16 cubic yds	<1 cubic yds	5 cubic yds	12 cubic yds

Clearly, the PA has the highest risk of any of the action alternatives, while the no-action and #9 and #11 offer low risks on these sites. Alternative 10 proposes uses of the section 34 segment with attendant risks of sediment delivery. Alternative 9 allows a few trips with a tracked vehicle, but no passenger vehicle could negotiate that road segment. Alternatives 6 and 7 would access site D using the existing road and likely contribute sediment to the mainstem and South Fork of R & R.

The amount of sediment that is anticipated to be generated at these sites can be estimated as a product of road width times the segment length affected. This estimate does not include gullying as mechanism for delivery, as locations where concentration will occur are difficult to predict when the road is design to prevent such an occurrence. The assumption that road width was 25' (to include erosion from disturbed area), and that the depth of wash was 0.25" across the surface. Based on observations, this depth of wash is likely higher than would ever occur across an entire surface so the numbers presented here are likely maximum estimates. They are best used as a comparison between alternatives.

Sediment is also generated during road construction. Under this proposal, alternatives 7, 8 and 10 propose to construct a bench road adjacent to Rough and Ready Creek. It is very likely that during construction material will enter R & R from this site. This risk is not found under the remaining alternatives. It is not possible to accurately estimate the quantity of sediment that will be introduced, but given the length of the road and observations from other sites, it is assumed to be between 50-100 cubic yards of material. Some of this material will be fines, some will be coarse. Rough and Ready is capable of transporting this material through the system at high flows, but the material will likely remain where it falls

during the summer and fall months. It is recommended that in order to limit the introduction of sediment into the creek during bench road construction, that blasting NOT be used as a means to excavate the road prism. There are other mitigations available to reduce sediment introduction such as log cribs, special drilling and rock blankets.

The direct effects of sediment delivery from these segments, as well as airborne dust, and any other sediment that came from disturbed hillslope sources could impact stream temperatures, water clarity, existing water uses, and aquatic habitat. Effects are contingent on the season of delivery. Airborne dust will likely only be delivered during the summer months and is expected to be mitigated by some form of dust abatement. The majority of the sediment delivery will occur during winter storms, and most likely during the first few storms of the season and/or during extreme events.

Due to the fine-grained nature of airborne dust, it may be expected to settle on the water surface and be transported out of the system with the current. As such it is not expected to occur in such quantity to directly, indirectly, nor cumulatively affect stream temperatures, water clarity, existing uses nor aquatic habitat.

The estimated maximum amount of fine sediment above current levels delivered to channels was shown in table xx. While the lack of data regarding current levels makes it more difficult to assess impacts, there is an assumption that the current rates of erosion from these roads, while not desirable, do not affect the previously noted high levels of water clarity. Nor have there been any registered violations nor complaints from water users regarding water quality. It can therefore be assumed that the existing levels of erosion are not limiting attainment of beneficial uses.

The fine sediment washed off of road surfaces and into tributaries during storm events will not likely directly impact stream temperatures as it will be carried out of the system in transport during the wet months of the year when stream temperatures are not a critical issue.

The fine sediment washed off of road surfaces and into tributaries during storm events may negatively impact aquatic habitat, and water uses under the PA. The cubic yards associated with alternative 6 and 9, while not desirable is very likely not large enough to be measurable. Winter water clarity may be decreased by the PA, 7, 8, & 10, especially during the first storm of the season.

Cumulative impacts from hillslope roads should the miner have access to the full 512 acres believed to be reasonably foreseeable are that additional sediment will be generated as a function of likely additional road length and road use.

Issue 2. Erosion from Stream Crossing fills, mainstem and tributaries. Rough and Ready Creek and its tributaries will be exposed most directly to new sediment at the stream crossings where road fill be placed with the channel. Crossing construction will also result in sediment being supplied to the channel. Very little vegetation will need to be removed, however as the majority of the proposed crossing sites have been used in the past and the disturbance has already occurred. In all cases it is recognized that erosion of roads is proportional to use, use considers ore trucks, service vehicles, administration vehicles and incidental trips by concerned citizens and other visitors to the sites.

The surface of the crossing fill will consist of crushed rock of less than 3 inches, and fines washed out ("washed rock"). Road surfacing specifications call for rock with resistance to abrasion measured by the LAR test. No more than 35% of the material may degrade into fines under the action of traffic. For this analysis, it is assumed that the washed rock meets or exceeds this specification and that 35% of the material will degrade into suspended load-sized sediment. The volumes of fines generated for each alternative was estimated from the volume of washed rock at each crossing, assuming 35% of the material degrades to fines. For those alternatives (PA) where summer flows are in contact with the road surface, fine will likely be transported downstream.

Prior to winter flow, it is assumed that 50% of the fines generated will not be recovered when the fords are removed and 10% of the fines will remain at bridge approaches. These fines will move as suspended load when the winter flows reach higher levels. The fine material is expected to have a very low clay content, and thus would settle out of water column rapidly. This fine material will likely be transported during the first high-flow event of the season. It is not possible to know precisely, but it is likely that transport of the fines could exceed the '10% above background turbidity' clause under OAR 340-41-365, (2) (c). The operator may apply for a permit for exception from this clause as specified under OAR 141-85-100 et seq (Removal and Fill Permits, Division of State Lands).

Results of this estimation are shown in table xx. The PA has the highest rates of predicted fine sediment delivery and transport. The remaining action alternatives differ from the PA by an order of magnitude. Only the PA may be expected to measurably affect water clarity, aquatic habitat and water uses. Alternatives 6, 7, and 10 may affect clarity and to a lesser extent habitat and uses, but are not likely to be measurable. The remaining alternatives are not likely to supply enough sediment to have a measurable effect on any variable.

Direct effects to water clarity will be to increase sediment concentrations and turbidity, likely in excess of state standards under the PA. State standards for

turbidity may be exceeded under alternatives 6, 7, and 10 also. State standards are not likely to be exceeded in the remaining alternatives.

Direct effects to aquatic habitat are discussed in a following section and may include changes to the biotic community should effects persist. Direct effects to water uses are most likely to affect those who move water through pumps and filters, or by those who consume the water directly with no filtration. Pumps and filters will require more frequent maintenance and replacement should water be withdrawn (likely domestic use only) during turbid winter flows. Turbidity may result in undrinkable water if water is left untreated.

Cumulative impacts from channel crossings should the miner have access to the full 512 acres believed to be reasonably foreseeable are not expected to be different in scope than those encountered under the existing analysis. This is because no additional crossings are anticipated. The impacts are however, likely to persist for a longer period of time as the crossings would be required to be kept in place and maintained for more years of operation.

Issue 3. Erosion from mining pits and stockpile site. Fine sediment may also be generated at the mining pits and the stockpile sites. These sites are generally situated well away from existing drainage such that erosion is likely to be very minor. The highest risk is associated with ponding of water during the winter months, water over-topping the edge of the pit and gully creation. Pit design will be such that an armored surface or other mitigation will guard against this source. Similarly, the stockpile location will be engineered to mitigate for this concern, it will be designed to drain and the pile will be covered to avoid winter erosion. Sediment erosion from these sources is anticipated to be minor and less than 2-5 cubic yards annually at each site.

Indirect and cumulative effects of sediment on water quality to the West Fork of the Illinois and to the downstream system may include effects on aquatic biota, stream temperature and water uses. Due to high background levels of suspended sediment transport observed in the Illinois River system, there are no expected effects to water uses and stream temperatures. Additional sediment transport may, however detract from other recovery efforts currently on-going in terms of watershed restoration of sediment sources to the Illinois. Cumulative impacts from pit and stockpile erosion should the miner have access to the full 512 acres believed to be reasonably foreseeable are that more sediment could be supplied to the stream system. This is simply a function of increased acres of impact anticipated under a larger operation.

Issue 4. Transport of bedload sediments, channel form Under the PA, it is proposed to allow the 7 crossings of mainstem R&R to wash out each year. The

amount of fill varies by location and ranges from 65 to 190 cubic yards. Computer modeling of one cross-section (near crossing 4) estimated 1860 tons per day move through that area at bankfull flows. It seems very likely that given the high stream powers observed on R&R that the washed rock placed at the crossings would indeed be dispersed downstream.

The direct effects of this dispersed rock are not expected to alter the existing bed topography nor channel form of R&R Creek during those years that bankfull flows are reached. Fill material may remain in place during winter seasons where bankfull flows are not achieved, this could result in fish migration issues as discussed further along in this document. It is likely, however, that in most years, enough erosion will occur such that some portion of the channel will be open for fish passage.

The indirect and cumulative effects of at least 10 years of rock placement and downstream dispersal may, however begin to be noticeable. Again, due to high stream powers channel bed elevation nor channel form will likely alter dramatically, but local adjustments to channel slope may occur. Cumulative impacts to bedload transport should the miner have access to the full 512 acres believed to be reasonably foreseeable are that channel form may be influenced if the proposal includes annual reconstruction of fords. The alluvial fan of R&R is already dramatically effects the position and confluence with the West Fork Illinois (Coleman, pers comm, May, 1998). Additional coarse sediment to R&R and its fan are not likely to change this relationship.

Issue 5. Sediment Supplied due to Helicopter Loads

There is a risk that loads carried by a helicopter could accidentally drop during transport. There is a very low possibility that these loads could drop and fall directly into the creek. Each load is approximately 2 cubic yards. This material is not desirable in the stream system and would likely result in turbidity in excess of state standards should it fall in during the summer months. Cumulative impacts related to helicopter loads should the miner have access to the full 512 acres believed to be reasonably foreseeable are that the opportunity for risk is proportional to flight time. Additional flight time would certainly be substantial if the operation were to mine the 512 acres using a helicopter.

F. Water Quality - Temperatures

The alternatives, including pit development and use, road development and use, and storage of ore, differ in their effects. The alternatives have been described elsewhere and only the points relevant to the following issues will be covered in this section:

1. Effects of Sediment on...
2. Changes to spring and wetland habitat.

The effects of flow on temperatures were discussed under Water Quantity - Low Flows.

In the case of Rough and Ready creek and the West Fork of the Illinois River, water temperatures are currently known to exceed State standards. It is anticipated that a 'natural condition assessment' will be conducted to verify the commonly held assumption that high water temperatures in Rough and Ready Creek are the result of natural conditions, and are minimally, if at all, exacerbated by management. The 'natural condition assessment' is one facet of the TMDL process required to meet State standards. The West Fork will not likely be handled under a 'natural condition assessment' as it is reasonable to believe that past management on private and publicly managed lands has affected water temperatures.

Issue 1. Effects of Sediment on Temperature. The effects of sediment on stream temperatures was discussed for direct, indirect and cumulative impacts under section E Water Quality - Sediment. In general, it is not anticipated that stream temperatures will change due to sediment transport. This is because most of the sediment transport will occur during winter months when sediment will be carried out of the basin and temperatures are not in a critical state. Additionally, no changes are anticipated in bed elevation such that temperatures could be effected by a widening nor narrowing of the channel form.

The water ponding that may be anticipated upstream of fords under the PA will increase stream widths such that more surface area will be subject to solar radiation. The amount of increased radiation will vary by site as a function of the geometry at that site. Generally, crossings with gently sloping banks (e.g. crossing 1) will have proportionally greater widths per rise in water elevation. While widening at this site will not likely result in measurable changes in water temperature, it is not desirable. Only the PA proposes ponding at any location. If POC root disease is present in the watershed at the time the PA constructs fords, the potential for killing POC trees exists. These dead trees would no longer be able to provide shade at these locations. This effect is not predicted to have measurable effects on temperature, but the trend is toward warmer water. The remaining alternatives have no risk associated with this variable.

Issue 2. Changes to spring and wetland habitat. Water temperatures measured in bedrock springs and gravel through-flow 'springs' were 5-10 degrees (F) cooler than the corresponding surface water temperatures (7/24/97). There has been some

concern that changes, specifically burial via road construction at crossing 3, would effect summer water temperatures in R&R. Road construction in this reach is likely to displace, and perhaps permanently alter the flow of these cool waters into R&R. Given the low volume of flow and their non-measurable (7/24/97) effects on water temperatures that day, it is not anticipated that these changes will directly effect the water temperatures in R&R. These changes are nonetheless, not the desired trend in this water quality limited stream. Only the PA has this risk associated, the remaining action alternatives do not propose to alter this site. There are no anticipated indirect nor cumulative effects associated with this variable.

Issue 3. Potential effects following the potential loss of POC. Riparian Forests serve to limit incoming solar radiation and prevent stream heating. Should POC be lost from these forests it will result in a loss of riparian shade. This effect will be most noticeable during the first few decade before other existing and/or replacement trees occupy the site. In many cases, the loss may be permanent. This will increase stream temperatures. It is not possible to know the precise amount of this increase without extensive computer modeling and tracking of the location of POC specifically. The risk of increase is proportional to the risk assessment by alternative given under the POC report. The cumulative impact of the loss of POC in riparian zones as one moves downstream in the watershed is also to increase stream temperatures until such time as another tree occupies the site.

Cumulative impacts from sediment onto temperature should the miner have access to the full 512 acres believed to be reasonably foreseeable are not expected to be measurable. Summer flows already flow in such a wide shallow channel that it is difficult to postulate that reasonably foreseeable sediment introductions would change that configuration. Changes to temperature from potential water withdrawals associated with the full 512 acres are discussed elsewhere.

G. Water Quality - Hazardous Materials and Dissolved Elements (geochemistry)

The alternatives, including pit development and use, road development and use, and storage of ore, differ in their effects. The alternatives have been described elsewhere and only the points relevant to the following issues will be covered in this section:

1. Risks associated with spills
2. Risks associated with dissolved elements

Issue 1. Risks associated with spills. This risk is proportional to the number of exposure opportunities (vehicles crossing channels) and the risk of equipment failure at that moment(s). The consequences are dependant upon the beneficial

uses of the water and its reaction to the material spilled.

The most easily identifiable hazard is hydraulic fluid and gas/diesel leaking or erupting during crossing. It is not possible to calculate this risk, but it is proportional to stream width (length of exposure to risk), flow (seasonal or perennial), notification and reaction times, equipment quality and equipment maintenance. The estimated number of times per year that a vehicle will cross a channel is given in the table below. Crossings of Rough and Ready pose more risk than crossing the tributaries as it is wider and runs water all year. The rank of the alternatives from most risk to least risk are: PA, 7, 6, 8, 10=11, 9 and no action.

	No Action	PA	Alt 6	Alt 7	Alt 8	Alt 9	Alt 10	Alt 11
Number of yearly trips	0	3390	5700	3390	3150	2	3100	1940
Number of R&R crossings	0	7 fills	3 bridge	3 bridge	2 bridge	n/a	1 bridge	1 bridge
Number of tributary crossings	0	10	3	3	3	1 xing in Rock creek	0	3

The consequences of a spill are high, especially to domestic water use, especially in the event that the spill goes unnoticed and hazardous materials are ingested. This risk is considered to be low, but not zero. Compliance with state law would require reporting. The potential for material to enter the groundwater also exists. Transport through the groundwater net and porous spaces in the soil make it far less likely that contamination would affect many, if any human water uses. Impacts to aquatic biota are not known, but are assumed to be detrimental to

individuals impacted.

The indirect and cumulative impacts of a spill are the potential for hazardous materials to be transported downstream.

Cumulative impacts from spills should the miner have access to the full 512 acres believed to be reasonably foreseeable are an increased risk of spill, but no change in increased impacts. The increased risk is associated with the additional vehicles, and longer period of operation for the full 512 acre operation.

Issue 2. Risks associated with dissolved elements The risks associated with potential enrichment of surface and groundwater by dissolved elements was discussed under section A. Soils and Geology. In general freshly exposed mineral surfaces may provide some additional dissolved loading to the system. With the exception of Nickel, the elements do not present any hazards to human health in the expected concentrations. Cumulative impacts from dissolved elements should the miner have access to the full 512 acres believed to be reasonably foreseeable are a likely increase in several elements, including Nickel. This would violate State Water Quality standards, as the existing condition is already above established safe drinking water

The effects on aquatic biota, including those from Nickel are below state standards currently and are not likely to increase dramatically. The indirect and cumulative effects of this additional dissolved load are expected to fall well within the natural range of variability given the drainage area of the West Fork of the Illinois River and any acreage downstream. Cumulative impacts to aquatic biota should the miner have access to the full 512 acres believed to be reasonably foreseeable are still expected to remain below state standards for Nickel. This is because the standards are an order of magnitude more tolerant (higher) for aquatic biota than for drinking water. A full geochemical analysis prior to implementation of more extensive mining would be required to confirm this assertion.

APPENDIX G
BIOLOGICAL EVALUATION
BOTANY

Final Biological Evaluation
for
Endangered and Sensitive Plant Species

NICORE
Mining Proposal

Illinois Valley Ranger District

Prepared by: Maria Ulloa-Cruz, Forest Botanist
June 7, 1999

Biological Evaluation

I. Introduction

A. Purpose:

The purpose of this biological evaluation (BE) is to compare the preferred alternative to the NICORE Mining Proposal from those alternatives discussed in the supplemental Draft Environmental Impact Statement, in sufficient detail to determine whether the Preferred Alternative will result in a trend toward Federal listing of any sensitive plant species.

B. Project summary:

The proposed project is called the "NICORE Mining Proposal." A Plan of Operation was submitted to the Illinois Valley Ranger District to develop 35 acres of nickel laterite mine pits, using a 14.3-mile haul route entirely on public lands located within the Rough and Ready Creek watershed. The project area is located in Josephine County, on the Illinois Valley Ranger District of the Siskiyou National Forest.

Legal location of the project area is:

T40S, R8W, Sec. 7, 18, 19, WM

T40S, R9W, Sec. 2, 3, 4, 8, 9, 10, 11, 12, 13, 14, 15, 16, 21, 22, 24, 25, 26, 27, 28, 33,
34, WM

Elevation in the project area ranges from approximately 1,300 feet to 4,200 feet.

C. Endangered, Threatened, and Sensitive Plants

Current management direction mandates conservation of several categories of rare plants on the Siskiyou National Forest. Protection of federally listed Endangered and Threatened species is mandated by the Endangered Species Act. No Threatened plants nor suitable habitat for Threatened plants is known to occur on the Siskiyou National Forest. Sensitive species are protected by USDA Forest Service regulations and manual direction. Some of the sensitive plant species are also listed as Species of Concern by USDI/FWS because their viability is of concern.

Arabis macdonaldiana is a federally listed Endangered plant known to occur on the Siskiyou National Forest. Several populations and unoccupied habitat are present in the project area.

Sensitive Plant species known or thought to be within the project area:
(see Appendix A for more information)

1. Sensitive Species:

<i>Calochortus howellii</i>	Howell's mariposa lily
<i>Cardamine nuttallii</i> var. <i>gemma</i>	Purple toothwort
<i>Epilobium oreganum</i>	Oregon willow herb
<i>Fritillaria glauca</i>	Siskiyou fritillary
<i>Gentiana setigera</i>	Elegant gentian
<i>Hastingsia atropurpurea</i>	Purple-flowered rush lily
<i>Limnanthes gracilis</i> var. <i>gracilis</i>	Slender meadowfoam
<i>Microseris howellii</i>	Howell's microseris
<i>Monardella purpurea</i>	Siskiyou monardella
<i>Perideridia erythrorhiza</i>	Red-root yampah
<i>Salix delnortensis</i>	Del Norte willow
<i>Senecio hesperius</i>	Siskiyou butterweed
<i>Streptanthus howellii</i>	Howell's streptanthus
<i>Viola primulifolia</i> ssp. <i>occidentalis</i>	Western bog violet

2. Species that were delisted since the Supplemental Draft Environmental Impact Statement was published and the Regional Forester's new Sensitive Plants List for Region 6, effective May 17, 1999.

<i>Epilobium rigidum</i>	Rigid willow-herb
<i>Hieracium bolanderi</i>	Bolander's hawkweed
* <i>Mimulus douglasii</i>	Douglas's monkeyflower
<i>Poa piperi</i>	Piper's bluegrass
<i>Sanicula peckiana</i>	Peck's snake root

*Also, delisted on BLM.

Determinations of effect in this BE are based on existing information and 1997 and 1998 field season surveys. General field surveys were done to assess habitat, ground conditions, and the presence or absence of sensitive plants in the project area. More intense field surveys were done to assess the proposed haul roads and the mining pit sites. *Arabis* expert Linda Vorobik and Forest Botanist Maria Ulloa surveyed the ridge location and the alternate route to mining site A, known *Arabis macdonaldiana* populations occur along this proposed haul route. Suitable habitat for sensitive plants also occurs along this route. Documentation of the findings were added to the project folder and discussed in the Supplemental Draft EIS.

Potential habitat for rare plant as assessed using a variety of sources: Soil Survey of Josephine County, Distribution Map of Ultramafic Rock & Nickel Deposits of Southwestern Oregon, Soil Resource Inventory of the Siskiyou National Forest, Oregon Natural Heritage Program Data Base, and sensitive plant population records on file at the Supervisor's and Illinois Valley Ranger District Offices of the Siskiyou National Forest. Sensitive plant surveys have been done in the same general area for: The Rough and Ready Creek Wild and Scenic River Eligibility Study, (FS), Rough and Ready Area of Critical Environmental Concern (BLM), Rough and Ready Botanical

Area (FS), A Preliminary Flora of the Rough and Ready Creek Watershed (Borgias), and Rough and Ready Botanical Wayside (State). The Proposed Project area and alternate routes were surveyed during the 1997 and 1998 field seasons.

The preferred action is Alternative 9. Alternative 9 will allow the miner to use the road from the south to "walk" the equipment to site B and to transport the equipment by helicopter to the other mining sites; to transport the material by helicopter to a stockpiling site. The road to site B will not be improved. I walked this road on April 6, 1999 to determine which species of plants could be impacted and to what extent.

II. Current Management Direction

A. Desired future condition and land allocations (see LRMP Chapter IV 87-90)

The Siskiyou National Forest Land and Resources Management Plan (LRMP) desired future condition (DFC) for the Rough and Ready Creek Botanical Area is described as follows: *"Natural and physical and biological processes will prevail without human intervention. Plant life inhabiting this ecosystem will continue to flourish. The goal is to protect, preserve, and enhance the exceptional botanical features of this area. Valid mineral claims existing prior to botanical area designation may be developed. Every effort should be made to protect botanical resources, especially sensitive plant species. Botanical areas may be recommended for withdrawal from mineral entry in situations where mitigation measures do not adequately protect management area values. The mineral potential of the area shall be assessed before withdrawal is recommended."* Additional NF lands in the project area are allocated by the Siskiyou NF LRMP (as amended by the NW Forest Plan) to Matrix, Administrative Study Area, and Riparian Reserve.

B. Forestwide Standards and Guidelines for Sensitive Plants (see LRMP Chapter IV 26-27).

Standards and guidelines applicable at the project level are:

Monitor the effects of management activities on sensitive plants. If monitoring results show a decline in species viability, alter management strategy.

Analyze the potential effects of all ground-disturbing projects on sensitive plants and their habitat. Mitigate project effects to avoid a decline in species viability at the Forest level.

Map, record, and protect essential habitat for known and sensitive plant species. Species management guides should be prepared to address the effects of land management activities on local populations of sensitive species at a broader scale, and to identify opportunities to enhance and develop habitat.

III. Description of Proposed Project

Proposed Action: The Proposed Action is described in the Plan of Operation submitted by the miner. The operation would extract nickel laterite from four deposits located in section 22, 8, 11 and 16 of T.40S., R.9W., Willamette Meridian. The areas to be mined total approximately 35 acres, all within the Rough and Ready Creek Watershed Area (proposed areas to be impacted are identified on the attached maps, Appendix C).

The key components of the Proposed Plan of Operation were discussed in the Biological Evaluation for the Draft Environmental Impact Statement (DEIS), January 26, 1998. An additional range of alternatives was discussed in the Biological Evaluation for the Supplemental Draft Environmental Statement of October 27, 1998. Implementation of the proposed project is planned over a 10 year schedule plan.

Alternatives: There are six alternatives to the proposed action. The impacts on sensitive plants by the proposed action, the no action alternative, the preferred alternative (Alternative 9) and the five remaining alternatives for the Final Environmental Impact Statement (FEIS) are compared in Appendix A. Appendix A also shows the status of the sensitive plants and reflects the changes that have occurred since the Supplemental Draft Environmental Statement was published.

IV. Existing Environment

For more information and further discussion on other vascular plants of concern, and information on vegetation and soils for this watershed, see the West Fork Illinois River Watershed Analysis files.

During the fall of 1997, spring/summer/fall 1998, and Spring 1999 I was able to survey and walk the roads that access mining site B from the north and south end, the road to mining site C, and part of the proposed road to mining site A. The primary reason I walked the roads was to observe if any of the disturbed areas have naturally revegetated over time. In the areas with better soils there is evidence of natural revegetation is very sparse . Herbaceous annuals and perennials were present on the sites where sampling and prospecting had occurred; tree seedlings were present on some of the roads and prospecting sites. Field observations and lack of past records indicates that no efforts have been made to revegetate the disturbed sites or the roads. Motorized vehicles are not driven on these roads by the public; most of the use is by hikers and horseback riders, except for road 461, which showed evidence of vehicle traffic.

A. Species accounts

Only new populations are shown on the Final Biological Evaluation. Refer to NICORE Sensitive Plant Biological Evaluation January 26, 1998 for previously discussed known population sites and to the Supplemental Draft Biological Evaluation of October 27, 1998 for additional sites found during the 1998 field season.

Macdonald's rockcress (*Arabis macdonaldiana*) is endemic to the Red Mountain area in the North Coast Range of California; this species is federally protected as Endangered. The USDI/FWS made a decision in 1997 that all known populations of *Arabis macdonaldiana* share the same taxonomy and genetic material. It occurs on barren to shrub-covered shallow, rocky, ultramafic soils which are peridotite in origin (Jeffrey pine woodland community). Elevation ranges from 500 to 4,000 feet. Known populations on the Siskiyou NF are found between North Fork Smith River and Diamond Creek, Packsaddle Mountain and East Fork Illinois River. *Arabis macdonaldiana* occurrences were confirmed by Dr. Linda Vorobik. These populations extend the range of this species in Oregon. The preferred Alternative 9 will avoid all known populations and known unoccupied habitat.

Known populations in the project area: 6

Howell's mariposa lily (*Calochortus howellii*) is endemic to the Illinois Valley in southwest Oregon. It occurs on serpentine soils, dry rocky slopes, often on Ceanothus brush-covered slopes or in open Jeffrey pine stands, from 800 to 4,200 feet elevation. The northernmost known populations on the Siskiyou NF occurs just north of Eight Dollar Mountain and the southernmost site is at the foot of Oregon Mountain. Between these two sites, additional populations are discontinuous and scattered. The westernmost population occurs at Oregon Mountain and the most eastern population known is in Democrat Gulch. Most populations are sparse and scattered.

Known populations in the project area: 17

Purple toothwort (*Cardamine nuttallii* var. *gemma*) is endemic to the Siskiyou Mountains of Josephine and Curry Counties, Oregon to adjacent Del Norte and possibly Siskiyou Counties, California. It occurs on gravelly serpentine soils on ridges, Jeffrey pine forests, near *Darlingtonia* bogs, and at a wide range of elevations.

Known populations on the Siskiyou NF occur at Red Mountain, Oregon Mountain, Waldo, Snow Camp, Wimer Road, Tincup Pass, Canyon Creek, Eight Dollar Road, Pearsoll Peak, Lemmingsworth Gulch, and Vulcan Peak.

Known populations in the project area: 5

Oregon willow-herb (*Epilobium oreganum*) is a Klamath Province endemic occurring in *Darlingtonia* bogs, and other wet serpentine areas from 500 to 7800 feet elevation. All extant populations in Oregon are found on scattered sites in Josephine County. In California, it is found in Siskiyou, Trinity and Humboldt Counties. Known populations on the Siskiyou NF occur along the west side of the Illinois Valley. The majority of plants are found from Eight Dollar Mountain southwest to Josephine Creek. At the south end of its range in Oregon it is found along the Oregon Mountain Road. Most populations are less than 100 plants.

Known populations in the project area: 2

Siskiyou fritillaria (*Fritillaria glauca*) is known from southern Douglas County, south through the Siskiyou Mountains of Josephine and Curry Counties in Oregon and into California. It occurs on gravelly serpentine slopes and ridges, from 1,800 to 6,400 feet elevation. On the Siskiyou NF this plant is found in about 20 geographical areas. There is one off-forest site at Waldo Lookout.

Known populations in the project area: 6

Elegant gentian (*Gentiana setigera*) known from Siskiyou Mountains in south-western Oregon and northern California. It occurs on serpentine wet meadows, bogs, and seeps on slopes at low elevation. On the Siskiyou NF this plant is found in 10 geographical areas.

Known populations in the project area: 3

Purple-flowered rush lily (*Hastingsia atropurpurea*) has a limited range, from Eight Dollar Mountain along the west side of Illinois Valley south to Parker Creek in Josephine County; it occurs on wet meadows, rocky seeps, serpentine *Darlingtonia* bogs, often in open areas on gentle slopes, and streambanks in partial shade, from 1,600 to 2,000 feet elevation. Known locations on the Siskiyou NF include Eight Dollar Mountain, Woodcock Creek, Josephine Creek, and Days Gulch. A population of two plants was reported at Rough and Ready Creek in 1989, next to the crossing of road 442/441. This population was not relocated in 1997. I assumed this population was extirpated.

Known populations in the project area: none

Slender meadowfoam (*Limnanthes gracilis* var. *gracilis*) is geographically restricted to Josephine and (historically) Jackson County. Historic collections from Douglas County need verification. All populations are found below 2,500 feet elevation on sunny, vernally wet meadows and stream edges, in valleys and low foothills, including soils formed from ultramafic rocks.

Known populations in the project area: none

Howell's microseris (*Microseris howellii*) is geographically restricted to serpentine areas of the Siskiyou Mountains in southern Josephine County, Oregon, especially on the west edge of the Illinois Valley. All populations are on soils formed from ultramafic rocks from 1,000 to 3,500 feet elevation. Habitat consists of slopes or flat ground with varying exposures, predominantly within Jeffrey pine/incense cedar/chaparral vegetation. Known populations on the Siskiyou NF occur on Rough and Ready Flat, Illinois River, Eight Dollar Mountain, Oregon Mountain, Days Gulch, Eagle Gap, Tennessee Mountain, Wimer Road, and Cedar Log Bog. It is found off-forest along Deer Creek, Woodcock Bog, and Waldo.

Known populations in the project area: 8

Siskiyou monardella (*Monardella purpurea*) is known from Curry and Josephine Counties, Oregon and adjacent California, where it grows on rocky, open slopes on serpentine soils or serpentine bedrock from 1,400 to 4,000 feet elevation. Also found on chaparral, woodland and montane forest. Typical associates include Jeffrey pine, western white pine, and coffeeberry. Known populations on the Siskiyou NF are documented from the trail to Silver Peak, Lemmingsworth Gulch, Oregon Mountain, York Creek, Vulcan Peak, Rough and Ready Creek, and Weston Ridge.

Known populations in the project area: 4

Red-root yampah (*Perideridia erythrorhiza*) Known from Douglas, Klamath, and Josephine Counties in Oregon, where it inhabits vernally moist depressions in heavy, poorly drained soils. Typical vegetation types associated with this plant are oak or pine woodlands below 5,000 feet in the Cascade Mountains. Josephine County sites

are in serpentine habitats. On the Siskiyou NF it has been found on Josephine Creek and Rough and Ready Botanical Area. There are two locations off forest at Eight Dollar Mountain.

Known populations in the project area: 1

Del Norte willow (*Salix delnortensis*) is known from Curry and Josephine County in Oregon and Del Norte County in California, where it grows on streambeds, stream-banks, and gullies on serpentine soils, below 1,500 feet elevation. Known populations on the Siskiyou NF are at Rough and Ready Creek, Josephine Creek, Box Canyon Creek, Star Flat, Cedar Camp, Road to Snow Camp, Meadow Creek, Quosatana Creek, headwaters of Hunter Creek, and Wimer Road.

Known populations in the project area: 4

Siskiyou butterweed (*Senecio hesperius*) is endemic to the Illinois Valley area of southern Josephine County, Oregon, where it grows on serpentine soils at lower elevations, on gentle to moderate slopes. Generally found in open Jeffrey pine savannah. Most of the known populations are within the boundaries of the Illinois Valley Ranger District. Known populations on the Siskiyou NF occur along Free and Easy Creek, Eight Dollar Mountain and vicinity, Cedar Log RNA, Josephine Creek, Rough and Ready Creek, and West Fork Illinois River. It is found off forest along Laurel Road, Woodcock Bog, and Waldo Hill.

Known populations in the project area: 12

Howell's streptanthus (*Streptanthus howellii*) is known from the Siskiyou Mountains, Josephine and Curry Counties in Oregon, and Del Norte and Siskiyou Counties in California. It grows on dry, rocky, serpentine slopes in conifer/hardwood forests; at 1,000 to 4,500 feet elevation. Known populations on the Siskiyou NF are found near the California line on the road to Sanger Peak, Rock Creek, Cedar Creek, Snow Camp, Lemmingsworth Gulch, Wimer Road, Vulcan Peak, Carpenter Gulch, Eight Dollar Mountain, Josephine Mountain, and South Chetco Rim Trail.

Known populations in the project area: 29

Western bog violet (*Viola primulifolia* ssp. *occidentalis*) is known from Curry and Josephine Counties, Oregon and Del Norte County, California. It is found in *Darlingtonia* bogs and streams on serpentine soils at lower elevations. Most of the known populations on the Siskiyou NF are within the boundaries of the Illinois Valley Ranger District.

Known populations in the project area: 2

B. Habitat status

Field visits, surveys, and past records indicate that parts of the Rough and Ready Creek watershed area have been previously roaded and mined. The watershed includes private inholdings. The private inclusions were not surveyed for this analysis. Botanically, we do not have a system in place to analyze past or cumulative impacts to sensitive plant populations or their habitat.

Ultramafic:

The Siskiyou National Forest Soil Survey map of the Rough and Ready Creek area shows large polygons of ultramafic soils in the project area that may be suitable habitat for: Macdonald's rockcress, Howell's mariposa lily, purple toothwort, Oregon willow herb, Siskiyou fritillary, purple-flowered rush lily, slender meadowfoam, Howell's microseris, Siskiyou monardella, red-root yampah, Del Norte willow, Siskiyou butterweed, Howell's streptanthus, and western bog violet.

These species all inhabit ultramafic sites, which have soil mineral imbalances that preclude dense tree or shrub sites from growing; therefore the plants are found in forest openings or even barrens. These areas are sometimes incidentally disturbed or destroyed by roadbuilding, skid trails, mining, and recreation. Although portions of the project area have been impacted by mining activities for the past five decades, most of the suitable ultramafic habitat for serpentine endemic plants is intact or, if disturbed, is still within the tolerance limits of the species of concern.

Riparian Habitats:

Riparian habitats throughout the project area may be suitable habitat for Oregon willow-herb, purple-flowered rush lily, and western bog violet. Several riparian areas were field surveyed for these species, and although similar species were present in some drainages, these species were not found in the Rough and Ready Creek area. Whether this means the habitat is unsuitable or the species have not dispersed into this area is not known.

Three small populations of Oregon willow-herb have been found in the fens off the Wimer road in the Oregon Mountain Botanical Area.

Perennial riparian habitat is present in the project area, but is limited to a few larger drainages, spring-fed seeps, and *Darlingtonia* fens. The riparian habitat has been impacted lightly, mostly to build roads and to divert water. Water diversion has created habitat which has been colonized by several species of aquatic plants, including uncommon species.

Rock Outcrops:

Rock outcrops are common throughout the project area and appear to be suitable habitat for stonecrops. Some rock outcrops have been affected by road building, mining, and other past disturbances in the project area. A few may have been used as rock sources for road material. Rock outcrops should be surveyed if rock material is needed from any of these sites.

Forested Habitats:

The project area has not been logged or roaded for timber management production. The area has not changed from its historic state; it does not carry the legacy of effects from

timber harvesting. Purple toothwort prefers Jeffrey pine forested habitat. This habitat type, though not pristine, is still well distributed and plentiful throughout the project area.

V. Effects of the Proposed Project

A. Direct and indirect effects

Direct negative effects to endangered or sensitive and endemic plants from mining operations can include uprooting, burial, or crushing of plants while excavating the mining sites, and upgrading, maintaining or building roads. Placement of landings or stock piling of rock on rare plant populations can also crush or bury individuals or whole populations. Negative effects may have already occurred in the area from previous mining operations and related impacts. All the project areas were surveyed. The preferred alternative is Alternative 9, the areas that have sensitive plants will be flagged by a botanist, to make sure that the least number of plants is impacted.

Indirect effects to plants and suitable habitat include soil disturbance that may render the habitat unsuitable for the rare plants. Depending on the degree of disturbance and the species in question, soil disturbance can have both positive and negative effects. Light disturbance may favor seedling establishment of Howell's mariposa lily and Howell's streptanthus in openings on favorable soils; these species are able to colonize disturbed sites unless outcompeted by weeds or unless the soil is repeatedly disturbed. There are less than 20 individuals of *Calochortus howellii* on road # 461 that accesses mining site B from the Southside. These individuals might be negatively impacted depending on the number of trips and the equipment type that will be walked to the area. If the impact is determined to be detrimental, these individuals will be removed and relocated to a light disturbed area of similar habitat or placed at the Berry Botanical Garden for study.

Intense soil disturbance would have negative effects on Howell's mariposa lily, Siskiyou fritillaria, red-root yampah, and Siskiyou butterweed. Effects of soil disturbance on Oregon willow-herb are unclear. Heavy soil disturbance, especially churning and compaction, is incompatible with maintenance of suitable habitat for rare plants--they will neither survive nor colonize churned up or compacted soils.

In the project areas, suitable ultramafic habitat is available for several species, but unoccupied (see habitat status section above). A portion of the unoccupied habitat is adjacent or included in the areas to be impacted, and may be disturbed during mining operations.

Soil disturbance also invites weed infestation, especially in areas along roads where weed seeds can be easily brought in on vehicles and equipment. Once established, weeds can outcompete native plants and prevent restoration of native vegetation on the site (see Appendix B, Supplemental Botanical Report, for further discussion). Weed competition is not a significant threat to sensitive plant populations in this project area. Preventive treatments to all equipment to avoid the introduction of *Phytophthora lateralis* would also prevent the spread of noxious and invasive weeds.

Wet areas that may provide habitat for elegant gentian, Oregon willow-herb, western bog violet, and purple-flowered rush lily will be largely protected by project design standards, since these species are confined to *Darlingtonia* fens, perennial water or spring-fed seeps; localized negative effects on riparian habitats are described in the Physical Science report and would be avoided during project implementation by selecting Alternative 9. Water diversion ditches found throughout this watershed have had negative impacts in the short-term but in the long term turned out to be a positive. Several local native species have colonized this long-ago-created habitat.

B. Cumulative effects

Since the early 1900's, much of the project area has been impacted by mining exploration, mining, road building, and botanical collecting of rare plants for the horticultural trade. There are non national forest lands in the project area, so cumulative effects of activities on private, state, or other federal lands is an issue. Many of the private parcels have been logged and cleared for home building and homesteads. Potential habitat for sensitive plants appears to be present, and the Oregon Natural Heritage Program Data Base contains reports of sensitive plants from private individuals. No data collecting was done to determine the effect of the mining activities of private land owners.

We cannot save all individual sensitive plants, if mining, road building, road reconstruction, and continued public use occur; but we can minimize the impacts to the sensitive plant populations.

If the laterite mining proved successful, more habitat and individual plants would likely be disturbed as more of the deposit was mined. Cumulative effects are not precisely known, since the population distribution on all laterite deposits have not been inventoried. Plants found along the haul route and within the mine sites are also likely to be found in adjacent areas. Additional surveys would be needed for future Plans of Operations that disturb more lands.

C. Compliance with management direction

This Biological Evaluation has documented the completion of the steps outlined in the 2670 section of the Forest Service Manual, and Siskiyou National Forest LRMP direction for management of sensitive plants, including the Aquatic Conservation Strategy.

VI. Determinations

The NICORE mining proposal may have the following effects on listed and sensitive plants:

Arabis macdonaldiana - The Preferred Alternative 9, the No Action Alternative, and Alternative 11 will have **No Effect to individuals or habitat**.

The proposed action and alternatives 6, 7, 8, and 10 May Affect - Likely to adversely affect individuals or habitat. Rerouting the road in Alternatives 6, 7, 8, from mining site

C to mining site A to avoid these populations and its habitat would decrease the finding to **May Affect - Not likely to adversely affect individuals or habitat.**

Calochortus howellii - The Preferred Alternative 9 and the No Action Alternative is associated with a **may impact** individuals or habitat, but is **not likely to result in a trend toward federal listing** or loss of viability for the species because of the existing roads. The proposed action and alternatives **6, 7, 8, 10, 11** ***will impact** individuals or habitat with a consequence that the action **may contribute to a trend towards federal listing** or loss of viability to the population or species.

Cardamine nuttallii* var. *gemma - The Preferred Alternative 9, the No Action Alternative, and Alternative 11 has a determination of **No Impact**. The Proposed Action and alternatives **6, 7, 8, and 10** **may impact** individuals or habitat, but **will not likely contribute to a trend towards federal listing** or cause loss of viability to the population or species.

Epilobium oreganum - The Preferred Alternative 9, the Proposed Action, the No Action Alternative, and Alternatives 6, 7, 8, and 11 have determinations of **No Impact**. Alternative 10 **may impact** individuals or habitat, but **will not likely contribute to a trend towards federal listing** or cause loss of viability to the population or species.

Gentiana setigera - The Preferred Alternative 9, the Proposed Action, the No Action Alternative, and Alternatives 6, 7, 8, and 11 have determinations of **No Impact**. Alternative 10 ***will impact** individuals or habitat, with a consequence that the action **may contribute to a trend towards federal listing** or cause a loss of viability to the population or species.

Fritillaria glauca - The Preferred Alternative 9 has a determination of **No Impact**. The Proposed Action and Alternatives **6, 7, 8, 10, 11** **may impact** individuals or habitat, but **will not likely contribute to a trend towards federal listing** or cause loss of viability to the population or species.

Microseris howellii - The Preferred Alternative 9 and the No Action Alternative have determinations of **No Impact**.

The Proposed Action and Alternatives **6, 7, 8, 10, and 11** ***will impact** individuals or habitat, with a consequence that the action **may contribute to a trend towards federal listing** or loss of viability to the population or species.

Monardella purpurea - The Preferred Alternative 9 and the No Action Alternative have determinations of **No Impact**.

The Proposed Action and Alternatives **6, 7, 8, 10 and 11** ***will impact** individuals or habitat, with a consequence that the action **may contribute to a trend towards federal listing** or cause loss of viability to the population or species.

Perideridia erythrorhiza - The Preferred Alternative and the No Action Alternative have determinations of **No Impact**.

The Proposed Action and Alternatives **6, 7, 8, 10, and 11** will affect one population, but because there are few known sites the project ***will impact** individuals or habitat, with a

consequence that the action **may contribute to a trend towards federal listing or loss of viability to the population or species.**

Salix delnortensis - The Preferred Alternative 9, and the No Action Alternative have determinations of **No Impact**.

Proposed Action and Alternatives 6, 7, 8, 10, and 11 **may impact** individuals or habitat, but **will not likely contribute to a trend towards federal listing or cause loss of viability to the population or species.**

Senecio hesperius - The Preferred Alternative 9 and the No Action Alternative **may impact** individuals but is **not likely to result in a trend towards federal listing or cause loss of viability to the population or species.**

The Proposed Action, and Alternatives 6, 7, 8, 10, and 11 ***will impact** individuals or habitat, with a consequence that the action **may contribute to a trend towards federal listing or loss of viability to the population or species.**

Streptanthus howellii - The Preferred Alternative 9 ***will impact** individuals or habitat but is **not likely to result in a trend towards federal listing or cause loss of viability to the population or species.**

The No Action Alternative **may impact** individuals, but is **not likely to result in a trend towards federal listing or cause loss of viability to the population or species.**

The Proposed Action and Alternatives 6, 7, 8, 10, and 11 ***will impact** individuals or habitat, with a consequence that the action **may contribute to a trend towards federal listing or loss of viability to the population or species.**

Viola primulifolia ssp. *occidentalis* - The Preferred Alternative 9, and the No Action Alternative have determinations of **No Impact**.

The Proposed Action and Alternatives 6, 7, 8, 11 will come close to a fen where one population grows, but the site will not be impacted. Alternative 10 will impact Road 4402; project road widening and maintenance **may impact** individuals or habitat but **will not likely contribute to a trend towards federal listing or cause loss of viability to the population or species.**

* The "will impact" associated with these species is based on the fact that these plants are on the Oregon Natural Heritage Program List 1 or potential impact sites are within "selected habitat" identified in Draft Species Management Guides. The "will impact" may be reduced with changes in road design to protect the potential impact sites. The FS, BLM, and miner will collaborate on ways to avoid and minimize impacts to sensitive plants and their habitat before any ground disturbing activities occur. See Management Recommendations for more information.

VII. Management Recommendations

- These recommendations are consistent with Forest Service policy to: "*Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service Actions*" (FSM 2670.22).

The following measures would minimize impacts to plant species of concern, even without knowing the exact locations of all listed, sensitive and endemic plants and their habitats in the project area:

- 1) Harvest bulbs of *Calochortus howellii* present on the access road # 4402-461 and re-plant at a suitable location or distribute among interested botanical gardens for conservation purposes.
- 2) Avoid piling excess material and parking equipment on serpentine areas that have not been approved for project uses.
- 3) Follow Region 6 policy on use of native plant material in restoration and other revegetation projects (4/14/94), when reseeding disturbed areas following project activities. See Appendix B for more information on this policy.
- 4) Use care to minimize soil disturbance on those areas that have known populations of sensitive or endemic plants.
- 5) Flag and avoid known populations of sensitive plants during mining operations; e.g. **sites with sensitive plant populations will not be used as sites for piling and depositing tailings.**
- 6) Do not impact suitable habitat for *Arabis macdonaldiana*.
- 7) Maintain the existing environment around Riparian areas and *Darlingtonia* fens, especially hydrological integrity.
- 8) Identified suitable habitat for sensitive plants and avoid or minimize impacts.
- 9) Use existing roads to stockpile material that would be removed from sample sites; utilize material to fill the mine pits.
- 10) Develop a revegetation plan that will enhance and protect the existing flora.

VIII. Literature Cited:

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IX. Contributors

Vorobik, Linda. Research Botanist. 1997, 1998. Personal communication regarding identification of *Arabis macdonaldiana* specimen and field trip to identify habitat and survey for new populations in the vicinity of the proposed new access road to site A.

NICORE Mining Proposal - FEIS - Alternative Comparison

Species (common name)	Proposed Action	Alt. 6 Impacted	Alt. 7 Impacted	Alt. 8 Impacted	Alt. 9 Impacted Preferred	Alt. 10 Impacted	Alt. 11 Impacted
<i>Arabis macdonaldiana</i> LE Macdonald's rockcress	1	5	5	5		3	
<i>Calochortus howellii</i> Howell's mariposa-lily	12	14	16	16	1	10	5
<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tuberized toothwort	1	4	4	4		5	
<i>Epilobium oreganum</i> Oregon willow-herb						3	
<i>Fritillaria glauca</i> Siskiyou fritillaria	4	1	5	5		4	4
<i>Gentiana setigera</i> Elegant gentian						3	
<i>Hastingsia atropurpurea</i> purple-flowered rush-lily							
<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam							
<i>Microseris howellii</i> Howell's microseris	5	7	13	7		8	6
<i>Monardella purpurea</i> Siskiyou monardella	2	3	5	4		11	3
<i>Perideridia erythrorhiza</i> Red-root yampah	1	1	1	1			1
<i>Salix delnortensis</i> Del Norte willow	7	6	7	1		1	1
<i>Senecio hesperius</i> Siskiyou butterweed	7	7	13	7	1	11	5
<i>Streptanthus howellii</i> Howell's streptanthus	16	16	14	9	8	20	13
<i>Viola primulifolia</i> ssp. <i>oc-</i> <i>cidentalis</i> western bog violet	1		1	1		2	
Total # sites impacted	57	64	84	60	10	81	38
Species	11	10	11	11	3	12	8

Proposed Action - Sensitive plant species Potentially Impacted NICORE Project Area

Codes SNF	Species (common name)	Number of Sites Impacted	STATUS	DATA SHEET No.
ARMC	<i>Arabis macdonaldiana</i> Macdonald's rock-cress	1	O-1, FS-LE	5647
CAHO	<i>Calochortus howellii</i> Howell's mariposa-lily	12	O-1, BLM-S, FS-S	5638, 5628, 5670, 5626, 5653, 5653, 5673, 5673, 5969, 5653, 5653, 5653
CANUG	<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tuberized toothwort	1	O-4, BLM-S, FS-S	5689
EPOR	<i>Epilobium oreganum</i> Oregon willow-herb		O-1, BLM-S, FS-S	
FRGL2	<i>Fritillaria glauca</i> Siskiyou fritillaria	4	O-2, BLM-A, FS-S	5623-#3, 5623-#4, 5623#6, 5623-#5
GESE2	<i>Gentiana setigera</i> Elegant gentian		O-1, FS-S	
HABR2	<i>Hastingsia atropurpurea</i> purple-flowered rush-lily		O-1, BLM-S, FS-S	
LIGRG	<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam		O-1, BLM-S, FS-S	
MIHO	<i>Microseris howellii</i> Howell's microseris	5	O-1, BLM-S, FS-S, State-T	5996, 5974, 5641, 5683, 5641
MOPU	<i>Monardella purpurea</i> Siskiyou monardella	2	O-2, BLM-A, FS-S	5680, 5669
PEER	<i>Perideridia erythrorhiza</i> Red-root yampah	1	O-1, BLM-S, FS-S	5656
SADE2	<i>Salix delnortensis</i> Del Norte willow	6	O-2, BLM-A, FS-S	5651, 5668, 5668, 5668, 5390, 5390
SEHE	<i>Senecio hesperius</i> Siskiyou butterweed	7	O-1, BLM-S, FS-S	5627, 5625, 5655, 5655, 5636, 5655, 5655
STHO	<i>Streptanthus howellii</i> Howell's streptanthus	16	O-1, BLM-S, FS-S	5697, 5697, 5697, 5697, 5699, 5972, 5719, 6008, 6008, 6008, 5696, 5696, 5696, 5973, 5973, 5973
VIPRO	<i>Viola primulifolia</i> ssp. <i>oc-</i> <i>cidentalis</i> western bog violet	1	O-1, BLM-S, FS-S	5665

Alternative 6 - Sensitive plant species Potentially Impacted NICORE Project Area

Codes SNF	Species (common name)	Alt. 6 # of Sites Impacted	STATUS	DATA SHEET No.
ARMC	<i>Arabis macdonaldiana</i> Macdonald's rock-cress	5	O-1, FS-E	5695, 5685, 5976, 6009, 6009
CAHO3	<i>Calochortus howellii</i> Howell's mariposa-lily	14	O-1, BLM-S, FS-S	5673, 5673, 5681, 5679, 5969, 5657, 5653 (+3), 5628, 5670, 5626, 5145
CANUG	<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tuberous toothwort	4	O-4, BLM-S, FS-S	5689, 5688, 5690, 5694
EPOR	<i>Epilobium oreganum</i> Oregon willow-herb		O-1, BLM-S, FS-S	
FRGL2	<i>Fritillaria glauca</i> Siskiyou fritillaria	1	O-2, BLM-A, FS-S	5691
GESE2	<i>Gentiana setigera</i> Elegant gentian		O-1, FS-S	
HABR2	<i>Hastingsia atropurpurea</i> purple-flowered rush-lily		O-1, BLM-S, FS-S	
LIGRG	<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam		O-1, BLM-S, FS-S	
MIHO	<i>Microseris howellii</i> Howell's microseris	7	O-1, BLM-S, FS-S, State-T	5678, 5977, 5674, 5683, 5641, 5988, 5996
MOPU2	<i>Monardella purpurea</i> Siskiyou monardella	3	O-2, BLM-A, FS-S	5669, 5680,
PEER	<i>Perideridia erythrorhiza</i> Red-root yampah	1	O-1, BLM-S, FS-S	5656
SADE2	<i>Salix delnortensis</i> Del Norte willow	6	O-2, BLM-A, FS-S	5390, 5390, 5668, 5668, 5668, 5993
SEHE	<i>Senecio hesperius</i> Siskiyou butterweed	7	O-1, BLM-S, FS-S	5144, 5625, 5627, 5676, 5636, 5655, 5682
STHO	<i>Streptanthus howellii</i> Howell's streptanthus	16	O-1, BLM-S, FS-S	5697 (+3), 5698, 5655, 5655, 5972, 5973 (+2), 5719, 5719, 6008 (+2)
VIPRO	<i>Viola primulifolia</i> ssp. <i>oc-</i> <i>cidentalis</i> western bog violet		O-1, BLM-S, FS-S	

Alternative 7 - Sensitive plant species Potentially Impacted NICORE Project Area

Codes SNF	Species (common name)	Alt. 7 # of Sites Impacted	STATUS	DATA SHEET No.
ARMC	<i>Arabis macdonaldiana</i> Macdonald's rock-cress	5	O-1, FS-LE	5647, 5676, 5686, 6009, 6009
CAHO3	<i>Calochortus howellii</i> Howell's mariposa-lily	16	O-1, BLM-S, FS-S	5145, 5638, 5628, 5670, 5626, 5653, 5653, 5653, 5653, 5673, 5673, 5675, 5969, 5664, 5679, 5681
CANUG	<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tubered toothwort	4	O-4, BLM-S, FS-S	5688, 5689, 5690, 5694
EPOR	<i>Epilobium oreganum</i> Oregon willow-herb		O-1, BLM-S, FS-S	
FRGL2	<i>Fritillaria glauca</i> Siskiyou fritillaria	5	O-2, BLM-A, FS-S	5623-#3, 5623-#4, 5623#6, 5623-#5, 5691,
GESE2	<i>Gentiana setigera</i> Elegant gentian		O-1, FS-S	
HABR2	<i>Hastingsia atropurpurea</i> purple-flowered rush-lily		O-1, BLM-S, FS-S	
LIGRG	<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam		O-1, BLM-S, FS-S	
MIHO	<i>Microseris howellii</i> Howell's microseris	13	O-1, BLM-S, FS-S, State-T	5996, 5974, 5641, 5683, 5641, 5667, 5683, 5678, 5986, 5988 (+3)
MOPU	<i>Monardella purpurea</i> Siskiyou monardella	5	O-2, BLM-A, FS-S	5680, 5669, 5642, 5737, 5627, 5677
PEER	<i>Perideridia erythrorhiza</i> Red-root yampah	1	O-1, BLM-S, FS-S	5656
SADE2	<i>Salix delnortensis</i> Del Norte willow	7	O-2, BLM-A, FS-S	5651, 5390, 5390, 5668, 5668, 5668, 5993
SEHE	<i>Senecio hesperius</i> Siskiyou butterweed	13	O-1, BLM-S, FS-S	5627, 5625, 5655 (+3), 5636, 5629, 5676, 5682, 5674, 5987, 5987
STHO	<i>Streptanthus howellii</i> Howell's streptanthus	14	O-1, BLM-S, FS-S	5697, 5697, 5697, 5697, 5699, 5972, 5719, 5719, 5696, 5696, 5696, 5973, 5973, 5973
VIPRO	<i>Viola primulifolia</i> ssp. <i>oc-</i> <i>cidentalis</i> western bog violet	1	O-1, BLM-S, FS-S	5665

Alternative 8 - Sensitive plant species Potentially Impacted NICORE Project Area

Codes SNF	Species (common name)	Alt. 8 # of Sites Impacted	STATUS	DATA SHEET No.
ARMC	<i>Arabis macdonaldiana</i> Macdonald's rock-cress	5	O-1, FS-LE	5647, 5976, 5686, 6009, 6009,
CAHO3	<i>Calochortus howellii</i> Howell's mariposa-lily	16	O-1, BLM-S, FS-S	5638, 5653, 5653, 5673, 5673, 5673, 5673, 5673, 5969, 5653, 5653, 5653, 5657, 5664, 5679, 5681
CANUG	<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tuberous toothwort	4	O-4, BLM-S, FS-S	5688, 5689, 5690, 5694
EPOR	<i>Epilobium oreganum</i> Oregon willow-herb		O-1, BLM-S, FS-S	
FRGL2	<i>Fritillaria glauca</i> Siskiyou fritillaria	5	O-2, BLM-A, FS-S	5623-#3, 5623-#4, 5623#6, 5623 #5, 5691
GESE2	<i>Gentiana setigera</i> Elegant gentian		O-1, FS-S	
HABR2	<i>Hastingsia atropurpurea</i> purple-flowered rush-lily		O-1, BLM-S, FS-S	
LIGRG	<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam		O-1, BLM-S, FS-S	
MIHO	<i>Microseris howellii</i> Howell's microseris	7	O-1, BLM-S, FS-S, State-T	5996, 5641, 5683, 5641, 5667, 5683, 5678
MOPU	<i>Monardella purpurea</i> Siskiyou monardella	4	O-2, BLM-A, FS-S	5669, 5642, 5737, 5627
PEER	<i>Perideridia erythrorhiza</i> Red-root yampah	1	O-1, BLM-S, FS-S	5656
SADE2	<i>Salix delnortensis</i> Del Norte willow	2	O-2, BLM-A, FS-S	5651, 5668
SEHE	<i>Senecio hesperius</i> Siskiyou butterweed	7	O-1, BLM-S, FS-S	5655, 5655, 5636, 5629, 5676, 5682, 5674
STHO	<i>Streptanthus howellii</i> Howell's streptanthus	9	O-1, BLM-S, FS-S	5972, 5719, 5719, 5973, 5973, 5973, 6008, 6008, 6008
VIPRO	<i>Viola primulifolia</i> ssp. <i>oc-</i> <i>cidentalis</i> western bog violet	1	O-1, BLM-S, FS-S	5665

Alternative 9 - Preferred Alternative

Sensitive plant species Potentially Impacted NICORE Project Area

Codes SNF	Species (common name)	Alt. 9 # of Sites Impacted	STATUS	DATA SHEET No.
ARMC	<i>Arabis macdonaldiana</i> Macdonald's rock-cress		O-1, FS-LE	
CAHO3	<i>Calochortus howellii</i> Howell's mariposa-lily	1	O-1, BLM-S, FS-S	5643
CANUG	<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tuberized toothwort		O-4, BLM-S, FS-S	
EPOR	<i>Epilobium oreganum</i> Oregon willow-herb		O-1, BLM-S, FS-S	
FRGL2	<i>Fritillaria glauca</i> Siskiyou fritillaria		O-2, BLM-A, FS-S	
GESE2	<i>Gentiana setigera</i> Elegant gentian		O-1, FS-S	
HABR2	<i>Hastingsia atropurpurea</i> purple-flowered rush-lily		O-1, BLM-S, FS-S	
LIGRG	<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam		O-1, BLM-S, FS-S	
MIHO	<i>Microseris howellii</i> Howell's microseris		O-1, BLM-S, FS-S, State-T	
MOPU	<i>Monardella purpurea</i> Siskiyou monardella		O-2, BLM-A, FS-S	
PEER	<i>Perideridia erythrorhiza</i> Red-root yampah		O-1, BLM-S, FS-S	
SADE2	<i>Salix delnortensis</i> Del Norte willow		O-2, BLM-A, FS-S	
SEHE	<i>Senecio hesperius</i> Siskiyou butterweed	1	O-1, BLM-S, FS-S	5711
STHO	<i>Streptanthus howellii</i> Howell's streptanthus	8	O-1, BLM-S, FS-S	5719, 5719, 5973, 5973, 5973, 5697, 5697, 7697
VIPRO	<i>Viola primulifolia</i> ssp. <i>oc-</i> <i>ccidentalis</i> western bog violet		O-1, BLM-S, FS-S	

Alternative 10 - Sensitive plant species Potentially Impacted NICORE Project Area

Codes SNF	Species (common name)	Alt. 10 # of Sites Impacted	STATUS	DATA SHEET No.
ARMC	<i>Arabis macdonaldiana</i> Macdonald's rock-cress	3	O-1, FS-LE	5647, 5650, 5650
CAHO3	<i>Calochortus howellii</i> Howell's mariposa-lily	10	O-1, BLM-S, FS-S	5638, 5653, 5657, 5664, 5969, 5954, 5640, 5643, 5643, 5265
CANUG	<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tuberous toothwort	5	O-4, BLM-S, FS-S	5648, 5649, 5649, 5707, 5649
EPOR	<i>Epilobium oreganum</i> Oregon willow-herb	3	O-1, BLM-S, FS-S	6204, 6204, 6204
FRGL2	<i>Fritillaria glauca</i> Siskiyou fritillaria	4	O-2, BLM-A, FS-S	5623-#3, 5623-#4, 5623#6, 5623-#5
GESE2	<i>Gentiana setigera</i> Elegant gentian	3	OR-1, FS-S	5432, 5308, 5308
HABR2	<i>Hastingsia atropurpurea</i> purple-flowered rush-lily		O-1, BLM-S, FS-S	
LIGRG	<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam		O-1, BLM-S, FS-S	
MIHO	<i>Microseris howellii</i> Howell's microseris	8	O-1, BLM-S, FS-S, State-T	5996, 5641, 5683, 5641, 5667, 5683, 5986, 5359
MOPU	<i>Monardella purpurea</i> Siskiyou monardella	11	O-2, BLM-A, FS-S	5680, 5669, 5642, 5737, 5627, 5646, 5637, 5637, 6221, 6221, 6221
PEER	<i>Perideridia erythrorhiza</i> Red-root yampah		O-1, BLM-S, FS-S	
SADE2	<i>Salix delnortensis</i> Del Norte willow	1	O-2, BLM-A, FS-S	5651
SEHE	<i>Senecio hesperius</i> Siskiyou butterweed	11	O-1, BLM-S, FS-S	5655, 5655, 5636, 5655, 5655, 5629, 5674, 5985, 5639, 5639, 5711
STHO	<i>Streptanthus howellii</i> Howell's streptanthus	20	O-1, BLM-S, FS-S	5972, 5719(+18 sites on Rd. 461 & 445)
VIPRO	<i>Viola primulifolia</i> ssp. <i>oc-</i> <i>cidentalis</i> western bog violet	2	O-1, BLM-S, FS-S	5665, 3933

Alternative 11 - Sensitive plant species Potentially Impacted NICORE Project Area

Codes SNF	Species (common name)	Alt. 11 # of Sites Impacted	STATUS	DATA SHEET No.
ARMC	<i>Arabis macdonaldiana</i> Macdonald's rock-cress		O-1, FS-LE	
CAHO3	<i>Calochortus howellii</i> Howell's mariposa-lily	5	O-1, BLM-S, FS-S	5638, 5653, 5657, 5664, 5969
CANUG	<i>Cardamine nuttallii</i> var. <i>gemma</i> yellow-tuberous toothwort		O-4, BLM-S, FS-S	
EPOR	<i>Epilobium oreganum</i> Oregon willow-herb		O-1, BLM-S, FS-S	
FRGL2	<i>Fritillaria glauca</i> Siskiyou fritillaria	4	O-2, BLM-A, FS-S	5623-#3, 5623-#4, 5623#6, 5623-#5
GESE2	<i>Gentiana setigera</i> Elegant gentian		O-1, FS-S	
HABR2	<i>Hastingsia atropurpurea</i> purple-flowered rush-lily		O-1, BLM-S, FS-S	
LIGRG	<i>Limnanthes gracilis</i> var. <i>gracilis</i> slender meadow-foam		O-1, BLM-S, FS-S	
MIHO	<i>Microseris howellii</i> Howell's microseris	6	O-1, BLM-S, FS-S, State-T	5996, 5641, 5683, 5641, 5667, 5683
MOPU	<i>Monardella purpurea</i> Siskiyou monardella	3	O-2, BLM-A, FS-S	5642, 5737, 5627
PEER	<i>Perideridia erythrorhiza</i> Red-root yampah	1	O-1, BLM-S, FS-S	5656
SADE2	<i>Salix delnortensis</i> Del Norte willow	1	O-2, BLM-A, FS-S	5668
SEHE	<i>Senecio hesperius</i> Siskiyou butterweed	5	O-1, BLM-S, FS-S	5655, 5655, 5636, 5629, 5674
STHO	<i>Streptanthus howellii</i> Howell's streptanthus	13	O-1, BLM-S, FS-S	5972, 5719, 5719, 5719, 5719, 5719, 5719, 5719, 5719, 5719, 6008, 6008, 6008
VIPRO	<i>Viola primulifolia</i> ssp. <i>occidentalis</i> western bog violet		O-1, BLM-S, FS-S	

APPENDIX H

FISH AND WILDLIFE REPORT

Fish & Wildlife Report
Biological Evaluation
and
Aquatic Conservation Strategy
Final Evaluation
Nicore Environmental Impact Statement

Prepare by: **Dave Vezie**, Fish and Wildlife Biologist



Fish

Distribution

Rough and Ready Creek is a tributary of the West Fork of the Illinois River. Salmonids known to occur include: Resident Rainbow Trout, Resident Cutthroat Trout, Klamath Mountains Province Steelhead Trout (ESU), Southern Oregon and California Coastal Chinook Salmon (ESU) and Southern Oregon / Northern California Coho Salmon (ESU).

Coho Salmon

Both the USFS and ODFW have survey records, which document the presence of the Southern Oregon / Northern California Coho Salmon (ESU) in Rough and Ready Creek during either the adult or juvenile stages of the life cycle. Juvenile Coho Salmon are known to utilize Rough and Ready Creek habitats (side channels and main channel deep-pools) in the vicinity of Seats Dam (Mayer/USFS 1998). Both the aquatic habitats and Riparian zones (300 horizontal feet from normal high water line) of all streams and estuaries that can still be occupied by any life stage of Coho Salmon was recently classified as *Critical Habitat* for Coho Salmon by the National Marine Fisheries Service (62 FR 62741). Notwithstanding, the recent Southwest Oregon Salmon Restoration Initiative (RVCOG 1997) does not recognize Rough and Ready Creek as a High Value Native Coho Habitat Area.

Fall-Run Chinook Salmon

Fall-run Southern Oregon and California Coastal Chinook Salmon (ESU) is known to both spawn and rear within Rough and Ready Creek. Habitat on the West Fork of the Illinois River, immediately adjacent to Rough and Ready Creek, is presently classified by ODFW as High value Native Fall Chinook Salmon Habitat.

Winter-Run Steelhead Trout

Winter-run Klamath Mountains Province Steelhead Trout spawn and rear throughout most of Rough and Ready Creek and many of the tributaries. Recent ocular reconnaissance identified low to moderate concentrations of juveniles at the proposed creek crossing sites and throughout the lower reaches of the creek within the planning area.

Resident Cutthroat Trout

Resident Cuttrout Trout occur throughout Rough and Ready Creek and many of the tributaries. Upper reaches of both the North Fork and South Fork of Rough and Ready Creek are likely more significant spawning and rearing sites than the main stem of the creek.

Resident Rainbow Trout

Resident Rainbow Trout also likely occur throughout Rough and Ready Creek and the tributaries

Land and Resource Management Plan - Management Goals

Standards and Guidelines

MAIL-3

1. Spawning Habitat

Chinook salmon, Coho salmon and Steelhead trout all likely spawn within the area of the proposed Rough and Ready Creek road crossings. Chinook salmon spawning immediately adjacent to and down stream of the proposed crossing sites may have increased stream-bed intra-gravel fines covering nests. At a site-specific level, intragravel fines could potentially be increased greater than 20 percent above background prior or just after fall spawning. Coho Salmon and Steelhead trout, spawning later in the season, are not likely to be impacted, in that micro site levels adjacent to the crossings may not be expected to exceed background levels by more than 20 percent. The Proposed Action, based on the number and type of crossings, presents the greatest potential to increase intragravel fines during chinook salmon spawning period. Other Action Alternatives, which either propose a reduced number of crossings and/or alternate types of crossings (i.e., bridge) are likely to elevate background levels to a lesser extent during fall spawning.

2. Rearing Habitat

Steelhead trout are known to rear within the area of proposed Rough and Ready stream crossings. Recent (1998) observations indicate that riffle sites, within the area of the major crossings, rear greater numbers of 0.0 juvenile steelhead than adjacent pool habitats. Presumably this is because elevated oxygen levels occur in these riffle habitats and reduced oxygen levels occur in the adjacent pool habitats during periods of high water temperature.

- a) Under all action alternatives overall stream temperature is likely to be maintained throughout the project area. However, some micro-sites may be cooled by major crossing structures such as bridges and culverts. Moreover, water pooled behind crossing structures may be associated with increased temperature and/or decreased dissolved oxygen. In addition, management of canopy cover is not proposed in this project. However, the risk of reductions in canopy cover from introduction of POC root disease is increased with all action alternatives. Stream temperatures may be increased at particular micro-sites due to canopy reduction from disease, however, the main-stem stream temperature would not likely be increased.
- b) Rearing capacity, relative to riffle habitat, would likely be diminished in all action alternatives except Alternative 9 (rearing capacity would be maintained in the No Action alternative), therefore the Proposed Action and Action Alternatives 6-8 and 10-11 would not meet this S&G. Action Alternative Crossing structures including culverts and fords on the main-stem Rough and Ready Creek, and the lower reaches of tributaries such as No Name and Alberg Creeks, may reduce the total surface area of steelhead rearing habitat during low flow conditions. The Proposed Action would have the greatest risk of affecting rearing capacity due to the high number of crossings and proposed design of the crossings. Action alternatives that use bridges for all major crossings, reduced overall number of crossings, and would avoid using the Alberg Route, would minimize adverse effects and best meet this S&G. The fewer the number of major crossings the better for rearing capacity.
- c) The existing amount of large woody material would not be directly reduced as a result of any action alternative. However any overall increased risk of introduction of POC root disease may degrade future large woody material recruitment.

3. Migration Habitat

Some seasonal fish passage barriers presently exist on Rough and Ready Creek (i.e., water diversions). The Proposed Action would reduce juvenile and adult passage in the vicinity of the crossings during the low flow period of the year. It is not known how much, if any, adult salmonid passage currently occurs during the low flow conditions. Moreover, it is not known to what extent existing structures prevent adult passage during low flow conditions. During the summer of 1998 observation of the numbers of juvenile steelhead in the main channel Rough and Ready Creek were conducted. Observations in the vicinity of the proposed crossings indicate that there may be a strong correlation with the distance up-channel and the numbers of juveniles observed (more fish were observed between proposed crossings #5 and #6 than between any other main-stem crossings). The Proposed Action clearly does not meet this Standard and Guideline (S&G). The fewer the number of major crossings the better the alternative regarding this S&G. Action alternatives that use bridges (Alts 6-11 not 9) better meet this S&G. The No Action Alternative and then Alternative 9 best meet this S&G.

1. Checklist Documenting Environmental Baseline and Effects of Action Alternatives on Relevant Indicators

Factors Indicators	Lower Rough and Ready Creek Reach Response Reach			Effects of the Action Alternatives Or No Action		
	Optimum Range	Marginal	Outside Optimum Range	Restore	Maintain	Degradate
<u>Water Quality</u> Temperature			X		6, 7, 8, 9, 10, 11, NA	PA
<u>Habitat Access</u> Physical Barriers		X			6, 7, 8, 9, 10, 11, NA	PA
<u>Habitat Elements</u>						
Sediment	X				NA, 9	PA, 6, 7, 8, 10, 11
Large Wood		X			PA, 6, 7, 8, 9, 10, 11, NA	
Pool Character and Quality		X			PA, 6, 9, 11, NA	7, 8, 10
Off-channel Habitat		X			NA, 9, 6, 7, 8, 10, 11	PA
<u>Channel Conditions and Dynamics</u>						
Width/depth ratios		X			PA, 6, 7, 8, 9, 10, 11, NA	
Stream-bank Condition		X			NA, 9, 11	PA, 6, 7, 8, 10
Floodplain Connectivity		X			6, 7, 8, 9, 10, 11, NA	PA
<u>Flow/Hydrology</u> Changes in peak flows	X				PA, 6, 7, 8, 9, 10, 11, NA	
<u>Watershed Conditions</u>						
Road Density and Location		X			NA, 9	PA, 6, 7, 8, 10, 11
Human Disturbance History		X			NA	PA, 6, 7, 8, 9, 10, 11
Riparian Reserves		X			NA, 9	PA, 6, 7, 8, 10, 11
Landslide and Erosion Rates		X			NA, 9	PA, 6, 7, 8, 10, 11
<u>Harassment or Incidental Take</u>		X			NA, 9	PA, 6, 7, 8, 10, 11

1. Selection of Optimum, Marginal, and Outside Optimum Range Environmental Baseline conditions are derived from Forest Service, BLM and ODFW stream survey data and synthesis of watershed analysis findings. These Ranges have been established in general terms for Southwest Oregon (Frick 1993) and conform to NMFS ESA determination standards. However, natural productivity of serpentine geology is recognized as producing much less than optimum conditions relative to many key indicators such as water temperature and large wood.

2. These three categories of function (Optimum Range, Marginal, and Outside Optimum Range) are defined for each indicator in the "Matrix of Factors and Indicators" (addendum)

3. For the purposes of this checklist (Table), "restore" means to change the function of an "Marginal" indicator to "Optimum Range" or to change the function of a "Outside Optimum Range" indicator to "Marginal" or "Optimum Range", moving conditions towards recovery. For the purposes of this checklist (Table), "degrade" means to change the function of an indicator for the worse. In some cases, a "Outside Optimum Range" indicator may be further worsened.

Discussion of Relevant Indicators

Temperature

- None of the Action Alternatives including the Proposed Action can be expected to result in any measurable overall water temperature changes within the response reach. However, some micro-site-specific changes may likely occur in the immediate vicinity of main channel stream crossings. Crossing structures, such as bridges, may, to some extent, reduce water temperatures at these micro-sites.

Physical Barriers

- The Proposed Action can be expected to further reduce both adult and/or juvenile steelhead trout passage during seasonal low flow conditions. Alternatives 6, 7, 8, and 10 propose to reduce the number of fish bearing stream crossings and use bridges. No action and Alternative 9 have no stream crossings and thus would best maintain fish passage.

Sediment Regime

- All Action Alternatives, including the Proposed Action increase the risk of fine sediment reaching the main channel of Rough and Ready Creek. In general, the number proposed crossings and the nature of the crossings reflects the relative risk of fine sediment delivery. Thus, the Action Alternative with the least number of channel crossings may be expected to present the least risk of fine sediment delivery. Any excessive amount of fine sediment delivery may be expected to reduce overall carrying capacity, relative to both summer rearing and fall spawning, in the immediate vicinity of the proposed major vehicle stream crossings (see physical science report for a detailed comparison of action alternatives relative to estimated sediment delivery).

Large Wood

- Port-Orford-cedar is potentially the most significant contributor of large wood in the *Riparian Reserve* within the planning area. Both Alberg Creek and No Name Creek have significant

populations of Port Orford cedar within these respective Riparian Reserves. Action Alternatives, including the Proposed Action, that use roads, likely increase the risk of spread of Port-Orford-cedar root disease into the planning area. At present, the Port-Orford-cedar root disease has not been documented to occur within Rough and Ready Creek Watershed. Any increased risks of the spread of the root disease may in turn constitute an increased risk for future in-stream large woody material within the above identified tributaries. No Action and Alternative 9 maintain the current risk (see POC report for more specific information).

Pool Character and Quality

- Main channel pool character and quality within the overall planning area is expected to be maintained under all Action Alternatives except alternatives 7, 8 and 10. Alternatives 7, 8, and 10 are associated with the additional risk to pool character and quality from the blasting of the bedrock immediately adjacent to the main-stem of Rough and Ready Creek..

Off Channel Habitat

- The Proposed Action could potentially degrade off channel tributary habitats adjacent to the confluence of No Name Creek and the main-stem of Rough and Ready Creek. All other Action Alternative and the No Action Alternative can be expected to maintain these specific off channel tributary habitats.

Width/Depth Ratios

- None of the Action Alternatives including the Proposed Action can be expected to change overall width to depth ratios within the response reach. Some low flow micro-site-specific changes are likely to occur within the immediate vicinity of main stream channel crossings.

Stream Bank Condition

- All Action Alternatives, except 9 and 11, have the potential to hinder properly functioning stream bank conditions at the proposed vehicle stream crossing sites. This potential is greatest with the Action Alternatives with the greatest number of proposed crossings (i.e., Proposed Action).

Floodplain Connectivity

- The Proposed Action may impact the No Name Fan and disrupt floodplain connectivity between Crossings 3 and 4. All other alternatives maintain the current conditions.

Changes in Peak Flows

- Neither the Proposed Action nor any of its alternatives are expected to affect peak flows (see discussion in physical science report).

Road Density and Locations

- Active road density is expected to increase in direct association with all of the Action Alternatives (except Alternative 9). Action Alternatives that propose to locate road segments the greatest distances from fish bearing streams is expected, to some degree, reduce the risks of degradation (based on location) associated active mineral haul roads (see the physical science report for more information about particular locations).

Human Disturbance History

- Under all Action Alternatives, disturbance associated with the mining of this area is proposed to continue for 5-10 years or more.

Riparian Reserves

- Under all Action Alternatives, except Alternative 9, the *Riparian Reserve* would be utilized as part of the mining transportation corridor. The Proposed Action would utilize the Riparian Reserve as a transportation corridor to the greatest extent.

Landslide and Erosion Rates

- The Proposed Action and Alternatives 6, 7, 10 and 11 have the potential to increase the risk of landslide and erosion rates relative to Mining Site D (see Physical Science Report). In addition, road surface erosion rates are expected to be highest in the Proposed Action relative to road locations (see Physical Science Report).

Harassment or Incidental Take

- All Action Alternatives, except Alternative 9, may increase the risk of harassment and/or incidental take. Action Alternatives 7, 8, and 10 are associated with some additional risk from the blasting of bedrock from the bench immediately adjacent to the main channel. However, mitigation to reduce the risk of rock-fall into the creek from bedrock blasting could be employed.

Other Indicators

Water Quality

See Physical Science Report

Hazardous Materials

Petroleum products (i.e., diesel fuel, gasoline, and hydraulic fluid) will be used in association with All Action Alternatives (see additional discussion in the Hazardous Materials Spill section of the EIS).

Determination of Effects for Proposed / Listed /Sensitive Anadromous Salmonids and/or Proposed / designated Critical Habitat in the Watershed or Downstream from the Watershed

Both the Proposed as Listed Southern Oregon and California Coastal Chinook Salmon (ESU) and the Listed Southern Oregon / Northern California Coho Salmon (ESU) are seasonally within the Rough and Ready Creek watershed and/or downstream of the watershed. The Proposed Action and Alternatives 6, 7, 8, 10, and 11 utilize roads within Riparian Reserves and degrade some or many indicators from the above Klamath/Siskiyou Mountains Province check list. Thus, these alternatives **May Affect** and are **Likely to Adversely Affect Listed or Proposed salmonids and/or Listed or Proposed Critical Habitat.** No Action and Alternative 9 would have **No Effect** on Listed or Proposed salmonids and/or Listed or Proposed Critical Habitat.

Forest Service Region Six *Sensitive* fish species also occur within the Planning area. . The Proposed Action and Alternatives 6, 7, 8, 10, and 11 utilize roads within Riparian Reserves and degrade some or many indicators from the above Klamath/Siskiyou Mountains Province check list. Therefore, all of the Action Alternatives, except Alternative 9, **May Impact** Individuals and/or Habitat, but *will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Populations* (i.e., steelhead trout and/or cutthroat trout) or species. The No Action Alternative and Alternative 9 would have **No Effect** on these *Sensitive* fish species.

Wildlife

Distribution and Effects

Hundreds of vertebrate and thousands of invertebrate species may occur within the NICORE Planning Area. The distribution and abundance of wildlife species of concern was recently described in the West Fork Illinois River Watershed Analysis (USFS 1997).

The Action Alternatives are would likely not seriously impact any known vertebrate populations. In addition, the Action Alternatives would not significantly impact the overall existing wildlife habitat conditions within the planning area. However, some of the action alternatives could result in site-specific impacts to riparian areas and rock outcrops. Impacts to riparian areas and rock outcrops could result in adverse effects to individuals or groups of wildlife (vertebrate and/or invertebrate). These impacts are not likely to be serious or affect overall habitat conditions. This judgement is based on the proposed scale of the operation relative to the total amount of habitat within the analysis area.

Cumulative Effects

Some more extensive habitat alterations and more extensive direct impacts to individuals and/or groups of individuals would likely occur from the implementation of any full-scale (500+ acres) mining alternative. The cumulative effects of such full-scale mining would impact greater numbers of groups of

individuals and/or populations (vertebrate and/or invertebrate). Monitoring for effects on animal populations should be conducted in all full-scale mining alternatives, and should be used to evaluate any future proposals.

Land and Resource Management Plan - Wildlife Standards and Guidelines

Management Indicator Species

Forest Management efforts consider all native vertebrate species. Several groups of species have special management needs. These groups include: (1) species dependent on specialized habitat conditions, such as cavity-nesters; (2) species requiring early, mature, or old-growth forest conditions for optimum habitat; (3) popular game species; and (4) endangered, threatened, and sensitive species.

Siskiyou National Forest Management indicator Species - Wildlife

The Forest list includes: Bald Eagle, Osprey, Spotted Owl, Pileated Woodpecker, Pine Marten, Woodpeckers, Black-tailed deer, and Roosevelt Elk.

The Proposed Action and/or Action Alternatives are not likely to seriously impact any known *Siskiyou National Forest Wildlife Management indicator Species*.

Survey and Manage Species (Wildlife)

The Survey and Manage (Wildlife) Standard and Guideline is intended to provide benefits to amphibians, mammals, mollusks, and arthropods. The Standard and Guideline contains four components, and priorities differ among them. These include: 1) Manage known sites, 2) Survey prior to ground-disturbing activities, 3) Extensive surveys, and 4) General regional surveys.

Survey prior to ground-disturbing activities

Habitat would be avoided under No Action and Alternative 9. Further surveys would be required if any other alternative is selected.

MA9 -Special Wildlife Sites

One existing Special Wildlife Site occurs within the Planning area. This is a Dispersed Habitat site (DH0788) which is located (T40S, R09W, Sec.04, NE) northeast of the proposed access route to Mining Site A. It is not likely that any of the Action Alternatives will impact this Special Wildlife Site. Based on existing information, to include the recent watershed analysis, there are no areas within the planning area presently identified as having potential as additional important Special Wildlife Sites.

O'Brien CaddisFly

The existing information on the O'Brien Caddisfly (*Rhyacophila colonus*) was recently evaluated in association with the West Fork Illinois River Watershed Analysis (USFS 1997). Available records reveal *R. Colonus* to be known from a single type locality. The Canadian F. Schmidt collected four adult males and four adult females during a visit to the Illinois Valley (the general vicinity of O'Brien, Oregon) in

June of 1965. These specimens are presently located at the Institute of Entomology Research, Ministry of Agriculture in Ottawa, Canada.

Recent (1996) attempts to collect *R. Colonus* were made by the Nature Conservancy. These unsuccessful efforts used black light traps. Specific areas of Rough and Ready Creek were sampled during the above efforts. Specific habitat associations for the species have yet to be identified. However, the larvae of this genus are most commonly found in small to mid-sized streams in forested montane areas of the Pacific Northwest. The Nature Conservancy, in partnership with the Siskiyou National Forest, continues to survey for this species. Based on the lack of conclusive surveys, no effects can be predicted.

Determination of Effects for Proposed / Listed /Sensitive Wildlife Species and/or Proposed / designated Critical Habitats in the Planning Area

The Action Alternatives, including the Proposed Action, will have No Effect on any *Proposed* or *Listed* Wildlife Species or any *Proposed* or *Listed* Critical Habitat. The Action Alternatives May Impact a *Sensitive* wildlife species (i.e., O'Brien CaddisFly) or this species habitat, but *will Not Likely Contribute to a Trend Towards Federal Listing or Cause a Loss of Viability to the Population* (i.e., O'Brien CaddisFly) or *Species* (i.e., O'Brien CaddisFly).

Aquatic Conservation Strategy

The conservation strategy employs several tactics to approach the goal of maintaining the "natural" disturbance regime.

Aquatic Conservation Strategy Objectives

Forest Service and BLM-administered lands within the Range of the northern spotted owl shall be managed to meet nine Aquatic Conservation Strategy Objectives.

1. The Proposed Action and all of the Alternatives may be expected to maintain the distribution, diversity, and complexity of the Rough and Ready Creek watershed and landscape-scale features.
2. Spatial and temporal connectivity would be degraded by road development and use between Crossings Three and Four in the Proposed Action and maintained in all other alternatives.
3. The physical integrity of the aquatic system as a whole is likely to be maintained, however shorelines and stream banks would be degraded at all crossing locations. Alternatives that reduce the number of stream crossings (9, 10, and 11) would best meet this objective.
4. Water quality may be degraded in all of the action alternatives except Alternative #9 (see physical science report). State water quality standards may be exceeded for short duration and distance downstream from the crossings. The Proposed Action, with its low water fords and lack of annual removal of washed rock at the crossings, would have the greatest impact on water quality. Other

alternatives are associated with less impact. The project is associated with a variety of risks, including potential for slope instability at Mine Site D, additional sediment delivery from road construction and reconstruction, increased nickel concentration, hazardous substance spills at crossings. Unless there are high magnitude landslides, and/or serious toxic spills, the water quality would be expected to remain within the range that currently supports biological, physical, and chemical integrity to support aquatic and riparian species.

5. See physical science report. Site-specific changes in timing (under low flow conditions), volume, rate, and character of sediment input, storage, and transport can be expected in the vicinity of the proposed vehicle crossings. Alternatives that minimize road development, especially within riparian reserves, would have less impact, but all action alternatives except Alternative #9 would fall short of meeting this objective within the project area.

6. The Proposed Action and all of the Alternatives can be expected to maintain in-stream flows sufficient to create and sustain riparian and aquatic habitats. Wetland habitat at the "No Name Fan" may be degraded in the Proposed Action and Alternatives #6 and #7. Impacts to wetland habitat near Crossing #1 can likely be avoided in all alternatives. The Proposed Action, with its use of the existing Alberg road, may interfere with routing of down wood into the stream. The overall timing, magnitude, duration, and spatial distribution of peak, high, and low flows can be expected to be maintained within the project area under all of the alternatives. However, Water withdrawal may occur in all action alternatives except Alternative #9.

7. Road development within the Rough and Ready floodplain is not expected to affect the timing, variability, and duration of the floodplain inundation and water table elevation in meadows. However, some impacts to small wetlands and fens may occur from road development between Crossings #2, #3, and #4, #6, and possibly at Crossing #1.

8. Some plant species, within riparian areas, may be affected by road construction, reconstruction, and use as a result of all of the action alternatives except possibly Alternative #9 (see Botanical Report). Rare species at present include fen species such as darlingtonia and western bog violet, and riparian species such as Del Norte willow. Alternatives that reduce the amount of road development in riparian areas are associated with less risk. Structural diversity of plant communities, and maintenance of summer and winter thermal regulation are not likely to be directly affected by any alternative, however, indirect effects based on the introduction of POC root disease may, in the long run, reduce diversity and thermal regulation within riparian areas supporting this species. Noxious weed introduction could also indirectly impact species composition and structural diversity by out-competing native vegetation. Loss of vegetation is not likely to affect maintenance of nutrient filtering, and/or appropriate rates of surface erosion, and channel migration. Bank erosion may be accelerated by loss of vegetation at crossings (see physical science report for alternative comparison).

9. The Proposed Action and all Alternatives are expected to maintain habitat to support well-distributed populations of animal species within the project area. Little is known about the Obrien Caddisfly, a sensitive invertebrate species that may occur within the project area, thus it is futile to speculate about

potential risks to this species. Potential affects on fish species are presented elsewhere in this report. The West Fork watershed analysis does not lead to a conclusion that any other animal species may be extirpated or otherwise significantly affected by any alternative. However, some sensitive plant species across several sites may be adversely affected by the action alternatives (see botanical assessment for details).

Components of the Aquatic Conservation Strategy

Components of the Aquatic Conservation Strategy include the Riparian Reserve, Key Watersheds, Watershed Analysis, and Watershed Restoration.

Riparian Reserves - Riparian Reserves within the planning area include: fish-bearing streams, permanently flowing non-fish-bearing streams, seasonally flowing or intermittent streams, wetlands less than 1 acre, constructed ponds and/or wetlands greater than 1 acre (i.e., water diversion ditches, etc.).

Key Watersheds - Neither Rough and Ready Creek nor the West Fork of the Illinois River was identified as a Key Watershed in the Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. Forest Service (1994).

Watershed Analysis - Rough and Ready Creek was included in the recent West Fork of the Illinois River Watershed Analysis (1997).

Watershed Restoration - In that Rough and Ready Creek is not presently identified as either a Key Watershed (USFS/BLM) or Coastal Salmon Recovery Initiative Core Area (ODFW). To date, watershed restoration within the Rough and Ready Creek watershed has not been an integral part of the overall USFS management/ planning. However, watershed restoration opportunities were identified for this watershed in the recent (1997) West Fork of The Illinois River Watershed Analysis.

Riparian Reserve Standard and Guidelines

As a general rule Riparian Reserve Standards and Guidelines prohibit or regulate activities in the Riparian Reserves that retard or prevent attainment of the Aquatic Conservation Strategy Objectives.

Roads Management

- RF-1.** Federal, state and county agencies are working in cooperation to achieve consistency in road design, operation, and maintenance necessary to attain the Aquatic Conservation Strategy Objectives.
- RF-2.**
 - a. Many of the proposed action alternatives for the Nicore project require significant road development within riparian reserves (See Table 1). Alternative 9 is designed to eliminate road development in the Riparian Reserves.
 - b. Project level analysis would be completed, including geo-technical analysis, on the final selected alternative. West Fork Illinois River Watershed Analysis, including Rough and Ready Creek, provides context for the project level analysis.

- c. Road design criteria, elements, and standards governing the construction and reconstruction of roads within the Riparian Reserve are being prepared in association with this analysis (see road access document).
- d. Preparation of criteria for the operation and maintenance of roads within the Riparian Reserve are also being done in association with this analysis (see road access document).
- e. Roads designed for this project would be constructed using Best Management Practices and other criteria to minimize disruption of natural hydrologic flow paths. Some diversion of stream flow could occur at the crossings, especially under the Proposed Action. Surface and subsurface flow may be interrupted in some Riparian Reserves.
- f. All roads would be designed to minimize sediment delivery into streams. (see physical science report for a comparison of alternatives).
- g. None of the action alternatives avoid wetlands entirely except 9 and 11

- RF-3.** The West Fork Watershed Analysis identified some roads that retard achievement of Aquatic Conservation Strategy Objectives. The Alberg Road currently is an active source of sediment.
- a. All action alternatives, except the Proposed Action, would abandon the current location of the Alberg road. Road construction and reconstruction would be designed to achieve ACS road construction/maintenance objectives.
 - b, c. The West Fork Watershed Analysis recommended and prioritized restoration activities, including road projects, within the watershed. The Alberg road would be closed and stabilized under Alternatives #6-#11. Annual storm-proofing would be required in all action alternatives prior to the wet season. Roads would be closed to the public in all action alternatives (roads would remain open in the Proposed Action). Long-term transportation needs relative to minerals operation would be considered following completion of the mining project.
- RF-4.** All crossings would be designed to maintain to prevent diversion of stream flow out of the channel and down roads in the event of a crossing failure.
- RF-5.** Road design criteria in all the action alternatives would out-slope or use drainage features to minimize risk of sediment delivery. However, use of the Alberg route would likely increase the risk of sediment delivery well above other action alternatives.
- RF-6.** The Proposed Action may retard the maintenance of fish passage during low flow conditions. All of the other action alternatives would be expected to provide and maintain fish passage at all road crossings of existing or potential fish-bearing streams. The use of bridges may indeed be the most effective way to provide and/or maintain fish passage, during low flow conditions.
- RF-7.** For the final selected alternative, a project road management plan (including Road Management Objectives) will be developed to meet the Aquatic Conservation Strategy objectives. Inspection and maintenance during (or immediately following) storm events may only be possible during the summer operating season; access across Rough and Ready Creek would not likely be possible during winter storm events. All action alternatives would approve only dry season operation and road use.

Minerals Management

- MM-1.** No mining within Riparian Reserves is proposed, however, a reclamation plan and bond will be required for the final, approved Plan of Operations. See the EIS for a discussion about the reclamation objectives.

- MM-2.** All the action alternatives, except 9, include road development within Riparian Reserves. The impact of these roads on the Aquatic Conservation Strategy objectives is described elsewhere in this report. The Proposed Action would locate a stockpile site that is partially within the mainstem Rough and Ready Creek Riparian Reserve. The other action alternatives would site this facility outside the Riparian Reserve. Road development within Riparian Reserves is minimized in all action alternatives (see Table 1 - the Proposed Action would develop substantially more roads within the reserves than the other action alternatives). The action alternatives would construct and maintain roads to meet roads management standards and minimize resource damage. The Proposed Action would clearly not meet this standard, because it includes a crossing that is not necessary (Crossing #4) and does not include specific design criteria to minimize resource damage. The Road Access Documentation Memo (Oleary 1997) describes criteria included for all action alternatives. Roads will be storm-proofed annually under all action alternatives. When the mining operation is complete, the roads may be decommissioned, depending on whether they are required for future mining. At the minimum, the roads will be storm-proofed. The roads would be closed to the public during mining operations in all action alternatives (the Proposed Action does not include provisions for road closures). All action alternatives (except the Proposed Action) would eliminate the Alberg Route. Under these alternatives, the FS would consider decommissioning and/or obliterating this road within its regular road management program. At the minimum, the road would be stabilized.
- MM-3.** None of the Action Alternative, including the Proposed Action, pose solid or sanitary waste facilities in the Riparian Reserves.
- MM-4.** Neither the Proposed Action nor any of the Action Alternatives submit leasable minerals.
- MM-5.** None of the Action Alternative, including the Proposed Action, intend salable mineral activities.
- MM-6.** All of the Action Alternatives, including the Proposed Action, will embody inspection and monitoring requirements designed to effect the modification of the Plan of Operation as needed to eliminate impacts that retard or prevent attainment of the Aquatic Conservation Strategy objectives. See Chapter Two within the EIS for a monitoring plan for the action alternatives.

Working References

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- RVCOG. 1997. Southwest Oregon Salmon Restoration Initiative: A Planning Effort in Support of the Coastal Salmon Recovery Initiative: Phase 1: A Plan to Stabilize the Native Coho Population From Further Decline. Rogue Valley Council of Governments. February, 1997.
- USFS. 1997. West Fork Illinois River Watershed Analysis Results Iteration 1.0. Illinois Valley Ranger District, Siskiyou National Forest. June 1997.
- USFS/BLM. 1994 Record of Decision for Amendments to Forest Service an Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. Forest Service and Bureau of Land Management. April 1994.

USFS. 1989. Land and Resource Management Plan Siskiyou National Forest. United States Department of Agriculture, Siskiyou National Forest.

Addendum

ALTERNATIVE 9 - PREFERRED - Limited Road Access, Helicopter Sampling

Alternative 9 would allow sampling of mine sites A, B, C, and/or D. This alternative would require Nicore to sample 5,000 tons of ore from the mine sites. Sampled ore would be hauled in helicopter buckets (about 670 round trips is estimated for a flight time of 120 hours is estimated for the removal of 5,000 tons of ore). No significant road improvement would be approved. The miner could walk tracked vehicles (such as a backhoe) to Mine Site B up Road 251 ("the Rock Creek Road), however equipment would have to be flown to the other mine sites. The Rock Creek road would not be approved for daily travel with personnel vehicles. NO STREAM CROSSINGS FOR ANY VEHICLE WOULD BE APPROVED.

Sampling would be limited to approved sites where surveys have determined that PETS and Survey and Manage Species can be avoided. All of the mine sites have been previously sampled, and this alternative would limit disturbance to previously sampled areas. The mine pits themselves would disturb less than one acre (approximately 0.2 acres per mine site).

Alternative 9 would require the miner to sample and process some ore to resolve the economic and operational uncertainties associated with the project,¹ without incurring the environmental degradation associated with road development and use. Nicore would be given five years to stockpile and process the ore. Five years is expected to provide adequate time to resolve plan uncertainties. Once the miner completed the sampling, he could submit a new Plan of Operations, with additional economic and operational analysis based on the findings of the sample processing. That plan would be subject to appropriate environmental analysis.

The alternative stockpile site would be used. The stockpile and mine sites would be designed for helicopter maneuver (bucket loading/unloading). The powerline road between 199 and the stockpile site would be improved.

APPENDIX I

ECONOMICS REPORT

Nicore Economics Report

There is much uncertainty pertaining to the economic situation associated with the Nicore Mining Proposal. This report explores that uncertainty, the potential effects of technology changes, the world market for nickel and associated products, assumptions used in this analysis, and the value of other resources located within the Rough and Ready Watershed.

The uncertainties associated with the economics of the Nicore Mining Proposal are mainly associated with world markets, processing ore, and smelting a product. Where and how does processing/smelting occur or is it going to occur? What is the value of the product? The answers to these questions are unknown. However, the value of processed nickel laterite is a known commodity on the world market. Modest assumptions of value and a sensitivity analysis can assess the economic feasibility depending upon processing costs and market conditions.

Different views of the economic values of mining nickel laterites at Nicore are available. One view is that such mining is not economical. Two papers, submitted to the Forest Service in response to the public comment period for the Draft EIS for Nicore, summarize this conclusion (Resource Strategies, 1998 and Barrick, 1998). According to this view, given the world markets and mining/processing costs, proposals such as Nicore are not economically viable. "On the basis our preliminary evaluation of various processing routes including Brokerage, Steel Mill Production and Smelting to produce a 3.5% Nickel Pig, there does not appear to be an economically attractive processing route to recover and market nickel products from the Oregon laterite ores" (Barrick, 1998). Conclusions of the "Economics of the Nicore Project" state the ore grades are at the extreme low end and the size of the orebody is far smaller than other similar ore bodies being considered for commercial use. Nickel prices are declining. There is an adequate supply of very low cost new mine projects in the pipeline and the large Voisey's Bay project in Canada will greatly expand production capability. Advances in nickel technology which could reduce costs for the Nicore material will have similar effects on other competing nickel resources and probably would not alter the competitive picture. Oregon is an unsuitable location for downstream investment in stainless steel operations given its distance from both the product and scrap markets.

An additional view is presented by David Russell, referenced from a talk given December 8th, 1997 in Kalgoorlie, Western Australia. He states "As recently as twenty years ago around 70% of nickel production came from 30% of the world's nickel resources that are in sulfides (Nicore deposits are nickel laterites, not sulphides). Today those statistics are still valid but in the very near future West Australian projects such as Murrin Murrin, Bulong and Cawse will start to change this ratio with a technologically driven move to increased production from laterite ores using acid leach metallurgical processing. As metallurgical technology advances, a step-like improvement in recoveries is apparent, and pressure acid leach is the current technology. With 70% of the world's nickel resources in laterites it will not be long before the balance of production swings in favor of the laterite deposits starting with the commissioning of three acid leach projects" (in Australia) (Russell, 1997). For purposes of this EIS, it is important to note that Nicore has made absolutely no proposals to utilize an acid leach process.

"The only nickel smelter in the United States closed in April 1998 because of low nickel prices. The smelter, near Riddle, Oregon, had been producing ferronickel from ores imported from New Caledonia. The adjoining mine on Nickel Mountain has been idle since 1996. 158 facilities in the United States reported nickel consumption. The principal consuming state was Pennsylvania, followed by West Virginia and Ohio. Approximately 44% of the primary nickel consumed went into stainless and alloy steel production. About 66,000 tons of nickel was recovered from purchased scrap in 1998. This represented about 35% of the reported consumption for the year." (Kuck, Peter, USGS, Jan. 1999)

"Stainless steel accounts for 40% of primary nickel consumed in the United States and two-thirds of world primary consumption. U.S. production of nickel-bearing stainless steel was down 6% from 1997's near-record 1.36 million tons. Demand for nickel-free grades of stainless steel remained strong because of robust automotive sales." (Kuck, Peter, USGS, Jan. 1999)

Notwithstanding the predominance of laterite ore, by far the largest source of nickel production continues to be from sulfides for economic reasons. However, as the growth in world nickel consumption continues, fuelled largely by expanding consumerism in Asia, there is increasing pressure to exploit the laterites (Reimann, M., O'Kane, T., and Cruz, E., 1998).

"The world nickel supply grew faster than demand in 1998. In August, the London Metal Exchange (LME) cash price dropped below \$4,300 per metric ton (\$1.95 per pound) - the lowest level in more than a decade. A sharp rise in exports of stainless steel scrap from Russia to the European Union contributed to the oversupply situation and offset cutbacks in world ferronickel production. The oversupply situation is expected to continue for 4 or 5 years because of mine and smelter capacity additions in Australia, Canada, Indonesia, and Venezuela. Since 1975, world demand for stainless steel has grown at an average rate of 4.5% per year. This growth rate is projected to continue for the next 20 years." (Kuck, Peter, Nickel Mineral Commodity Summaries, U.S. Geological Survey, January 1999).

"The estimated global resource of nickel laterite is around 8 billion tons grading 1.4% nickel, containing some 118mt of nickel. (The Nicore deposits are purported to be approximately 0.8 to 1% nickel and have 3,800 tons of nickel.) Of this world resource only 4.6 billion tons are classed as reserves, and contain 70mt of nickel. This is sufficient for around 70 years of total world demand at current levels.

The major nickel laterite deposits are located in New Caledonia, Cuba, Indonesia and the Philippines which together account for 75% of the total world nickel laterite resources. New Caledonia accounts for around 25% of the currently reported laterite resources. In addition in Central Africa some 5% of the world's known laterites are found in Burundi (Russell, 1998)." Anaconda Nickel Limited has recently announced a joint venture with Cobra to develop substantial nickel laterite deposits with an inferred resource of 255 million tons at 1.41% nickel and 0.08% cobalt (Anaconda, 1998). "The marketed products of nickel laterite projects include bulk ore, matte, ferronickel, nickel oxide sinter, mixed sulphides, electronickel and nickel metal powder." (Russell, 1997)

The USGS estimates world nickel reserves contain at least 130 million tons of nickel (60% in laterites and 40% in sulfide deposits). In addition, extensive deep-sea resources of nickel are in

manganese crusts and nodules covering large areas of the ocean floor, particularly in the Pacific Ocean. Substitutes for nickel would result in increased cost or some trade-off in the economy or performance of the product. Aluminum, coated steels, and plastics can replace stainless steel to a limited extent in many applications.

Cobalt is a valuable by-product of nickel laterites. The average cobalt credit per pound of nickel produced at the 1995 level is 24 cents (AME Mineral Economics, 1998).

Current utilization of the total Western World nickel mining capacity is around 86%, an historically high figure. Operating rates are predicted to decline as low as 76% with the opening of new mines at Voisey's Bay in Canada in 2001-2003(AME Mineral Economics, 1998). Anaconda Nickel Limited of Australia, has predicted a long term period of depressed nickel prices of around \$2.25/pound as the nickel market prepares for the imminent substantial supply of nickel from new low-cost producers (Anaconda Media Release, 17th July 1998).

"The nickel concentration in limonite (clay portion of the more developed soil part of the deposits) considered to have economic value is in the range of 1% to 1.8% with an average near the lower end of the scale, while saprolite (weathered rock part of the deposits) runs in the range of 1.8% to 3.5%. An average of 2.3% nickel is considered high grade" (Reimann, et.al., 1998).

The Economics of Mining

"The value of an ore body in the ground begins with the value of the contained metals which by application of the relevant metal prices, gives a gross value per ton of ore. From there, two cost factors are the determinants of potential profitability: the cost of getting it out of the ground (mining) and the cost of extracting the marketable metal (processing). Finally, the reserves of ore must be such that the capital cost of putting the operation in place can be recovered, leaving an income stream from which all these parameters in common, hence they form the basis for comparison.

Laterites are by nature large, low grade nickel cobalt deposits, and can therefore be compared with equivalent low grade gold and low grade copper deposits. However, Nicore would be a relatively small operation, not a large deposit. The 0.05 ounce per ton gold, valued at \$19 per ton of ore, is a typical Nevada heap leaching situation which can and is being profitably mined. 0.5% copper ore at \$10 per ton is being commercially mined in Arizona. By comparison, a laterite of typical grade contains \$115 worth of metals per ton" (Reimann, et.al., 1998). The grade at Nicore is probably lower than that of the typical operating grade material. "The cost of mining all three types of ore is similar, and should be in the order of \$2-\$5 per ton, as all are open pit, large volume situations. By comparison, hard rock, under ground mining as is typical for sulfide ores, is highly labour intensive and can cost five times as much. From the above comparison, it is apparent that laterite nickel ore enjoys a major advantage in the combination of low mining cost with high value content. These two factors provide a strong incentive to find economic means of extracting nickel from laterites"(Reimann, et.al., 1998).

Economics of Processing

"Nickel is considered to be a sophisticated metal, particularly with respect to the industrial processes needed to extract it from its ores. Unlike gold, which can be mined and sold by individual operators with rudimentary equipment, the production and marketing of nickel is complex and capital intensive, with the result that only a few large corporations have so far succeeded in becoming profitable producers" (Reimann, et.al., 1998). There are no known processes that seem feasible for the production of nickel on the small scale envisioned by Nicore. Moreover, there are no large smelter operations identified by the claimant to process the ore thus this question must remain a major uncertainty.

"The chemical reaction (oxide reduction) which must take place to free the metallic nickel is endothermic. This means that a net input of energy (usually in the form of heat) is needed to free the nickel. By contrast, the process to free nickel from sulfide ores is accompanied by oxidation, namely the burning of the sulfur. This gives off energy, so that, on balance, the processing of sulfides is less energy intensive than processing laterites" (Reimann, et.al., 1998).

"The energy needed to reduce the nickel ores is most commonly provided by heating, in a process called smelting. This process is well understood, and has been used for decades by the large producers. It is a high temperature, high energy operation with good nickel recovery but low cobalt recovery. Smelting is not amenable to processing limonite because the iron content is too high and the nickel grade too low to be economic. Saprolite is more suitable, with lower iron and higher nickel concentrations. In this case, the end product is an iron-nickel alloy known as ferronickel, or if sulfur is added, a high grade nickel matte. Most of world production achieved from lateritic ore uses high-grade saprolite as feed stock" (Reimann, et.al., 1998). The lateritic ore from Nicore is relatively low grade.

Some new processes are becoming available for processing lower grade saprolite and limonite, such as that found at Nicore. However, even with the new processes, the amount of reserves and lower grade of the reserves would probably make Nicore a marginal economic operation. Any process favorable for reducing the processing costs would generally make those operations with larger reserves and higher ore percentages even more favorable over the smaller, lower percentage ore bodies such as Nicore.

The assumptions used in this economic analysis are as follows:

1. Under the proposed action, 3.5 acres per year for ten years would be mined to a depth of 12 feet of which 50% would be usable after screening. This amount of material would produce 380 tons of nickel per year.
2. Smelting costs of nickel are \$2.25 per lb. This cost would actually vary depending upon the process used and the grade of ore present (Barrick, 1998).
3. Processing Costs of raw material is \$25/ton (Barrick, 1998).
4. Extraction and Transportation Costs are listed in the process record for each alternative, but generally exceed \$6/ton. Transportation costs beyond the stockpile site are assumed to be part of the processing costs. (This assumption is a very generous one but since there is no indication

where the ore will ultimately be processed, speculation on transportation costs beyond that point is not meaningful. But it must be recognized that the cost used herein is likely the minimum that would be experienced.

5. The value of nickel and associated metals at Nicore is \$2.27 per pound on the world market. It is assumed that the making of stainless steel with nickel can be accomplished with ores throughout the world.

6. An internal rate of return is 4%. (This assumption is also conservative and is suggested by the Forest Service Economic and Social Analysis Handbook SSH1909.17, section 15.42-1.)

7. Inflation affects both the price of metals and the costs of production equally.

The value of other resources in the proposed project area include the areas undeveloped character, the botanical resource, the potential wild and scenic river resource, the water quality of Rough and Ready Creek and the fisheries resource . For the these valuable resources, no quantification of value is presented. But it is of note, that all of these resources are becoming increasingly scarce in the United States and consequently are increasing in value.

Effects of Implementation

The following chart summarizes the effects of implementation for the Nicore Alternatives for economics. The reader needs to refer to the other sections of the SDEIS for detailed effects on undeveloped character, botanical resources, and fish resources.

For the economic analysis, all alternatives have a negative present net value. All sites individually have a negative present value. This is mainly due to the high production costs associated with nickel. Major changes in the world situation for nickel or in the technology for producing nickel would have to occur before significant change in the relative economic status of the Nicore proposal could exist.

Though the economic impacts are uncertain, the impacts on the other values of the watershed definitely would occur and are displayed by alternative in other sections of this document. Economics is a study in relative scarcity which allow comparison of monetary and nonmonetary values. Clearly the more scarce resources at this point in time to the nation and the world are the environmental qualities of the Rough and Ready Creek area which will be diminished by any development. There are numerous readily available sources of nickel exploitation which offer considerably better cost/benefit scenarios.

Indicator	Proposed Action	Alternative 6	Alternative 7	Alternative 8	Alternative 9	Alternative 10	Alternative 11	No Action Alternative

Present Net Value of Mining	-\$10.1 mm	-\$10.6 mm	-\$10.2 mm	-\$9.5 mm	-\$0.97 mm	-\$9.0 mm	-\$7.5 mm	0
Benefit Cost Ration	0.58	0.57	0.57	0.57	0.10	0.55	0.59	n/a
Cer-tainty of Econo-mics	Uncer-tain	High degree of Accura-cy						

The benefit cost ratios for each alternative are displayed. All of the ratios have costs exceeding benefits. The sampling option, because it would use an expensive helicopter, has the lowest ratio. However, this ratio is not to be compared with the full development alternatives as it could lead to full development or no action. All other ratios for action alternatives are between 0.5 and 0.6. The most economically efficient alternative, measured by a benefit/cost ratio is alternative 11. These ratios would change as assumptions of values and costs of production change.

The breakeven point (the price at which costs equal revenue) for the price of nickel and associated minerals such as cobalt and iron varies for the different alternatives. The proposed action's costs would equal its revenue when the world market is \$3.75/pound for the price of nickel and associated minerals. In contrast, alternative 7's breakeven point is at \$4.02 per pound. If and when the price for nickel and associated minerals would reach \$5.54/pound, the proponent would receive a reasonable rate of return for the investment on all alternatives. Within the last five years, nickel did reach a price of \$3.73/pound in 1995. However, as noted above, the price has fallen significantly to \$1.95/pound in August, 1998 (lowest in a decade) and long term trends are not expected to exceed \$3.00 per pound (Anaconda Media Release, 17th July 1998).

When the cost of the Environmental Impact Statement is factored into the analysis, the present net worth of all alternatives is decreased by approximately \$300,000. The benefit cost ratios are also decreased by several percent except for alternative 9 where the decrease is much greater due to the small benefits accrued.

Employment Potential

George Trahern and Michael Schneyder of the Josephine County Tax Assessor's Office were interviewed (see Mendenhall Report) to discuss potential effects of the Nicore mine with regard to employment. They stated that the Proposed Action and all alternatives would create employment. The road construction/reconstruction would create a one-time employment

increase and then subside. The excavation and hauling of ore material could provide longer-term employment.

Others have indicated that the mining could also reduce employment through indirect effects related to quality of life. The Josephine County Homebuilders Association, for example, oppose the mine partly on the basis that it could reduce the number of new homes people decide to build in the area. Fire Mountain Gems also indicated that jobs could leave the area if people did not want to live or work around an active mine. The Josephine County Homebuilders Association and Fire Mountain Gems letters are in the analysis files.

The Illinois Valley Community Response Team, and other groups interested in economic development, have endeavored to create opportunities for diversified industries that maintain steady employment and contribute to Quality of Life goals. Market driven cycles in "boom-and-bust" industries like mining can adversely affect economies of small towns.

Property Values

Trahern and Schneyder were also approached for information regarding property values (see Mendenhall Report). They agreed that the personal values of people who cherish solitude and living in a rural environment could be decreased by the mine site, but said that this shouldn't be confused with property values. Some people may move away because they do not like the effects of the mining, others may not buy property because of the mining operations, and others may not have strong preferences. The mining proposed for the next ten years would have the greatest effects on those living closest to the operations (see discussions elsewhere in the EIS). However, overall trends related to property values are not likely to be affected by the operation.

Private road improvements contemplated in Alternatives 6 and 11 would likely lead to increased property values (see Mendenhall report), despite the loss of personal values (quiet, solitude) residents may experience.

A baseline for property values has been established through the Assessor's Office (see Mendenhall report for references). For 1,101 parcels of land in T40S, R9 and R10W (excluding federal land), the average value for "vacant land" was \$19,999. The average value for the "improved land" was \$78,849. For 412 parcels in T40S, R9W, the average value for "vacant land" was \$19,495. The average value for the "improved land" was \$65,791. Values have tended to increase over recent years and that trend can be expected to continue, regardless of alternative chosen.

Trends in property values in neighboring Douglas County may provide relevant information regarding potential effects from Nicore (see Methany data, Mendenhall report). The actual property values for Riddle increased 10% just for 1997 (though, by the effect of a new law, they also decreased by nearly an equal amount). Overall property values in the Riddle area increased 60% from 1991 to 1996 (ibid.). Mining had been discontinued near Riddle, however the smelter there continued to operate.

Property values from 1982 through 1989, however, show a negative trend: values decreased 8% for residential properties smaller than 10 acres, and decreased 6% for properties larger than 10 acres but less than 40 (ibid.). Active mining occurred at Riddle during those years. The mine near Riddle is visible from Highway 5 and throughout the town.

Soda Springs, Idaho is another small town with an active mining operation. Preston Phelps of the Caribou County Assessor's Office stated that property values reflected an increasing trend over many years (ibid.), despite the presence of a mine. Between 1995 and 1999 property values increased 40% for seven residential properties priced from \$65,000 to \$125,000.

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Joel King / Rochelle Desser

6/99

APPENDIX J
PORT-ORFORD-CEDAR
CONTAINMENT STRATEGY
FOR ALTERNATIVE 9

**POR-T-ORFORD-CEDAR DISEASE CONTAINMENT STRATEGY
NICORE SPECIAL USE PERMIT
ILLINOIS VALLEY RANGER DISTRICT SISKIYOU NATIONAL FOREST**

his Port-Orford-cedar (POC) root disease containment strategy addresses the potential risk of spread of Phytophthora lateralis (PL) associated with the approval of a Special Use Permit under alternative 9 of the SDEIS.

1. MANAGEMENT DIRECTION FOR PORT-ORFORD-CEDAR
2. PROJECT DESCRIPTION
3. RISK ANALYSIS
4. CONTAINMENT STRATEGY
5. Monitoring

Management Direction

One of the goals of the 1989 Siskiyou Land and Resource Management Plan (Forest Plan, Goal #24, p. IV-2) is to perpetuate Port-Orford-cedar as a functioning part of the forest ecosystem throughout its natural range.

Siskiyou National Forest Plan Standard and Guideline 12-8 states:

"Strategies for POC management shall be integrated into environmental analyses and project planning for all areas that support POC...POC should be managed as a major component of the appropriate plant association in areas of low to moderate risk of infestation...Appropriate practices identified from experience and research should be applied on a site or drainage-specific basis to prevent or reduce the spread and severity of PL."

The Aquatic Conservation Strategy objectives (ROD) include:

"Maintain and restore the species composition and structural diversity of plant communities in riparian areas and wetlands to provide adequate summer and winter thermal regulation, nutrient filtering, appropriate rates of surface erosion, bank erosion, and channel migration and to supply amounts and distributions of coarse woody debris sufficient to sustain physical complexity and stability."

"Maintain and restore habitat to support well-distributed populations of native plant, invertebrate, and vertebrate riparian-dependent species."

The Southwest Oregon Late-successional Reserve Assessment identifies PL control as a potential treatment for achieving desired late-successional conditions.

The West Fork Watershed Analysis identified POC as a small component of the minority of forest stands it appears in throughout the wilderness where it is most concentrated on serpentine soils and also along streams.

PROJECT DESCRIPTION

Alternative 9: Helicopter sampling. Total road miles .75 of reconstruction, 1 culvert at highway 199. Equipment would be allowed to enter site "B" via road 4402461. Access sites "A", "C", "D" would be by allowed only by helicopter.

MANAGEMENT OBJECTIVES BY SUBUNIT:

This project under all alternatives is one subunit Rough and Ready Creek drainage.

OBJECTIVE: Prevent the import of the disease into uninfested areas.
[off site spores picked up and carried into uninfested area]

RISK ANALYSIS:

The major concern for the import of disease is dependent on; (1) the location of the transportation system used to access the project area in relation to frequency of POC along the route, if infestations are present and the amount of POC which will be at risk below the areas of activity. (2) The time of year. (3) Washing of vehicles and equipment.

The risk of introduction of PL is significantly lower with a Helicopter operation in comparison to the other alternatives considered. This alternative limits the use of most of the roads within the area. Certainly the ones which would present the highest risk of introduction of PL. The Alberg Creek is avoided as well as the alluvial fan which supports a stand of POC. The risk of inoculum introduction from activities associated with stream crossings, road construction or reconstruction and maintenance are eliminated.

Although Wimer Road (4402) has infested areas along it mitigation can reasonably lower the risk of inoculum being transported into Rough and Ready Creek. Reconnaissance of the access route to site "B" found no POC adjacent to road 4402461. Scattered POC exist along road 4402445 and there is no known infection. Washing equipment and unloading on Road 4402 during dry weather is a measure to prevent mud carrying inoculum from being imported to site "B".

CONTAINMENT STRATEGY

Dry Season Operation

June 1 through October 15

Washing of Vehicles and Equipment

Ground based equipment will need to be washed before start of operations each season. Washing can be done prior to entering Forest Service or BLM lands.

Water Use

Avoid use of potentially infested water (dust abatement, fire suppression, seeding, etc.).

Road Closure

Road 4402461 would be closed by physical barrier upon completion of operations at site "B".

Remaining Risk of Disease Introduction

There is a concern over remaining risk of disease introduction after project implementation . The Rough and Ready Creek is currently open to the public without restriction. Activities that transport infected soil into the area could occur. This may be due to visitors to the area that are not complying with the containment strategy and wildlife migration.

Monitoring

1. The Forest Service will inspect the equipment for compliance of washing requirement before operations begin each season.
2. The permittee will report any occurrence of dying POC within the project area.
3. Periodic monitoring by the Forest Service during the operates will occur to insure compliance with the control measures.
4. Roadside and downstream monitoring for introduction of the root disease Phytophthora lateralis will occur yearly in conjunction with project-specific and district-wide Port-Orford-cedar monitoring.

Submitted By: Larry Pera
POC Coordinator, I.V.R.D,

APPENDIX K
ROAD ACCESS
DOCUMENTATION

United States Forest
Department of Service
Agriculture

Siskiyou
National
Forest

200 NE Greenfield Road
PO Box 440
Grants Pass, OR 97526-0242

Reply to: NICORE Road Alternatives

Date: April 12, 1999

Subject: Documentation

To: The Files

The transportation routes for access to the four planned mining sites is included in the Proposed Action (PA) and six alternatives. These routes utilize the existing roads as much as feasible. The existing roads have been used in the past by miners to access the claims and haul out samples. There are other routes that have been considered to access some of the sites, but it would mean building new roads in the area. Building new roads for the ten years planned for the project did not seem reasonable except to avoid especially steep sections, to avoid routes in actual creek channels and riparian areas, or to avoid where the channel normally floods.

Trucks planned by the operator to haul the ore are 25 ton articulated off-highway trucks. This size of truck is no longer in common use but some can probably be found. 30 ton articulated trucks are available. Some alternatives also use standard dump trucks which are highway legal. Due to the weight of the ore, the trucks will be only 1/2 to 2/3 full, so there should be little problem of ore dribbling over the truck beds. The estimated haul would be 15 to 20 vehicles per day, plus about 20% additional service vehicles.

Rough and Ready Creek has been found to be eligible for Wild and Scenic River classification and the Botanical land allocation in the bottom reaches. Some recommended new routes would have to go through the botanical lands or would be within the scenic section of the proposed W&S River and possibly visible from a section of Rough and Ready Creek which was found to be eligible for "wild" classification. These other new routes were not included in order to not impact sensitive areas.

Most of the roads for this project already exist, including those in the South Kalmiopsis Roadless Area. Not all of the roads are on the Forest road inventory. These are mining roads that were built prior to forming the roadless area. The planned mining areas have been disturbed and sampled in the past. The disturbed areas may not cover the entire areas planned in this operation.

The following is documentation of criteria and components used in the alternatives for this project.

Utilities -- The Rough and Ready Creek Road has an overhead power line, a buried telephone line, and an irrigation canal along and parallel to the road. The irrigation canal is along only a portion of the road, and a feeder line crosses the road in one location. The power line and buried telephone line go to the last residence prior to the Forest Boundary. Unless this road is reconstructed to a double lane standard, the power line should not be affected (S&G 9-6). In widening the road from existing 10' to 12', the irrigation canal could require some sections to be

shifted, and the phone line could be affected where existing culverts need extended, including the culvert where the irrigation canal line feeder line crosses the road.

There is a primary power line crossing Section 13 and the southeast corner of Section 14. All alternatives follow portions of the line and use the work road for this line. The power line will not be affected by any alternative (S&G 9-6). The irrigation canal along the Rough and Ready Creek Road crosses this road at the southeast corner of Section 14 in Alternatives 6, 10, and 11. Widening the road may require extending the culvert at this crossing but would not affect the primary power line.

Land Line Boundaries -- Some property lines and corners would be located with all alternatives (S&G 9-7). The marking of these lines and corners would be the responsibility of the Plan of Operation holder (operator). These lines and corners are:

A property corner near the center of Section 14 on the north side of Rough and Ready Creek would be needed for the PA, or Alternatives 7, 8, or 10. A property corner west of the center of Section 14 should be marked for the PA. A property corner to the east of the west line of Section 14 and on the north side of Rough and Ready Creek should be marked for the PA. The south line of Section 14 and property corners along this line are needed for Alternatives 6 or 11. The west line of Section 14 needs to be marked where Rough and Ready Creek Road crosses the Forest boundary for Alternatives 6 or 11.

Haul Road Design -- The planned use of the roads for haul of minerals is June 15 to September 15, the dry season of the year. Use during wet periods within these dates would be managed (RF-7). The actual location, design, and staking of constructed roads would be engineered by the operator and approved by the Forest Service. Some criteria is used in the below data for the purpose of costing for comparison of alternatives which may not be the final design criteria.

All roads would be designed for the high clearance vehicles used in this project except along Rough and Ready Creek Road to 100 feet past the last residence access. A high clearance vehicle design will permit use by both sizes of haul trucks and by service vehicles. All roads would be designed with a 12 foot (plus 1 foot tolerance) running surface except the Wimer Rd which would use the existing width. A greater running surface could be required in agreement with the landowners along the Rough and Ready Creek Road should either Alternative 6 or 11 be used. Turnouts would not be constructed except along the Rough and Ready Creek Road and where only clearing, and possibly use of borrow, is required along the other roads (existing turnouts on the Wimer Rd would be kept). Where feasible, "J holes" could be placed to allow traffic to pass on the narrow miner roads. "J holes" are spots where a vehicle could get off the road just enough to allow passing and then return to the road by backing up. "J holes" are minimum impact and could have surfacing where needed. Communications between trucks would be desirable for safety.

During storms when water is actually running on the road surface, all haul should stop to reduce sediment runoff.

Some sections would be reconstructed to obtain the necessary width. Other sections would be relocated or a new route constructed to avoid steep grades, to get the road out of the flood zone, and to avoid especially bad sections of the road in the various alternatives. All cut and fill slopes on new road sections would be at the steepest possible consistent with being stable and for safety of planned vehicles. Steep cuts and fills would reduce the exposure of mineral soil to erosion but

could increase the amount of ravel and slides on cut slopes until they stabilize. All new construction would avoid wetlands. Other design and location criteria are:

Grades up to 25% with short pitches up to 200 ft. over 25% grade but under 30% grade permitted.

Waterbars or cross ditches in grades above 10% would be built in where feasible. If not feasible, these would be put in at the end of each season at about 150 ft. interval above 15% and at increased spacing below 15%.

In all live drainages, except in the PA, culverts or bridges would be placed during use. Alternative 11 would have a permanent bridge at Rough and Ready Creek crossing #5, but all other bridges and culverts would be removed each season (except in the Wing & Faren ditch which would remain until the end of the project, culverts placed in the Rough & Ready Creek Road up to the junction with Rd 445, and at the entrance to Highway 199) and at end of planned use. Bridges would permit fish passage at all times and reduce sediment and oil droppings from reaching the water. Most structures are not sized or installed to be permanent. The sizes and approaches for permanent structures would be economically unneeded for this project, although the permanent structures could be considered if the proponent wished to install them. Culverts at the ramp to Hwy 199 and on the Rough and Ready Creek Road would remain in place, even following the project.

Washed rock is used for surfacing across main drainages and for approaches to temporary bridges. The depth of this rock is greater on R&R Creek crossings #5 and #6 due to the water depth. No salvage is planned for the washed rock so the cost of replacing this rock each season is used. Any rock that could be salvaged at the end of a season would include fines from the crushing effect of the haul vehicles, and these fines would not be rewashed out for use the following season. Salvaged rock could be used on other portions of the access roads.

Culverts and bridges would not be adequate in size for winter flows (except the permanent bridge in Alternative 11) as this would require major fills and abutments that would be subject to erosion. These roads are expected to have little or no use following this project.

Temporary bridges may not eliminate all fording of Rough and Ready Creek or the South Fork. It is possible the surface of approaches to the structures may not be entirely out of the water. The depth of water at crossings #5 and #6 could leave parts of the road surface under water, and the road surface could be under water at high flow periods, especially early in the season and during periods of summer storms.

Other crossing options were discussed but not used such as:

Concrete fords and with culverts - These would be more expensive initially and could introduce impurities into the water while being constructed. Annual maintenance of these crossings could be cheaper than replacing the culverts or washed rock. It would be more expensive to remove these at the end of the project.

Bailey Bridges and other portable bridges - Much more expensive than railroad flat cars and require more substantial abutments. Removal and replacement each year would be more expensive. The bridges would have a high salvage value at end of the project.

Road surfaces would be outsloped except on flats and side hill road sections on the route to Site B. Site B can be accessed from outside the drainage and further protection for POC is required, so the road surface would be insloped with waterbars or cross ditches to control where the water leaves the road. There are no live streams on this route. If necessary, culverts could be used to get inslope water across the road, then removed at end of the project. Sections of outslope that also require a berm will need breaks in the berm where cross ditches are placed for winter to allow water to get off the road. These breaks should be armored with added rock in the cross ditch bottom and at the outdrain to reduce erosion.

Surfacing would be used on all roads, except in the PA, up to and past the private land parcels to Road 438 or to the junction of Roads 442 and 445. Thereafter, spot rocking is planned over reconstructed sections and on rough sections. All rock is planned as 3"-, except on Rough and Ready Creek Road to 100 feet past the last residence driveway, between Highway 199 and the stockpile sites, on Wimer Rd #4402, and on Alternative 6, and Rd. 461 of Alternative 10 where an aggregate size of 1 1/2"- would be used for highway legal trucks. Pit run rock can be used in lieu of the 3"- if a suitable source is available. On Alternatives 6 and 11, the Rough and Ready Creek Road would be single lane paved with turnouts for cost calculations in lieu of rock and dust abatement for comparison of the alternatives, but the actual surfacing will be based on the agreement between the landowners and the operator. Paving Rough and Ready Creek Road would reduce noise and additional traffic from watering and blading. Dust abatement and surface blading would make the costs of paving or aggregate somewhat comparable.

Wimer Rd #4402 is to be paved in Alternative 10 in lieu of aggregate surfacing and a wash station for POC protection. A paved road to Rd 4400461 would not require a separate vehicle washing to access Site B and the Cable Landing from Site D. A cost analysis of aggregate and a washing station vs. paving the Wimer Rd shows the paving to be the least cost.

Borrow material is used with the PA in exceptionally rough sections of the Alberg Road (grid roller with a Cat to break down the boulders might also be feasible), to widen the Rough and Ready Creek Road in spots, and as needed elsewhere to reduce excavation and build up the road surface. The actual location for this material would be from sites with rock from the R&R Creek drainage so as to not introduce other soils and rock into the drainage. The source could be waste or oversize material from crushing the surfacing material, from mining operations, or from old crushing sites on the delta.

Clearing associated with construction and reconstruction would be just enough to do the necessary construction or reconstruction and to keep the roads clear with site distance during haul.

On flats and side slopes where possible, no excavation would be done except to remove or break down larger rocks and boulders. Borrow and surfacing would fill over stumps and smaller boulders without removing them. Also, sections of road that are now badly washed would be filled in to at least the original ground surface with borrow to facilitate drainage across the road rather than down the road as is presently happening.

Excavation would be kept to a minimum. Where full bench excavation is required (slopes over about 55-60%), the excavation would be hauled to flatter slopes and used to build the road without excavation, or used as borrow to build up sections of existing roads as indicated above. Initial cuts and finishing on steep ground would lose materials down the hill. In some areas, this loss could enter creeks and riparian areas. Loss could be reduced to a great extent by using logs to catch rock and soil, or an excavator to build the pioneer

road in full bench and near full bench sections. Use of an excavator could double the cost of these sections.

Road sections where the slope immediately downhill from the road exceeds 35% will need a berm the height of the axle of the largest vehicle traveling the road. These sections will require a wider subgrade to place the berm. The added width could be built using borrow material or by excavating about three feet into the cut slope, using the excavated width and the excavated material to widen on the fill side to get needed additional width. (Discussions with MSHA identified that berms are needed for safety.)

Helicopter Flight Route -- The route used by the helicopter(s) will be chosen so the closest approach to any building not associated with the mine is at least 1000 feet. This route will most likely pass over or near Site C from the other Sites, then to the stockpile site. The return route will be in the opposite direction. The road to the Mars swimming site will need to be signed or blocked to traffic during periods of the helicopter flights for safety.

Spill Plan -- There will be a certain amount of automotive oils that will drip from vehicles on the route. There is nothing planned to stop/reduce this normal loss except possibly some surfacing options would reduce the amounts that would go into drainages. There does need to be some plan to reduce damage from larger spills that may take place from broken lines and vehicle accidents.

A spill plan will need to be developed by the operator that is approved by the Forest Service. This plan would include equipment and material on site (possibly near the stockpile site and near crossings) for sponging up or limiting flow of spills in creeks. Communications in each vehicle should be planned so word can be spread quickly to get spills cleaned up immediately. The storage of petroleum products in containers of 660 gallon or greater will need to be in designated holding areas to keep spills from leaving the site.

Road Closures -- All routes except the PA will have road closures (gates were used in the costs) to prevent use during operations and during the off-season so as to reduce the chance of introducing POC root rot into the area. The closure would be at crossing #1 in the PA and Alternatives #7,8, & 10, and near the Forest Boundary in Alternatives 6 and 11. Another closure would be needed above Site B to keep traffic from getting into the area from the west. Following the project, most roads on National Forest lands (except the Wimer Road # 4402) will be waterbarred to provide drainage and blocked.

Road Maintenance -- All routes except the Rough and Ready Creek Road to 100 feet past the last residence driveway and the Wimer Road would be maintained to maintenance level 2 standards (high clearance vehicle). The Rough and Ready Creek Road to the last residence and the Wimer Road would be maintained to maintenance level 3 (suitable for passenger cars).

A road maintenance plan would be required as part of the Plan of Operation to be approved annually by the District Ranger to include the following criteria. Maintenance of the surfacing and drainages will be required each season, during and after summer storms, and during the haul (RF-7). Use during wet periods would be halted to prevent damage to riparian resources (RF-7). Installed culverts and bridges would be removed at the end of each season (except the culvert in the Wing & Faren Ditch, the permanent bridge in Alternative 11, the culvert at the ramp to Hwy

199, and those on the Rough and Ready Creek Road to the junctions with Rd 445). These structures would be put back in place at the start of each season. Much of the washed rock surfacing over live crossings will be pulled out of the drainage but some is expected to be lost during the winter and all will be replaced each season. Some of the other surfacing will also need replaced each season. The buildup of boulders for temporary bridge approaches will probably need to be replaced each season. Some road work to replace the road template will be needed each season due to wash and erosion from heavy winter rains.

Dust Abatement -- In the lower reaches of the project where the haul route is adjacent to private residences or in the view area of the residences and Highway 199, dust is to be abated. The haul through private land in Alternatives 6 and 11 is costed as pavement in lieu of rock and dust abatement for comparison of the alternatives. The planned surfacing on the rest of the lower reaches routes would have fines and, along with the breakdown of the surfacing due to haul, would produce dust. All options of dust abatement is costed with the use of water so as to not introduce any new materials into the area. The operator would acquire any necessary water rights. The amount of water used for dust abatement, if taken out of Rough and Ready Creek in the sections with flowing water, would probably not be noticeable in the downstream flow. Several types of dust abatement are available:

Petroleum products - Initial cost of these materials is high, but maintenance and replacement are more reasonable. This would introduce oils or asphalts in the botanical area that do not now exist. There is the chance of getting some of this material in the streams during placement. A lighter application would be needed at the start of each season and possibly during haul. Water is required to prepare the surface and mixing of the asphalt if it is an emulsion.

Salt products - Initial cost of these materials is high, but maintenance and replacement are more reasonable. Replacement of these materials are at a much reduced rate from the initial application and would most likely be needed each season and possibly during haul. Some watering would need to be used in conjunction with these materials to prepare the surface, to mix with the salts, and following application to keep the surface moist. Use of this material would introduce salts in the botanical area that do not now exist. There is the chance of getting some of this material in the streams during placement and there will be some kill of vegetation immediately adjacent to the road from the spray during placement. This material can become slick where there are a lot of fines with the surfacing.

Lignin - This is a byproduct of the paper making process and has been used successfully on many Forest roads. The material has been found to be nontoxic to fish. The use of this product would introduce chemicals into the botanical area that is not now present. The product is water soluble and can wash away from the road. Water is required in the preparation of the surface and in mixing with the product. A reduced application would be needed each season, and possibly during the season if there are heavy summer rains or as needed during haul. This material can build up a residue from repeated applications.

Water - The application of water can be readily used to abate the dust and is the material costed in the alternatives. The water would need to be from a clean source and could come from Rough and Ready Creek to eliminate the chance of introducing POC root rot spores into the area.

Vehicle Washing -- All vehicles used in this project would require washing prior to entering the project area and each time they return to the project area. This washing is to remove all mud and

dirt which could hold POC root rot spores and noxious weed seeds. Washing can be done at facilities prior to returning to the project with clean water (free from POC root rot spores) available or at a washing station set up at the start of the project using clean water. This washing would reduce contamination by the root rot disease and also reduce noxious weed seeds that need to be kept out of the project area.

Use of State of Oregon and Josephine County Roads -- County and State roads will not be used to haul ore to the stockpile site, except on Alternatives 6 and 11 where the end of County Road 5552 will be crossed, and in Alternative 10 which uses County Roads 5550 and 5552. The use of County Roads may require a County permit which would be obtained by the proponent. County Roads 5550 and 5552 would also be used to haul asphalt, aggregate, and borrow materials for Alternatives 6, 10, and 11.

The Rough and Ready Creek Road is not claimed by the County as their road. This road is in effect owned by each landowner, although some of the deeds do mention "rights of the public within the limits of public roadways," and prescriptive rights may be available due to the long use of the road by miners and others to reach the existing routes on the middle section of Rough and Ready Creek.

State Highway 199 would be used eventually to haul ore to a smelter, or to haul the finished product if a smelter were built near the stockpile or mill site. This highway would also be used to haul aggregate and borrow materials for the PA and all Alternatives except the No Action Alternative, and asphalt for Alternatives 6, 10, and 11. The amount of use added to Highway 199 by haul of the ore and construction materials is considered insignificant to existing traffic by the State and would have little effect on the highway. Also, a wash station could be developed on State lands near the beginning of the project requiring crossing the highway to get to the project roads.

Crushing and Borrow Sites -- These materials should come from sites in the R&R Creek drainage. This would tend to not introduce soil, rock, and POC root rot from outside the drainage preserving the botanical integrity of the drainage. There are four sites on the R&R Creek fan that would satisfy this need. All four sites have been used in the past (one being currently used) so the sites are already in a disturbed condition.

A. The first is a site between R&R Creek and the PA stockpile site. High water from R&R Creek could get to the site but probably not overtop it. The site would be visible from Hwy 199 and by people visiting the R&R Creek Wayside, but not from the parking area which has vegetation and a low ridge at the Wayside, which hides the area. People could see the site by walking along Hwy 199 or upstream from the parking area. Water for washing rock could be readily obtained from R&R Creek. This site being adjacent to the project roads could have the least amount of road to construct/reconstruct.

B. The second site is across R&R Creek (the north side) from the PA stockpile site and upstream 1/4 to 1/2 mile. The site is an island during high water, but access to the site is dry during the summer. Extreme high water could inundate most of the site, and once the material is used may lower the island so extreme high water could inundate the whole site. The area is visible from a short section of Hwy 199 at and near the bridge crossing R&R Creek, and by some people hiking out from R&R Creek Wayside. Water for washing rock would be readily available from R&R Creek. The haul route would be to Airport Way (north of the airport) to Hwy 199, or a shorter route following the Power Line

road crossing R&R Creek (this would be an additional crossing of R&R Creek) to the project roads.

C. The third site is along the north side of R&R Creek and downstream just over a 1/4 mile from Hwy 199 bridge. The site is covered during extreme high water and is visible from a short section of Hwy 199 at and near the bridge crossing R&R Creek. Water for washing rock would be readily available from R&R Creek. The haul route to project roads is shorter than from Site B and would access Hwy 199 just across from R&R Creek Wayside.

D. The fourth site is on private land (Rough & Ready Lumber Co.) in an area used for rock in the past and has recently been used as a crushing site by the State of Oregon. This site east of Hwy 199 is generally not subject to flooding, and is not easily seen (the equipment and stockpiles can be seen, but not the site) from Hwy 199. Water for washing rock would need to be hauled to the site unless existing ponds at the site are a suitable water source.

Another possible site is on the ridge above mining Site C. The section of the ridge that becomes very rocky could be used as a rock and borrow source. This site would be difficult to see, except some dust rising into the air may be seen at times during the crushing operations. Water for washing rock would have to be hauled to the site.

/s/ Robert E. O'Leary

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