REVIEW ENVIRONMENTAL ASSESSMENT
RAYMOND MINE PLAN OF OPERATIONS

Fairfield Ranger District, Sawtooth National Forest, Camas County, Idaho
June, 2013

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# TABLE OF CONTENTS

1 INTRODUCTION / PURPOSE OF AND NEED FOR ACTION ........................................ 1-1
  1.1 Introduction ........................................................................................................ 1-1
  1.2 Changes Made to the June 2011 Environmental Assessment .............................. 1-1
  1.3 Decision Framework ........................................................................................ 1-4
  1.4 Purpose of and Need for Action ....................................................................... 1-4
  1.5 Forest Plan Direction ....................................................................................... 1-5
  1.6 Applicable Regulatory Requirements and Required Coordination ..................... 1-5
  1.7 Public Involvement ......................................................................................... 1-7
  1.8 Tribal Consultation ......................................................................................... 1-8
  1.9 Issues .............................................................................................................. 1-8
  1.10 Issues and Concerns not carried forward for Detailed Analysis ....................... 1-9

2 PROPOSED ACTION AND ALTERNATIVES ....................................................... 2-1
  2.1 Proposed Action ............................................................................................ 2-1
  2.2 Connected Actions (Non-federal Actions) ....................................................... 2-7
  2.3 No Action Alternative ................................................................................... 2-7
  2.4 Alternatives Not Analyzed in Detail ............................................................... 2-7
  2.5 Environmental Protection Measures ............................................................ 2-9
  2.6 Federal, State or Local Approvals Potentially Applicable to Proposed Action ... 2-12
  2.7 Comparison of Resource Impacts .................................................................. 2-12

3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES ...... 3-1
  3.1 Introduction .................................................................................................... 3-1
  3.2 Past, Present or Ongoing Related Actions .................................................... 3-1
  3.3 Overview of Affected Area ............................................................................ 3-2
  3.4 Water Quality and Hydrology ...................................................................... 3-4
  3.5 Hazardous Waste and Previous Mining Operations .................................... 3-12

4 CONSULTATION AND COORDINATION ......................................................... 4-1

5 REFERENCES ....................................................................................................... 5-1

Appendix A: Water Monitoring Program .................................................................. 5-4
Appendix B: Issues and Concerns not analyzed in Detail ....................................... 5-9
Appendix C: Screening Data from Site Investigation (SI) ........................................ 5-13
TABLES

Table 2-6. Summary of Permits and Approvals.................................................................2-12

Table 2-7. Summary Comparison of Resource Impacts by Alternative .........................2-13

Table 3-1. Relative Forest Wide Standards for water quality and hydrology. ..................3-4

Table 3-2. Relevant Upper South Fork Boise/Upper Salmon River Valley Management Area
Objectives for Water Quality and Hydrology.................................................................3-5

Table 3-5. Relevant Forest-Wide Standards for Hazardous Materials and Previous Mining
Operations......................................................................................................................3-12
FIGURES

Figure 1.1. Location of Raymond Mine and Proposed Project.................................................. 1-3

Figure 2.1. Aerial View of Raymond Mine Operation ............................................................. 2-1

Figure 2.2. Topographic Map of Project Area and Location of the Raymond Mine .............. 2-53

Figure 3.1. Surface Water Resources in the Activity Area......................................................... 3-6
**List of Acronyms**

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>APE</td>
<td>Area of Potential Effect</td>
</tr>
<tr>
<td>ARD</td>
<td>Acid Rock Drainage</td>
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<tr>
<td>ASD</td>
<td>Aquatic Survey Database</td>
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<td>ASI</td>
<td>Archeological Site Inventory</td>
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<tr>
<td>AU</td>
<td>assessment units</td>
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<tr>
<td>BMPs</td>
<td>Best Management Practices</td>
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<tr>
<td>CESA</td>
<td>Cumulative Effects Study Area</td>
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<td>CIA</td>
<td>Cumulative Impacts Area</td>
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<tr>
<td>CWA</td>
<td>Clean Water Act</td>
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<tr>
<td>COC</td>
<td>Contaminant of Concern</td>
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<tr>
<td>CFS</td>
<td>Cubic Feet per Second</td>
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<td>DD</td>
<td>Detrimental Soil Disturbance</td>
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<td>EA</td>
<td>Environmental Assessment</td>
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<td>EIS</td>
<td>Environmental Impact Statement</td>
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<td>EPA</td>
<td>U.S. Environmental Protection Agency</td>
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<td>ESA</td>
<td>Endangered Species Act</td>
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<td>FONSI</td>
<td>Finding of No Significant Impact</td>
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<td>FS</td>
<td>Forest Service</td>
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<td>FSH</td>
<td>Forest Service Handbook</td>
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<td>GIS</td>
<td>Geographic Information System</td>
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<tr>
<td>GPM</td>
<td>Gallons per Minute</td>
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<tr>
<td>HUC</td>
<td>Hydrologic Unit Code</td>
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<tr>
<td>ICDC</td>
<td>Idaho Conservation Data Center</td>
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<tr>
<td>ID</td>
<td>Interdisciplinary</td>
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<td>IDFG</td>
<td>Idaho Fish and Game</td>
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<td>MA</td>
<td>management area</td>
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<tr>
<td>MBTA</td>
<td>Migratory Bird Treaty Act</td>
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<tr>
<td>MCL</td>
<td>Maximum Contamination Limit</td>
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<td>MIS</td>
<td>Management Indicator Species</td>
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<td>MOU</td>
<td>Memorandum of Understanding</td>
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<td>MPC</td>
<td>Management Prescription Category</td>
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<td>MSGP</td>
<td>Multi-Sector General Permit</td>
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<td>MU</td>
<td>management unit</td>
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<tr>
<td>NEPA</td>
<td>National Environmental Policy Act</td>
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<td>National Forest Management Act</td>
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<td>National Historic Preservation Act</td>
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<td>NPDES</td>
<td>National Pollutant Discharge Elimination System</td>
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<tr>
<td>NRCS</td>
<td>Natural Resource Conservation Service</td>
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<tr>
<td>NRHP</td>
<td>National Register of Historic Places</td>
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<tr>
<td>ORV</td>
<td>off-road vehicle</td>
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<tr>
<td>PNV</td>
<td>potential natural vegetation</td>
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<td>PoO</td>
<td>Plan of Operations</td>
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<td>PVGs</td>
<td>Potential Vegetation Groups</td>
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<tr>
<td>RCAs</td>
<td>Riparian Conservation Areas</td>
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RMC  Risk Management Criteria
SBA  subbasin assessment
SHPO  State Historic Preservation Officer
SPCC  Spill Prevention Control and Countermeasure Plan
SFBR  South Fork Boise River
SWPPP  Stormwater Pollution Prevention Plan
TEPC  Threatened, Endangered, Proposed and Candidate
TMDL  Total Maximum Daily Load
TSRC  Total Soil Resource Commitment
USDA  U.S. Department of Agriculture
USFWS  U.S. Fish and Wildlife Service
VMS  Visual Management System
VQO  Visual Quality Objective
WCS  Wildlife Conservation Strategy
WEPP  Water Erosion Prediction Project
1 INTRODUCTION / PURPOSE OF AND NEED FOR ACTION

1.1 Introduction

The Fairfield Ranger District of the Sawtooth National Forest (FS) received a Plan of Operations (PoO) submitted under 36 CFR 228A by Thornley Williams, Jr. (Operator) for the expansion of underground mining at the Raymond Mine, located in Camas County Idaho, T5N, R14E, Sections 6 & 7 (Figure 1.1). Mr. Williams is proposing underground mine development from two existing adits and new mine development from two collapsed adits. His plans include rehabilitating a pre-existing shaft linking the underground levels. Mining is anticipated to continue through 2020 with completion of final reclamation by 2022.

Development of the Raymond Mine began in the early 1930s (Mineral Land Assessment, 1987). Sporadic prospecting and mining began in the late 1970’s when members of the proponent’s family acquired the unpatented mining claims of the Aurora Group. Mr. Williams was last authorized under a 1993 Plan of Operations to continue developing the Aurora Tunnel at the Raymond Mine. Mr. Williams submitted a new Plan of Operations in April 2010 to the USFS. The USFS has conducted a review of the Plan and determined that the preparation of an Environmental Assessment (EA) is necessary to comply with the requirements under the National Environmental Policy Act (NEPA).

1.2 Changes Made to the June 2011 Environmental Assessment

As the Responsible Official, Fairfield District Ranger Mike Dettori signed a Decision Notice and Finding of No Significant Impact (FONSI) on June 24, 2011 approving actions contained in Alternative 1 of the Raymond Mine Plan of Operations Environmental Assessment (EA). The decision authorized mineral development activity to occur over a 20 year period and authorized up to 0.5 additional acres of surface disturbance for these mining activities. On August 26, 2011, Ranger Dettori withdrew his decision in order to allow for additional analysis. During 2011 and early 2012 additional plan details were agreed to by the FS and the operator.

The following summarizes the changes made to the 2011 Raymond Mine Plan of Operations Environmental Assessment with this document.

- Chapter One has been expanded to better discuss the framework for decision and issues not analyzed in detail. It also includes an expanded discussion of applicable regulatory and consultation requirements including the Idaho Roadless Ruling and its relation to locatable mineral activities.

- Chapter Two presents modification to the Proposed Action by the operator from a 20-year to 10-year mine life for operations unless timelines are modified by a future plan of operation.
• Additional mitigation measures pertaining to water quality monitoring and reclamation have been included and described.

• Chapter Two has been expanded to include a more detailed explanation of the No-Action alternative with the current site condition at the Raymond Mine as a baseline for the environmental analysis.

• Chapter Two includes discussion of alternatives considered but not analyzed in detail.

• Chapter Three includes discussion of Recognized Environmental Conditions with regard to the previous mining activity. A discussion of contaminant screening as part of a site investigation was conducted at the Raymond Mine to identify any Contaminants of Concern (COCs) and determine whether hazardous substances are present at concentrations that present a risk to human health or the environment. The full Site Inspection report including metals screening and water quality data is a part of the project record.
1.3 **Decision Framework**

Under current mining law, citizens of the United States are authorized to file mining claims, conduct mining operations on those claims, and hold conditional property rights (conditioned on compliance with applicable law and regulation) to the locatable minerals extracted from these claims. Accordingly, the US Forest Service has no authority to prohibit an otherwise reasonable plan of operations for such mining, i.e., one that can be characterized as the logical next step in the orderly development of a mine.

The Forest Service is neither advocating nor proposing the miners plan of operation. The miner initiated this mining proposal and has a possessory right to conduct mineral extraction operations on his lode claims. However, the regulations at 36 CFR 228 create a dual need for Forest Service action:

First, it is legally required to respond to the mining proponent’s request to authorize mining based on the proposed plan of operations (36 CFR 228.4).

Second, the Forest is required to ensure that “operations are conducted so as, where feasible, to minimize adverse environmental impacts on National Forest surface resources” (36 CFR 228.8).

Accordingly, the FS is conducting this environmental review in response to the proposed PoO submitted by the miner and in fulfillment of specific requirements set forth in subpart A of the Forest Service’s Minerals regulation (36 CFR 228A). Moreover, this action is linked with the agency’s ongoing stewardship responsibility for National Forest System lands.

The completion of an EA, however, is only applicable to major federal discretionary actions (40 CFR 1501.3, 1508.18(a)). This EA therefore, is limited to actions over which the Forest Service has discretion. That action is not whether to mine, since the law already authorizes that and the agency’s role is ministerial (see above). The only discretionary action of the Forest Service here concerns the identification of terms and conditions that the miner needs to incorporate into his PoO so that operations shall be conducted so as to minimize adverse environmental impacts on National Forest surface resources (36 CFR 228.8).

Based on the environmental analysis and disclosure documented in the EA, the Authorized Official will decide 1) whether to select the proposed action as proposed or modified, or as described in an alternative; 2) what mitigation measures if any, are needed; and 3) what monitoring is required.

1.4 **Purpose of and Need for Action**

When reviewing valid mining proposals, the Forest Service’s Purpose is to minimize adverse environmental impacts to surface resources by regulating the functions, work, and activities connected with the miner’s plan to remove locatable minerals from National Forest System lands. The compelling Need for the Forest Service to take this action is to comply with the legal requirements to respond to the claimant’s reasonable PoO (36 CFR 228.4), and to ensure that “operations are conducted so as, where feasible, to minimize adverse environmental impacts on National Forest surface resources” (36 CFR 228.8).
The statutory right of Mr. Williams to explore for and develop mineral resources on federally administered lands is recognized in the General Mining Law of 1872 and is consistent with the 2012 amended Sawtooth National Forest Land and Resource Management Plan (Forest Plan). Surface management regulations (36 CFR part 228A) require that all mineral exploration, development, and operations activities be conducted in a manner that minimizes adverse environmental impacts on National Forest surface resources (36 CFR part 228.8). Past mining activities at the Raymond Mine have created the need to address any impacts to existing surface resource created from historic mining and apply terms and conditions to the newly submitted Plan of Operations.

1.5 Forest Plan Direction

The Forest Plan is a guide for natural resource management activities on lands administered by the Forest Service (Forest Service 2003, 2012). It describes management goals and objectives, resource protection methods, desired resource conditions, and the availability and suitability of lands for resource management. For this EA, the standards identified in the Forest Plan are incorporated into the evaluation of potential impacts of the Proposed Action on forest resources.

The Forest Plan describes management direction that is either forest-wide or area-specific (management area). The forest-wide management direction provides general direction for all forest resources and is the foundation for area-specific direction. The Forest Plan has 20 management areas within the SNF. The Proposed Action is within Management Areas 2 and 6; Upper Salmon River Valley and Upper South Fork of Boise River. Consistency of the Proposed Action in meeting forest-wide direction and Management Area direction are described in Section 3.1.2 and in Section 3.0 for each resource.

1.6 Applicable Regulatory Requirements and Required Coordination

1.6.1 Idaho Roadless Areas

The final 2008 Roadless Rule designates 250 Idaho Roadless Areas (IRAs) and establishes management themes that provide prohibitions with exceptions or conditioned permissions governing road construction, timber cutting, and discretionary mineral development. As per Idaho Roadless Rule, (§36 CFR 294.25):

\( (b) \) Nothing in this subpart shall affect mining activities conducted pursuant to the General Mining Law of 1872.

The project area is within the Smoky Mountains Idaho Roadless Area (IRA). The 2008 Idaho Roadless Rule classifies the IRA by management themes. There is only one IRA theme, "backcountry-restoration", within the project area. Roadless Rule direction associated with the backcountry/Restoration theme includes the following:

\( (b) \) Backcountry/Restoration. (1) Road construction and reconstruction are only permissible in Idaho Roadless Areas designated as Backcountry/ Restoration where the Regional Forester determines: (iii) a road is needed pursuant to statute, treaty, reserved or outstanding rights, or other legal duty of the United States;
Proposed activities within the Smoky Mountains IRA include excavating two collapsed adits that once accessed the underground mine and reconstruction of a collapsed shaft with continued mining in two existing adits. No new roads will be constructed or reconstructed. While the mineral activity conducted under the 1872 Mining Law does not trigger the Idaho Roadless Rule (36 CFR 294.25(b), an Idaho Roadless Area Characteristics Evaluation Worksheet was completed (see Project Record) and it was determined the proposed action would result in stable effects of the roadless area characteristics. Therefore, the proposed mining activity within the Smoky Mountains IRA is in compliance with the 2008 Idaho Roadless Rule requirements.

1.6.2 Endangered Species Act

This Act (ESA) provides for the protection and conservation of threatened and endangered plant and animal species. The U.S. Fish and Wildlife Service (USFWS) create a list of the threatened, endangered, proposed, and candidate species and their critical habitats under the ESA. Candidate species have no protection under the ESA, but they are included for early planning consideration. This information is used to verify the habitats and/or species present in the area affected by a proposed project.

The Proposed Action was assessed to determine the potential impacts on threatened and endangered plant and animal species under the ESA. A biological assessment/evaluation consistent with the requirements of this act was prepared based on the Proposed Action. Concurrence on the determination of effects for ESA listed species was received from the USDI Fish and Wildlife Service (USFWS, May 25, 2011) for the Raymond Mine Plan of Operations and is part of the project record.

1.6.3 Clean Water Act

The action alternative is consistent with the Clean Water Act (CWA) and its amendments (33 USC §1251 et seq 1972). Effects to water quality and fisheries are disclosed in Section 3 of this EA.

1.6.4 National Historic Preservation Act

This Act provides for the protection of prehistoric and historic resources. National Historic Preservation Act compliance (NHPA Section 106) review was completed for the Raymond Mine Plan of Operations and a memo outlining the findings with Idaho State Historic Preservation Office concurrence is located in the project record dated June 8, 2011. The review concluded that there is no potential to cause effects to historic properties as defined in 36 CFR Part 800.4. If during operations cultural resources are encountered, the activity would be suspended and further investigation would be conducted.

1.6.5 Migratory Bird Treaty Act

This Act and subsequent Executive Order and Memorandum of Understanding (MOU) between the USDI Fish & Wildlife Service and USDA Forest Service provide for the protection of migratory birds. Based on the small scale of existing and proposed ground disturbance (<1 acre), the Proposed Action would have no effect on nesting migratory birds and is consistent with this Act.
1.6.6 Environmental Justice

In accordance with Executive Order 12898, all action alternatives were assessed to determine whether they would have disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority or low-income human populations. This assessment considered such programs, policies, and activities. No effects were identified during scoping or the formal 30-day comment period on the Proposed Action.

1.6.7 Research Natural Areas / Recommended Wilderness

There are no Research Natural Areas and no Recommended Wilderness within the project area.

1.6.8 Forest Service Mining Regulations (36 CFR 228A)

The Raymond Mine 2010 PoO was submitted under the authority of the 1872 Mining Law as amended. The Forest Service derives the authority to regulate such activities from the 1897 Organic Act (16 USC 478, 551), the Multiple Use Mining Act of 1955 (30 USC 612), and the Mining and Minerals Policy Act of 1970 as reissued in the 1990s. Forest Service decisions regarding such POOs must be in accordance with its mining regulations at 36 CFR 228A and are issued after compliance with the requirements of the NEPA.

In accordance with these laws and regulations, and in particular, 36 CFR 228.8, a decision will be made to approve the Operators PoO as submitted in 2010 and revised in 2011, or with terms and conditions to minimize impacts to surface resources.

1.7 Public Involvement

The proposal was listed in the Sawtooth Forest “Schedule of Proposed Actions” starting in January, 2011. The proposal was provided to the public and other agencies for comment during scoping November 18 – December 18, 2010. In addition, as part of the public involvement process, the agency published a legal notice concurrently with the 30-day ’Notice of Proposed Action’ (NOPA) comment period in the Times News newspaper, located in Twin Falls, Idaho on November 18, 2010.

The project was also scoped internally to FS staff and external Agencies including US Fish & Wildlife Service, NOAA Fisheries, Idaho Department of Lands, Idaho Department of Parks and Recreation, Idaho Department of Fish & Game, and Idaho Department of Environmental Quality.

Three comment letters were received as part of the scoping process. One letter was from Idaho Parks and Recreation which commented on the effects of the proposed operation to recreational trails in the project area. Another letter was received by the Idaho Conservation League which had several comments and concerns related to claim validity, duration of the operation, cumulative impacts, etc. The third letter was from Pleasant View Ranch in Fairfield, Idaho who commented on the overall tidy nature of the mining operation.
The proposed plan of operations and potential effects to listed threatened and endangered species was discussed with the US Fish and Wildlife Service and the NOAA Fisheries Service during monthly Sawtooth National Forest Level 1 meetings on October 25, 2010 and March 16, 2011. Neither agency raised concerns with the proposed action as presented.

Fairfield District Ranger Mike Dettori signed a Decision Notice and Finding of No Significant Impact (FONSI) on June 24, 2011 approving actions contained in Alternative 1 of the Raymond Mine Plan of Operations Environmental Assessment (EA). The Idaho Conservation League (ICL) administratively appealed that decision on several grounds citing the need for detailed water quality data, more definitive RCA delineation, site reclamation alternatives and expanded biological surveys. On August 24, 2011, Ranger Dettori and staff met on site at the Raymond Mine with representatives of ICL to review the project and concerns cited in the appeal. On August 26, 2011, Ranger Dettori withdrew his decision in order to allow for additional analysis.

A 2nd legal notice was published on March 14, 2012 in the Times News newspaper, notifying the public of another 30-day ‘Notice of Proposed Action’ comment period on the revised 2012 EA. Comments were received from Pleasant View Ranch in Fairfield, Idaho and Idaho Conservation League.

1.8 Tribal Consultation

Tribal governments have a special and unique legal and political relationship with the United States government as reflected in the United States Constitution, treaties, statutes, court decisions, executive orders, and memoranda. This relationship imparts a duty on all federal agencies to consult, coordinate, and communicate with American Indian Tribes on a government-to-government basis. Because Indian Tribes can be affected by the policies and actions of the Forest Service in managing the lands resources under its jurisdiction, the Forest Service has a duty to consult with them on matters affecting their interests. Because of this government-to-government relationship, efforts were made to involve local tribal governments and to solicit their input regarding the proposed action.

The Shoshone-Bannock Tribes and the Shoshone-Paiute Tribes were notified of the proposal through formal letter on November 18, 2010. No response was received from the Tribes in regards to this proposal.

1.9 Issues

Issues are statements of cause and effect, linking environmental effects to actions. Issues serve to highlight effects of unintended consequences that may occur from the proposed action, providing opportunities during the analysis to explore alternative ways to meet the purpose and need for the proposal while reducing adverse effects (FSH 1909.15, Chapter 12.4).

Issues were developed and evaluated according to Forest Service Handbook (FSH) 1909.15 using comments identified during public scoping along with Forest Service analysis and ID team meetings with FS resource specialists familiar with the Project Area. Pollutants and hazardous materials generated from mining activity and their potential impact to water quality was the only potential resource issue identified and is addressed in the impacts analysis in Section 3.0.
1.10 **Issues and Concerns not carried forward for Detailed Analysis**

Other issues were received and considered and are identified in the project record. While these issues are important, they were generally found to have already been addressed through project design criteria; are addressed by law, regulation, Forest Plan, or other higher level decision, or were determined to not be measurably affected by the proposed action or alternatives analyzed in specialist’s reports. These other issues include noxious weeds, cultural and heritage resources, soil resources, recreation, public safety and effects to Inventoried Roadless Areas.

The following resources are not present or would not be affected by the Proposed Action: environmental justice; farmlands (prime or unique); floodplains; geology; paleontologic resources; range resources; wild and scenic rivers; Native American concerns; social and economic values; Wilderness and Wilderness Study Areas (WSAs). Preliminary issues and/or comments and the rationale for not addressing them in detail are included in Appendix B.
2 PROPOSED ACTION AND ALTERNATIVES

2.1 Proposed Action

The FS proposed action is to approve a new plan of operations for the Raymond Mine with added terms and conditions for environmental protection and reclamation. The PoO, as submitted by Thornley Williams Jr. (Operator), proposes a 10 year operating period. The Raymond Mine has been in sporadic operation since the late 1970’s. The last plan of operation was authorized for a one year operating period in 1993. Since that time the operator has continued to access the mine and mining claims and operated sporadically within the preexisting Aurora Tunnel. Currently the disturbance footprint for the mine area, including the landings, spur roads and waste rock dumps is approximately 1 acre. The proposal is for continued underground mining in two active adits, excavation and development of two collapsed adits, and slope stabilization using wire mesh and rock bolts. The proposal also calls for reconstructing a collapsed shaft with a roof structure to be built as cover to keep out snow and weather. The miner proposes to construct a vehicle turn-around area as a final extension of the access road, adding an additional .05 acres of disturbance. Upon completion of operations, waste rock material would be used to back-fill the shaft and underground workings and the site reclaimed.

Figure 2.1. Aerial View of Raymond Mine Operation
Depending upon site conditions, operations could begin in early June and extend through November however the site is generally not accessible by vehicle until late June due to elevation and snow pack. Upon completion of adit and shaft development the operator proposes to remove only high-grade material, with minimal addition of waste rock added to the existing dumps. The operator proposes removing between 5 and 10-tons of ore per day, a maximum of two trips daily, using a pick-up towing a 5th wheel trailer. The ore is to be stockpiled on the privately owned Vienna patented claims. The proponent estimates that the stockpiled ore will be hauled once per week using an 18-wheel haul truck out Smiley Creek road for ore processing off Forest.

2.1.1 Mine Access Roads

The mine is accessed via Forest Road 077 (Smiley Creek Road) within the Sawtooth National Recreation Area (NRA) joining a narrow, limited access road beyond the locked gate at the end of the Smiley Creek road. The locked gate is located on a patented millsite claim and access is controlled by a private land owner. The operator is under agreement with the landowner granting him access through the private property to the Raymond Mine.

The majority of proposed hauling, stockpiling of ore material and road maintenance will occur within the Smiley Creek drainage of the Upper Salmon River watershed. All access roads including the Smiley Creek road will be smoothed and water barred to promote positive surface drainage. Maintenance would be done according to Forest Service specifications. Best Management Practices (BMPs) for sediment control will be employed during construction, operation, and reclamation to control and minimize sedimentation from roads.

2.1.2 Equipment

Heavy equipment would be used to improve and maintain the access roads. The operator would access the site in a four wheel drive vehicle or ATV.

All portable equipment, including support vehicles and drilling supplies, would be removed from the Project Area during extended periods of non-operation.

2.1.3 Water Use and Management

The estimated daily requirement of water for mining operations is between 50 and 100 gallons per day. The operator has historically diverted approximately 5 gallons per minute (gpm) of water from a spring located approximately 1000 feet northeast of the mine.

Water discharges from the lowest level (Aurora Tunnel) at a rate of 1 to 3 gpm depending on seasonal flow. The operator has captured this water into a 2-inch pipe and diverted it so there is no potential for interaction with Emma Creek or waste rock dumps below the tunnel. In accordance with BMPs the operator will continue to divert water discharging from the adit to ensure no interaction with rock dumps and Emma Creek. The operator will also monitor and sample these waters in accordance with a water quality monitoring plan (Appendix A) under the guidance of the Forest Service. Current low and high season volumes have been...
Figure 2.2. Topographic Map of Project Area and location of the Raymond Mine.
Raymond Mine Underground Mining and Development Project

Data Source: Topo Online Service, Sawtooth National Forest
Map Data: December 2012

0 0.225 0.45 Miles
measured at 1 and 3 gpm respectively with anecdotal information from the operator indicating that volumes have not changed significantly since acquiring the claims in the late 1970’s. If the volume of water discharging increases to above 7 gallons per minute with a concurrent change in water chemistry, mining operations will stop until a plan of operation amendment is received and reviewed to address the hydrologic changes.

2.1.4 Work Force

The workforce would be comprised primarily of the operator and one or two other miners as needed. Given that operations at the mine site are seasonal in nature there are no plans for personnel to live on site.

2.1.5 Solid and Hazardous Materials

Hazardous substances utilized at the project site would include diesel fuel, gasoline, and lubricating grease. Gas and diesel fuel would be transported in hand-held containers in the bed of a 4-wheel drive truck or ATV as well in internal vehicle fuel tanks. Volumes of fuel needed for the project would not exceed more than 20-30 gallons per week for actual mining operations. Transporting and hauling ore off site would be the most consumptive use of fuel. Lubricating grease would be transported in five-gallon tubs (or similar containers). All containers of hazardous substances would be labeled and handled in accordance with Idaho Transportation Department (ITD) and Mine Safety and Health Administration (MSHA) regulations. All petroleum products would be stored in appropriate containers on a properly lined staging area on site to ensure that any leakage or spills are contained.

In the event that reportable amounts of hazardous or regulated materials are spilled, measures will be taken to control the spill and the Forest Service, Idaho Department of Environmental Quality (IDEQ) and/or the Emergency Response Hotline would be notified as required. Hazardous substance spills would be cleaned up immediately and any resulting waste would be transferred off site in accordance with all applicable local, state, and federal regulations.

Trash generated in the Project Area would be removed from the site and disposed of in an appropriate disposal facility located off National Forest System Lands.

2.1.6 Seasonal Shut-Down

Mining operations at the Raymond Mine have typically ceased before the winter months and the onset of deep snow each year. The operation will be closed down and stabilized at the end of each season. These activities will include the removal of portable equipment by the operator or seasonal storage underground. No potentially hazardous materials such as petroleum, petroleum products, or lubricating material would be left on site during the winter closure. All support vehicles would be removed from the site. Access to the underground mine would be secured in order to prevent entrance by wildlife or the public.

The site is typically inaccessible due to deep snow until late June. Water quality and quantity will be assessed prior to seasonal shut-down. Draining water will continue to be directed away from the portal and operating area by way of buried pipe for infiltration into the forest floor.
2.1.7 Reclamation

A reclamation plan has been created for the project that provides direction for restoring disturbed lands and to ensure visual and functional compatibility with surrounding areas. Because this site has a history of prospecting and mining activity dating to the 1930s, it is important to consider the existing site condition in the context of an updated mine development plan. Reclamation would be completed to the standards described in 36 CFR 228.8(g) and the Forest Service Guide for Reclamation Bond Estimation and Administration (April 2004).

The historic mining and preexisting mine features are an important consideration in the final reclamation scenario for the Raymond Mine. The operator will continue to add material to the existing waste rock dumps as this is consistent with the development of the operation, however the dumps will not expand considerably beyond the current footprint. The upper and mid-level waste rock dumps are composed primarily of weak to moderately mineralized granite host rock excavated from the underground workings. This material is typically orange to buff colored due to oxidation of sulfide minerals. Upon exposure and oxidation of this material other metals may be detected at the surface at various concentration levels. No milling has occurred historically on site therefore no fine-grained tailings exist.

![Figure 2.2. Rock dumps below Aurora Tunnel.](image)

During mining the operator will actively manage the location and size of waste rock dumps, monitor the water that has historically discharged from the Aurora Tunnel, and keep worksites clean and safe. Concurrent reclamation will be completed to the extent possible during operations to ensure that waste rock dumps remain stable and do not unnecessarily encroach into the Riparian Conservation Area (RCA).¹ No waste rock is currently located or will be located within the RCA². Waste rock dumps will be stabilized in order to prevent surface erosion of this

¹ Forest Plan Standards for Mineral and Geology Resources MIST08 & MIST09 (Forest Plan, as amended, III pg.52)
² For this proposed project, an Aquatics Specialist completed field verification of site characteristics, including flood-prone width, site potential tree height, and riparian vegetation, to determine which would be the most appropriate RCA delineation. For Emma Creek and the project area, the aquatics specialist determined that the appropriate RCA buffer is two site-potential tree heights from the outer edge of the floodplain for Emma Creek, a
material that could potentially migrate after final closure into a future floodplain or RCA. Previously disturbed areas that are no longer required for operations including staging areas, turn-around areas, rock dumps, or berms would be considered suitable for concurrent reclamation. These areas can be recontoured, graded or otherwise stabilized and seeded during operation. Periodic maintenance may be required during the establishment of vegetation to address erosion issues through the adjustment of soil amendments or seed mixtures to help establish a self-sustaining plant community.

Prior to final reclamation screening of waste rock will be conducted to determine whether the level of metals will be a risk to human or ecological receptors. Where metals are found to be elevated, these areas will be covered with clean soil or rock material to a depth sufficient in preventing the migration of COCs. These containment controls are intended to eliminate dust and direct contact from contaminated materials. Surface controls such as berms, rip-rap or other sediment control features would be used to control contaminant migration resulting from surface water (storm water). Typical controls include consolidation, grading, surface water containment or diversion, erosion protection, and revegetation. Site controls would also be necessary to limit disturbance of the area until adequate vegetation can be established.

All portals will be removed and collapsed in order to secure them from entry by the public or wildlife and reclaimed as close to original contour as possible. All equipment and materials will be removed and salvaged as appropriate. A portion of the access road leading to the crossing of Emma Creek and shared with Forest Trail 7063 will be reclaimed so as to leave only a trail template necessary for shared use with recreationists. Seeded areas will be monitored for stability and revegetation success. As during the period of operations, water quality will continue to be assessed in order to ensure that land application of these waters remains a viable management solution.

Grading will be used to accommodate reshaping and compacting areas to stabilize slopes, promote positive drainage and infiltration. Erosion protection, such as riprap or diversions, will be incorporated in the surface water controls as necessary to prevent erosion of the waste materials. Erosion resistant materials, such as mulch and natural or synthetic fabric mats, may also be used in other areas to minimize water and wind impacts.

Acceptable vegetative communities and ground cover will be a requirement of reclaimed areas. The Forest Service will develop a selection of appropriate native plant species, guidance regarding the preparation of the seeding area, seeding and/or planting, mulching and/or chemical stabilization, and fertilization. Revegetation may also involve adding a growth medium and/or soil amendments to provide nutrients and organic materials to establish vegetation. Neutralizing agents such as lime, kiln dust or limestone can be mixed to varying depths, or throughout the entire volume of waste materials. Revegetation is essential to controlling water and wind erosion processes and minimizing infiltration of water through plant evapotranspiration processes. Successful revegetation will be a requirement of reclamation bond release.

perennial stream, with one site-potential tree height width for any intermittent streams. The dominant trees in the project area are mature lodgepole pine with a site potential height of 70 feet. Therefore, the RCA buffer is 140 feet from the outer edge of the floodplain on each side of Emma Creek.
2.2 **Connected Actions (Non-federal Actions)**

Connected actions are activities on non-federal land that are interrelated with (connected to) the Proposed Action. While some activities would occur on private lands and are subject to change, connected actions described in this section represent the Forest Service’s best estimate of connected actions based on the plan of operations (POO).

These actions include the following:

- Reconstructing a segment of the access road occurring on private land.
- Transporting ore from FS lands to private lands for stockpiling and later transport off forest.

Connected actions, which are related to cumulative actions, are further discussed under the cumulative effects analysis in Section 3.0

2.3 **No Action Alternative**

In accordance with the NEPA, this EA evaluates the No Action Alternative. The No Action-No Mining Alternative forms the baseline from which the impacts of the Proposed Action can be measured. Under the No Action Alternative, the Forest Service would not approve the PoO and would not authorize mining activities. The FS would become responsible for reclamation of the current site condition and would monitor water quality and quantity from the Aurora tunnel.

Approval of the No Action/No Mining Alternative would not be consistent with 36 CFR 228.1, which in accordance with the United States mining laws (30 United States Code (USC) 21-54) confers a statutory right to enter upon the public lands to search for minerals and those activities to be regulated to minimize adverse environmental impacts to NFS surface resources.

2.4 **Alternatives Not Analyzed in Detail**

2.4.1 **Reduced Term for Operating Plan Less Than Ten Years**

Comments received during the scoping period addressed the Forest Service’s consideration of additional action alternatives, particularly with regard to bonding, reclamation, the scale of mining operations and the timeframe (life) of the operations. Specifically it was suggested that “[t]he environmental analysis should explore shorter operating periods in the range of alternatives because circumstances surrounding the operations are likely to change within that time period.”

The 1955 Multiple Use Mining Act (30 USD 612) restricts mining operators to using reasonable methods of surface disturbance that are appropriate to their stage of operations (United States v. Richardson, 599 F. 2d 290 (1979); cert. denied, 444 US 1014 (1980). This legal principle is reinforced in 36 CFR Part 228, which provide procedures for authorizing operations on the National Forests which are reasonably incidental to mining, but requires that such operations be conducted so as to minimize adverse environmental impacts.
Prospecting and mining at the Raymond Mine as well as many other prospects within the Vienna Mining District are well documented (US Bureau of Mines, 1987; Mitchell, 2009;)

Underground development began at the Raymond Mine as early as 1930 (Williams, pers. comm., 2012). The Raymond Mine has been in sporadic operation since the claims were acquired by the current claimant in 1984. Considering the evidence of historical prospecting and exploration activities at the Raymond Mine, it has been determined that the activities leading up to the most recent PoO have all been reasonable uses of National Forest System lands for advancing mining to the next appropriate stage of operations. The operator has also acted in good faith to ensure that the activities proposed or uses asserted under the 1872 Mining Law have been conducted in order to minimize adverse environmental impacts.

The operator originally proposed a 20-year operating period at the Raymond Mine but has now limited the current proposal to a 10-year operating period. This time frame and the activities proposed are reasonable given the short operating season, predominantly one-man operation, remote mine area, no established surface occupancy and low-level of mechanization used in the operation. Terms and conditions of the approval will ensure that adverse impacts to surface resources are minimized.

Monitoring is in place to address the impacts of the operations to the surface resources. The water quality monitoring plan includes annual components to ensure standards are met and to address any changed conditions in water quality. In addition, new circumstances that arise (e.g. a species becomes listed, earthquakes, etc.) could trigger additional consideration, analyses or a postponement of operations depending upon the scope of changed conditions.

Given the limited scope of operations and the restrictions and mitigation that are part of the proposed action, a ten-year operating plan is reasonable. Evaluating a shorter term operating plan (seven years, four years, etc.), would not result in any changed effects analysis nor provide the decision-maker with any different information. The effects analysis is based upon the proposed action in its entirety.

Should a changed condition occur, it would be addressed. For all these reasons, an operating plan of less than 10 years was not analyzed in detail.

2.4.2 Alternatives Based on Reclamation and Bonding

Comments were received requesting the bonding costs be detailed in the environmental analysis for each alternative and that the bond must be substantive enough to cover the worst possible impacts.

The Forest Service is charged with managing the reclamation of lands disturbed by mining activities in order to minimize the environmental impacts and ensure that disturbed lands are returned to a condition that is consistent with long-term forest land and resource management plans (36 CFR 228.8). Reclamation is an integral and mandatory component of any Plan of Operation that proposes surface disturbance. The appropriate components of reclamation (FSM 2841) are somewhat site specific, but in general consider revegetation of disturbed sites, stability of overburden or waste dumps, concurrent reclamation and post-mining land configuration.
The bond amount is an estimate of the costs should either the Forest Service or a contractor need to do the reclamation work if the claimant defaults. The direct cost of reclamation is based upon the specific details of the closure and reclamation work outlined in the approved POO.

The amount of the bond and the level of detail will evolve from conceptual design during permitting, to actual design and operation of the mine. Bond estimates are adjusted as the level of information and development progresses. Additional standards are often developed and required as the mine develops and the bond changes.

During the planning and analysis, these general reclamation components are considered along with some specific plans based upon what is reasonably foreseen to occur given what is being authorized in the POO. The bond then is drafted during the analysis and finalized after a decision, considering the decision and all the requirements associated with it.

The 36 CFR 228A regulations provide for new or adjusted reclamation bonds when making decisions to approve initial, modified (228.4(e)) or supplemental (228.4(d)) POOs. Bonds can be adjusted as needed to reflect the actual need for and cost of reclamation, (FSM 2841.1(f)) and Section VI.B of the FS POO Form, FS 2800-5).

To calculate bonds based on alternatives would be misleading. Bonding is based on regulation and policy and must be followed. For these reasons, alternatives based on bonding are not considered in detail.

2.5  Environmental Protection Measures

Environmental protection measures are proposed to avoid or minimize negative effects to resources surrounding and within the Project Area. Specific measures include:

2.5.1  Monitoring\(^3\)/Permitting

- The operator will collect a water sample from the lowest adit (Aurora Tunnel) at the start and close of seasonal mining operations or as specifically requested. These samples are to be tested at an EPA approved laboratory. Analyses shall include but may not be limited to; pH, TDS (Total Dissolved Solids), and IOC Contaminants (Inorganic Compound).
- The operator shall immediately (within 1 business day) notify the FS of any appreciable change in the character of water flowing from the lowest adit or if water seepage develops from any new excavation. The operator will submit a sample of this water for laboratory analysis for testing of the parameters discussed above.
- If detrimental results are obtained in the water samples that occur consistently over two operating seasons, the operator will be required to submit a plan amendment as specified in 36 CFR 228.4 (e) to address methods to control impacts to both ground and surface water.

\(^3\) Water Quality Monitoring Protocol cited in Appendix A.
2.5.2 Water Quality\textsuperscript{4}/Aquatics

- No refueling or storage of fuels, lubricants, and other toxicants will be authorized within the RCA, except for refueling with spill-resistant containers with a capacity of less than 5 gallons.
- USFS-approved methods would be utilized to prevent gullying and rilling of fill slopes, cut banks, and natural ground surface.
- Operator is responsible for the maintenance and upkeep of the roads, including erosion control methods.
- The operator would prevent debris from entering stream courses and in the event debris enters stream courses in any amount that may adversely affect the natural flow of the stream, water quality, or fishery resource, the operator would remove the debris within 48 hours in a manner agreed to with the FS that would minimize disturbance to stream courses.
- If FS administration of this project identifies unanticipated impacts to fish or fish habitat, the activity will be suspended until corrections can be made and consultation reinitiated.
- Wheeled or tracked equipment would not be operated in streams except at crossings approved by the FS.
- The operator will actively manage water discharging from the Aurora tunnel and location of waste rock dumps to avoid interaction in order to prevent the possible leaching of metals.
- The operator will actively manage the placement and location of waste rock to avoid interaction with the Riparian Conservation Area (RCA).
- Concurrent reclamation of disturbed areas would be conducted to the extent possible during operations.
- All activities will be conducted in accordance with Idaho environmental anti-degradation policies, including IDEQ water quality regulations at IDAPA 58.01.02 and applicable federal regulations.
- Stormwater monitoring, inspections, and reporting will be conducted in accordance with the National Pollutant Discharge Elimination System (NPDES) MSGP and SWPPP.

2.5.3 Wildlife and Vegetation

- The Operator would utilize fish-friendly culvert construction, if necessary. For crossings on fish-bearing streams, the crossing would need to pass the 100-year flood and span the creek channel. Any culverts installed for road drainage would need to be a minimum of 18” diameter.
- Five-needled conifer trees (ie: white-bark pine) will not be utilized for any aspect of the Raymond Mine Plan of Operations or disturbed as an action connected to the operations.
- No snow plowing will be authorized for winter mining operations to avoid issues with lynx, wolverine denning, and mountain goat wintering.
- Adits would be secured when not in use to avoid bat ingress.
- The operator will notify the Fairfield Ranger District if any TES wildlife species are encountered at the project site during mining operations. A wildlife biologist would work

\textsuperscript{4} Adherence to applicable BMPs include those identified by EPA for Industrial Stormwater Management, Sector G: Metal Mining Facilities http://www.epa.gov/npdes/pubs/sector_g_metalmining.pdf
with operator to minimize disturbance to any active TES species nest or den should one occur at the mining site.

- Reclamation seeding will be done with indigenous seed mixtures appropriate for the elevation and habitat as directed by the Forest Service.

2.5.4 Noxious Weed Control

- Vehicles entering the mine site should be clean and free of noxious weed seed.

2.5.5 Cultural Resources

- If any previously undiscovered historically or culturally significant materials are exposed or discovered the Operator would cease operations, leave such discoveries intact, and notify the Forest Service.

2.5.6 Scenic Values

- Reclamation of disturbed areas would be conducted to the extent possible during operations to minimize impacts to scenic values.

2.5.7 Public Safety

- All adits and accesses to underground operations will be gated and locked in order to prevent access by the public.
- The operator is responsible to meet all applicable state and federal laws and regulations and all reasonable measures would be taken to prevent and suppress wild fires (36 CFR 228.11). All vehicles would carry extinguishers and other fire suppression equipment as appropriate.
- Signs would be posted at relevant points on the Emma Creek trail (7063) and West Fork trail (7224) that could potentially access the Project Area when mining activities are in progress.
- The operator would work to keep the mine site in a safe, neat and workman-like manner at all times (36 CFR 228.9)

2.5.8 Seasonal Shut-Down

- The operation will be closed down and stabilized at the end of each season. These activities will include the removal of portable equipment or storage and securement underground.
- No fuel, petroleum products, drilling supplies, or lubricating materials would be left on site during the winter closure.
- All support vehicles would be removed from the site.
- Access to the underground mine would be secured in order to prevent entrance by wildlife or the public.
- Water quality and quantity will be assessed prior to seasonal shut-down.
2.6 **Federal, State or Local Approvals Potentially Applicable to Proposed Action**

Table 2-6 presents a summary of potential permits and approvals needed to implement the Proposed Action.

<table>
<thead>
<tr>
<th>Approval Type</th>
<th>Status/Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water right from IDWR</td>
<td>Approval of water appropriations would be obtained before activities requiring the water appropriations are implemented.</td>
</tr>
<tr>
<td>NPDES Multi-Sector General Permit from U.S. EPA</td>
<td>Under Section 402 of the Clean Water Act the proponent would be held to the requirements of the National Pollutant Discharge and Elimination System (NPDES) and Section 401 Certification(^5) should waters from the mining operations or stormwater runoff from operations openly discharge pollutants into Emma Creek. A SWPPP would be initiated prior to activities associated with the POO.</td>
</tr>
<tr>
<td>Section 404 Permit from the U.S. Department of the Army, Corp of Engineers (USACE)</td>
<td>No permit anticipated. If any streams or wetlands are disturbed, the appropriate 404 permit would be obtained prior to disturbance.</td>
</tr>
<tr>
<td>Stream Alteration Permit from IDWR</td>
<td>No permit anticipated. Not required for impacts on intermittent or ephemeral streams. A Stream Alteration Permit would be obtained for impacts on perennial streams prior to crossing them if below the ordinary high water mark.</td>
</tr>
<tr>
<td>Endangered Species Act</td>
<td>Consultation with and concurrence from the USFWS and National Oceanic and Atmospheric Administration (NOAA) Fisheries, would be obtained before a National Environmental Policy Act (NEPA) decision on the project is made.</td>
</tr>
<tr>
<td>Reclamation Bonding</td>
<td>The appropriate bond would be established and required by the Forest Service before activities subject to bonding are implemented.</td>
</tr>
</tbody>
</table>

2.7 **Comparison of Resource Impacts**

This section provides a summary of the potential direct effects of implementing each alternative considered in detail. The summaries provided in Table 2-7 are derived from Chapter 3, which are in turn derived from Technical Reports, Biological Evaluations, and other information sources in the project record. More detailed discussions of Environmental Consequences are provided in Chapter 3.

\(^5\) Idaho 401 Guidance states that “It is the obligation of the permit or license applicant to provide sufficient information that establishes there is a reasonable assurance that the discharge will comply with applicable provisions of the Clean Water Act and state Water Quality Standards. If DEQ denies certification, the federal agency cannot issue the federal license or permit. [http://www.deq.idaho.gov/water-quality/surface-water/standards/401-certification.aspx](http://www.deq.idaho.gov/water-quality/surface-water/standards/401-certification.aspx)
Table 2-7 Summary Comparison of Resource Impacts by Alternative

<table>
<thead>
<tr>
<th>Resource Impact</th>
<th>Indicator</th>
<th>Proposed Action</th>
<th>No Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface Water Quality</td>
<td>Risk of chemical contamination of waterways</td>
<td>Low risk, given project design criteria for water monitoring program</td>
<td>No risk; no continued mining however long term observation and monitoring would be required to ensure site stabilization.</td>
</tr>
<tr>
<td></td>
<td>Physical or chemical degradation of waterways due to erosion and transport of material from existing waste rock piles.</td>
<td>Low risk, given project design criteria for mitigation and interim and final reclamation.</td>
<td>No risk: no mining therefore no additional material added to rock dumps. Reclamation of current disturbance would become the responsibility of the FS and would contribute to final stabilization of site.</td>
</tr>
<tr>
<td>Groundwater Quality</td>
<td>Potential impacts to groundwater from mining activity or degradation of waste rock.</td>
<td>Low risk given project design and mitigation measures</td>
<td>No risk: No mining on NFS lands. Reclamation of current disturbance would become the responsibility of the FS and would contribute to final site stabilization.</td>
</tr>
</tbody>
</table>
3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 Introduction

This section describes the “affected environment” (baseline conditions) and the environmental consequences (impacts) of the Proposed Action (defined in Section 2.1) and the No Action Alternative (defined in Section 2.2). Pursuant to direction found at 40 CFR 1500.1(b) and 1500.4, the discussions presented here are summaries of the completed analyses and form the scientific and analytical basis for the alternatives’ comparison presented at the end of Section 2.0. Unless specifically stated otherwise, the project record (40 CFR 1502.21) is incorporated by reference and contains the detailed data, methodologies, analysis, references, and other technical documentation used in the assessment.

The information outlined in this section was obtained from resource field studies of the area, available information sources, and communication with relevant government agencies and individuals with knowledge of the area. This section focuses on the environmental elements or resources that are expected to be directly or indirectly and individually or cumulatively affected by the Proposed Action. Direct impacts would occur as a result of the Proposed Action at the same time and place. For example, the excavation of rock and soil to construct an adit portal is a direct impact. Indirect impacts are also caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. An example would be the potential establishment of an invasive plant species in an area that has been reclaimed after the project is concluded.

3.2 Past, Present or Ongoing Related Actions

Cumulative impacts occur as a result of an incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts must be evaluated along with the direct and indirect impacts of the Proposed Action. Cumulative impacts can result from individually minor but collectively major actions over a period of time.

The scope of analysis for cumulative impacts is limited to past actions within the project area and actions that are reasonably foreseeable and include the current Sawtooth National Forest Schedule of Proposed Actions and expected plans of operations (POOs) that may come prior to completion of this analysis. The analysis of cumulative impacts represents the Forest service’s best estimate of activities occurring on private land for the purpose of analysis.

Cumulative impacts associated with each resource are outlined in the appropriate subsection of Section 3.0 of this environmental assessment (EA). It is assumed that although the incremental impacts of each past activity may not be known, the existing condition is representative of those past activities. Individual resource areas discuss, if appropriate, the incremental impacts past activities may have had.
3.3 Overview of Affected Area

The Raymond Mine currently encompasses approximately one acre of surface disturbance on National Forest System lands of the Fairfield Ranger District. Access is via Forest Service system road 70077 (Smiley Creek Road) which travels on and off private land near the head of the Smiley Creek drainage on lands administered by the Sawtooth National Recreation Area (Sawtooth NRA). The road crosses the drainage divide at 8800 feet where it intersects trail #063 which roughly follows Emma creek. The ridgelines and peaks in both drainages range between 9000-9600 feet. Vegetation consists of whitebark pine (Pinus albicaulis) and subalpine fir (Abies lasiocarpa) trees. The understory is sparsely vegetated with elk sedge (Carex geyeri), Ross sedge (C. rossii) along with scattered alpine forbs, grasses and sedges growing in soil pockets among the scree and rock.

Forested vegetation in the Emma Creek drainage consists of lodge pole pine (Pinus contorta), douglas fir (Pseudotsuga menziesii) and subalpine fir (Abies lasiocarpa) and Engleman spruce (Picea engelmannii) along the riparian area. The understory species are similar to those found in the Smiley Creek drainage. A few whitebark pine are scattered below the ridgeline and near the mine site. Non-forest areas are talus and scree in the upper portion of the drainage. Some areas of non-forested vegetation occur and are primarily mountain shrub habitats dominated by mountain big sagebrush (Artemisia tridentata vaseyana) green rabbit brush (Chrysothamnus nauseosus) and chokecherry (Prunus virginiana) with bunch grass including fescues (Festuca idahoensis and F. ovina), and bottlebrush squirreltail (Sitanion hystrix), and scattered perennial forbs such as pussytoes (Antennaria microphylla), sandwort (Arenaria capillaries), balsamroot (Balsamorhiza sagittata), silky lupine (Lupinus sericieus), sego lily (Calochortus nuttallii), yarrow (Achillia millefolium), and several species of buckwheats (Eriogonum spp).

Wet meadows and non-forest riparian areas in upper Smiley and Emma Creeks support vegetation that varies from a variety of willow species, hydric grasses, sedges and wetlands with peaty mineral saturated substrates often associated with seeps and adjacent springs.

The Sawtooth NRA and Fairfield Ranger District provide habitat for one federally listed threatened terrestrial plant species, Ute ladies’-tresses. The U.S. Fish and Wildlife Service (USFWS) list located at [www.fws.gov/idaho/species/IdahoSpeciesList.pdf](http://www.fws.gov/idaho/species/IdahoSpeciesList.pdf) is dated February 6, 2013 (project record). Although Ute ladies’-tresses orchid is listed as threatened on the ESA list, it is not currently included on the biannual Forest-wide species list for the Sawtooth NF. Due to previous direction by the USFWS and the existence of potential habitat for this threatened species, the Sawtooth NF proactively includes this species in Biological Assessment’s in accordance with Section 7(a)(1) of the ESA. Ute ladies’-tresses orchid is not known to occur within the project area.

In relationship to the proposed action, bull trout presently occur in the South Fork Boise River (SFBR) drainage on the Fairfield Ranger District. These fish spawn and rear young in many of the tributaries the SFBR (Kenney 2002), but the main stem of the river and the lower reaches of many of the tributaries are not considered to be spawning or early (i.e., first year) rearing habitat. The main stem of the SFBR and of Big Smoky Creek are thought to harbor adult and advanced juvenile fluvial (i.e., large-river dwelling) bull trout year-around and are known to serve as a migratory corridor for adult and advanced juvenile fluvial and adfluvial (lake-dwelling) bull trout during the spring and fall. In addition, some sub-adult fluvial and adfluvial bull trout (typically
175-300 mm in length) are known to “wander” into habitat which may not be suitable for spawning or early rearing (as opposed to migration to or from spawning and/or early rearing habitat) and may exist for short or long periods in stream reaches that otherwise would be unoccupied or used only as a migratory corridor (Personal communication, Bruce Rieman, Fisheries Research Biologist, RMRS). Full-time resident (non-migratory) populations of bull trout also live in SFBR tributary streams where fluvial and adfluvial fish spawn and rear.

Emma Creek was electrofish-sampled in 1993, 1994, 1999, 2001, and 2004 (Kenney and Kovacs 2007) and in 2008 (Kenney, unpublished data), yielding various age-classes of bull trout at most sites. The Idaho Department of Fish and Game also radio-tracked an adult adfluvial bull trout into Emma Creek in 1998 and 1999 (Partridge et al.). Based on the available data, a reproducing migratory bull trout population exists in Emma Creek and individuals likely exist in the drainage from the mouth to the lower headwaters year-round. The upstream-most sampling site was at about 7,400 feet in elevation in 2008, where juvenile bull trout of several age classes were relatively abundant.

The mine site is adjacent to a point on Emma Creek that is at approximately 8,400 feet in elevation. While sampling has not been performed in Emma Creek above the 7,400-foot site mentioned above, this site is likely well-above the upper elevation for bull trout presence in the drainage. This is because bull trout habitation in the other three bull trout patches in the upper South Fork Boise watershed (Bear, Johnson, and Ross Fork creeks) does not appear to extend above about 7,400 feet and the highest elevation where bull trout have been sampled in several years of surveys on the District is about 7,580 feet (in Smoky Dome Creek; Kenney and Kovacs 2007).

Further, the drainage area of Emma Creek at a point adjacent to the mine site is only about 60 hectares while the drainage area at the upper Emma Creek sampling site is about 800 ha. Drainage areas at the upper end of bull trout habitation on Bear, Johnson, Ross Fork, and Smoky Dome creeks are respectively roughly 400, 500, 800, and 500 ha (Kenney and Kovacs 2007). The guideline for the lower cutoff for potential bull trout presence in a Boise River basin stream is a drainage area of about 400 ha (Isaak et al. 2009).

Also, a section of the Emma Creek channel beginning about 1,300 linear feet above the upper sampling site consists of a massive (~1,900’+ in length) accumulation of porous alluvium that has been observed (both on satellite photos and on the ground) and is poor bull trout habitat in that it has no riparian vegetation, little in the way of defined banks, and does not carry surface water in the late summer which coincides with the majority of the project activity period.

Considering the elevation, drainage area, and presence of the poor bull trout habitat, including a seasonal passage barrier created by the alluvial plug, it is almost certain that bull trout do not exist in Emma Creek in proximity to the mine site. Employing the likely upper observed limits of bull trout elevation and drainage area noted above (~7,600 feet in elevation and ~400 ha in area), an extreme upstream limit for bull trout habitation in the Emma Creek channel is probably near the upper end of the alluvial plug. This point is about 1.2 miles downstream of the mine site, so bull trout presence in Emma Creek probably reaches its upstream limit somewhere between 1.2 and 1.8 miles below the mine site.
3.4 Water Quality and Hydrology

3.4.1 Forest Plan Direction

The Forest Plan includes direction designed to protect water resources pursuant to the Clean Water Act (CWA), and the associated beneficial uses as defined by Idaho Department of Environmental Quality (IDEQ). Both Smiley Creek and Emma Creek are undesignated surface waters but are protected for beneficial uses which include cold water aquatic life, primary and secondary contact recreation, and the propagation and protection of fish, shellfish and wildlife (Idaho Administrative Procedures Act [IDAPA] 58.01.01).

Table 3-1 shows applicable management direction under the Forest Plan for assessing forest-wide impacts to water quality and hydrology. The intent of this direction is to evaluate proposed land management activities for consistency with the Forest Plan pursuant to CWA compliance (2012 amended Forest Plan). Complying with the requirements of the CWA supports and maintains designated beneficial uses.

<table>
<thead>
<tr>
<th>Number</th>
<th>Direction Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Goal SWGO05</strong></td>
<td>Design and implement watershed management programs and plans that will restore water quality and watershed function to support beneficial uses.</td>
</tr>
<tr>
<td><strong>Goal SWFO06</strong></td>
<td>Meet or surpass State water quality standards by planning and designing land management activities that protect water quality.</td>
</tr>
<tr>
<td><strong>Goal SWGO07</strong></td>
<td>Provide water quality for stable and productive riparian and aquatic ecosystems while fully supporting appropriate beneficial uses.</td>
</tr>
<tr>
<td><strong>Goal SWGO08</strong></td>
<td>Manage water quality to meet requirements under the Clean Water Act and Safe Drinking Water Act, with special emphasis on de-listing water quality limited water bodies under Section 303(d) and supporting state development and implementation of TMDLs.</td>
</tr>
<tr>
<td><strong>Goal SWGO09</strong></td>
<td>Promote integration of planning, analysis, implementation, and monitoring efforts that support the ESA, Magnuson-Stevens Act, and Clean Water Act requirements.</td>
</tr>
<tr>
<td><strong>Standard SWST01</strong></td>
<td>Management actions shall be designed in a manner that maintains or restores water quality to fully support beneficial uses and native and desired non-native fish species and their habitat, except as allowed under SWST04 below.</td>
</tr>
</tbody>
</table>
| **Standard SWST04** | Management actions will neither degrade nor retard attainment of properly functioning soil, water, riparian, and aquatic conditions, except:  
  - Where outweighed by demonstrable short- or long-term benefits to watershed resource conditions; or  
  - Where the Forest service has limited authority (e.g., access roads, hydropower, etc.). In these cases, the Forest Service shall work with permittee(s) to minimize the degradation of watershed resource conditions. |
| **Standard SWST06** | In cooperation with affected state, tribal, and local governments, holders of water rights, and other interested parties, determine in-stream flows needed for protection of water related resources when accessing permit or license actions such as mining claim development, hydropower development, snowmaking, or water transmission facilities. When determining the sufficient quality, quantity, and timing of flows, use the following four factors:  
  (a) maintenance and restoration of habitat for fish, wildlife, and riparian plant communities;  
  (b) maintenance of channel stability and capacity for passing floods;  
  (c) maintenance of recreational opportunities such as fishing, swimming, boating, and aesthetic enjoyment; and  
  (d) maintenance of water quality and natural temperature regimes. Make sufficient flows a condition of permit or license issuance. |
Within legal authorities, ensure the new proposed management activities within watersheds containing 303(d) listed water bodies improve or maintain overall progress toward beneficial use attainment for pollutants that led to the listing.

Source: Forest Service, 2012

The Forest Plan management direction related to water quality that is specific to both the Upper Salmon River Valley and Upper South Fork of Boise River Management Areas is shown in Table 3-2.

### Table 3.2. Relevant Upper South Fork Boise/Upper Salmon River Valley Management Area Objectives for Water Quality and Hydrology.

<table>
<thead>
<tr>
<th>Number</th>
<th>Direction Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Road Standard 0226/0612</td>
<td>Road construction or reconstruction may only occur where needed: a) To provide access related to reserved or outstanding rights, or b) To respond to statute or treaty, or c) To address immediate response situations where, if the action is not taken, unacceptable impacts to hydrologic, aquatic, riparian or terrestrial resources, or health and safety, would result.</td>
</tr>
</tbody>
</table>

While the Forest Plan has no specific standards or guidelines for protection of groundwater resources in the management area, the Forest Service has developed a four-part information system on groundwater management on NFS lands: (1) FSM 2530 and 2880; (2) a Forest Service report on groundwater laws, regulations, and case law for all 43 states with NFS land (Forest Service 2005a); (3) a technical guide on groundwater inventory and monitoring (Forest Service 2012a); and (4) a technical guide on managing groundwater resources on NFS land (Forest Service 2005b). For groundwater resources, the Forest Service states, “the NFS contains substantial groundwater resources, for which stewardship and protection are mandated by congressional acts. Many other natural resources on NFS lands rely, directly or indirectly, on groundwater and would be damaged or destroyed if that water were depleted or contaminated” (Forest Service 2005b).

### 3.4.2 Affected Environment/Existing Condition

The activity area is the area of analysis for direct and indirect impacts on water quality and hydrology. For this evaluation, the activity area describes portions of the upper Smiley Creek and Emma Creek watersheds. Figure 3-3 shows the activity area, including the Proposed Action areas (mine site, access road), and related surface water resources.

#### 3.4.2.1 Drainage Characteristics

The Raymond Mine is located in the Smokey Mountains north of Fairfield, Idaho at an elevation of approximately 8500 feet. The mine is located near the headwaters of Emma creek, which is a tributary of the South Fork of the Boise River, located approximately 7 downstream miles. The mine is located about ¼ miles below the divide between the unnamed tributary of Smiley Creek and Emma Creeks and approximately 250 feet east and uphill of Emma Creek (Figure 3.1).
3.4.2.2 Surface Water Hydrology

Surface-water hydrology in the area is a function of rain, snowmelt, and groundwater baseflow (the discharge into a stream from natural storages) and is characterized by highly variable precipitation and water movement over and through steep terrain and fractured granite bedrock of the Idaho Batholith. High flows in spring and early summer result from snow melt that accumulates over the winter. In the summer and fall, baseflows are a function of groundwater levels and rain events. Annual precipitation for the analysis area is near 45-inches with highest amounts in the winter. The base flow of upper Emma Creek is approximately 0.03 cfs supplied largely by spring snowmelt. Spring snowmelt typically begins in March, with peak flows of upper Emma Creek ranging between 1 and 5 cfs occurring in May and decrease in the subsequent summer months, usually reaching base flow by August or September.

Emma Creek is in the youthful stage of development originating from springs and seeps and is classified as an erosional stream, with a distinctive V-shaped profile and steep gradient. Stream channel morphology of Emma Creek is dominantly shaped by bedrock morphology and thin colluvium deposits of poorly sorted mix of boulders, cobbles, gravels and finer sediment of granitic origin. Colluvium rarely exceeds 1 m in depth higher in the drainage and is almost nonexistent near the mine site. Emma Creek is a non-designated stream but is considered beneficially useful for recreation and contributes to the health of riparian areas, wildlife habitat, and fisheries. Surface runoff during storms appears to be the primary agent for sediment influx to Emma Creek, especially in areas of steep unconsolidated slopes with sparse vegetation.

3.4.2.3 Groundwater Resources

The FSM chapter 2882.3 specifically identifies goals for the protection of groundwater and groundwater dependent ecosystems on NFS lands. Moreover, the Forest Service Technical Guide to Managing Ground Water (2005b) provides specific procedures for mining activity and the interaction with groundwater. NFS lands contain substantial groundwater resources, for which stewardship and protection are mandated by congressional acts. In addition to the federal land management statutes cited in the FSM 2501, protection of groundwater resources falls under the jurisdiction of IDEQ and is described in the Groundwater Quality Rule (IDAPA 58.01.011).

Ground water recharge in the Emma Creek and Upper Smiley Creek basins occur by way of rainfall and snowmelt falling on the granodiorite bedrock outcropping in the Smokey Mountains and within drainage basins of Emma and the unnamed tributary to Upper Smiley Creek. The fractured granodiorite bedrock at the elevation of the Raymond Mine contains very little or no primary porosity. Water is transmitted primarily through fractures and the hydraulic connectivity is typically very low or nonexistent in areas. At this elevation fracturing within the granodiorite allows for very shallow recharge to the ground water system of the area by lateral and downward movement of water through fracture zones and is predominantly contributing to the base flow of Emma Creek. In the activity area, the groundwater table is highly variable depending on location, or may be completely absent where bedrock occurs at the surface. Groundwater in the glacial and alluvial materials beneath the valley floors outside of the project area is derived from infiltration of precipitation and shallow groundwater flow from upgradient portions of the watersheds. No groundwater monitoring wells exist in the activity area and no previous exploration drilling has been completed. Typically wells drilled in consolidated bedrock of metamorphic or igneous origin yield very small amounts of water and dry holes are common or
wells go dry after producing only for a short time which would not contribute meaningful information for a more complete hydrologic analysis. The closest domestic well is located approximately 15 miles from the mine site downstream of Emma Creek beyond its confluence with the South Fork of the Boise River.

3.4.3 Environmental Consequences

3.4.3.1 Direct and Indirect Impacts

3.4.3.1.1 Proposed Action

Under the Proposed action, the greatest risk for impacts to surface waters is pollutants generated from the mining activity interacting with Emma Creek.

Surface Water

Emma Creek is located adjacent to the Project Area. The proposed action includes increased traffic on the access road. The increase in road traffic is likely to increase effects to aquatic resources without implementation of BMPs. Direct and indirect effects of the Proposed Action would be minimized with environmental protection measures outlined in Chapter 2. BMPs would be utilized by the operator to control erosion and sedimentation. The operator would prevent debris from entering stream courses and in the event the operator causes debris to enter stream courses in any amount that may adversely affect the natural flow of the stream, water quality, or fishery resource, the operator would remove the debris within 48 hours in a manner agreed to with the USFS that would minimize disturbance to stream courses. Wheeled or tracked equipment would not be operated in streams except at crossings approved by USFS or to remove debris as approved by USFS. With mitigation and road BMPs the effects would be minimal and less than under current conditions without them and result in an overall decrease in sediment delivery to Emma Creek.

The Aurora Tunnel is the lowest level development mine adit and provides a conduit for water migrating along fractures to directly discharge to the surface. Water currently discharges from the Aurora at a rate of between 1 - 3 gpm depending upon seasonal fluctuation. Samples collected from water discharging from the Aurora level indicate water quality to be typical of ground waters from predominantly granitic parent material with detection of Zn, Pb, and Ar, contributed from the largely oxidized minerals associated with the orebody. Over time, the percolation of water has contributed to extensive near surface oxidation of sulfide minerals that would have contributed to metal leaching and mobility by acidifying water percolating through the system. The neutral pH of the discharging water combined with low metal content observed in water quality analysis to date indicate that oxidation has occurred to the extent that the remaining mineralized material is not significantly altering water draining from the mine. All water samples collected, including waters from Emma Creek above and below the Raymond Mine are not contaminated with metals. For example, Arsenic in five samples collected to date occurs at or below the Maximum Contamination Limit (MCL) of 0.01 mg/L set by the EPA. All samples collected to date meet or exceed water quality standards set by Idaho Department of Environmental Quality (IDEQ) and comply with Idaho Water Quality Standards.

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6 BMPs include those identified by the Forest Service, SWPPP and Best Management Practices for Mining in Idaho.
If new mineralized areas are discovered underground that are geochemically and structurally different than the current mineralization of interest then continued mining could alter water chemistry and volume. For a substantially negative effect to occur, an increase in volume of water and a substantial decrease in quality would both have to occur in order to contribute to significant metal loading and the potential to degrade water quality in Emma Creek. This is not likely at the scale of mining proposed and degradation is unlikely since analysis indicates that water is not acid draining and is not contaminated. However requiring monitoring and reporting of changes in adit discharge will ensure that if a change in water quality occurs, appropriate additional mitigation and/or a Plan of Operation amendment would be implemented to comply with Forest Plan Standards and Clean Water Act requirements. An increase in metal concentrations in adit discharge without a change in volume would also result in no effect to Emma Creek since mitigations and monitoring would ensure that drainage would not reach the stream channel.

A comparison to the IDEQ cold water biota criteria indicate that the concentrations for zinc and lead in adit discharge were found to slightly exceed cold water biota standards, however metals concentrations measured at the point of probable entry into Emma Creek do not. Based on in-stream water quality analysis and site investigation, no loading occurs from adit discharge or waste dumps and there are no violations of Idaho Water Quality Standards (Appendix C). Therefore, metals concentrations in surface waters pose no risk to human health or pose an ecological risk.

The water draining from the Aurora level has historically been redirected and land applied away from the Emma Creek drainage so as not to have any surface influence with Emma Creek. BMPs would continue to be utilized to prevent water draining from the mine from interacting with Emma Creek as well as waste rock dumps in the area below the adits. Monitoring protocols for the water discharging from the Aurora level and additional terms and conditions for environmental protection will be incorporated7. These protocols will provide critical data to monitor hydrologic conditions as well as any changes in water chemistry that may impact the environment. The operator will work with the Forest Service to collect and provide this data.

**Groundwater**

As with any bedrock groundwater system, bedrock permeability and thus groundwater yields in the project area vary with depth due to stratigraphic and/or structural patterns. Mining through these various water-bearing zones and intervening low permeability confining units can create conduits for flow between different water-bearing zones (cross flow) if the zones are under differing hydrostatic pressure. If poor quality groundwater from one water-bearing zone were to flow through an opening created by mining into another zone of better quality, this could constitute an impact on groundwater resources. However, the potential for water quality impacts through cross contamination of individual water bearing zones is considered to be minimal at this site. Potential for groundwater degradation exists from naturally occurring mineralization. When groundwater passes through subsurface mineralized rock that has the potential to degrade water quality, the extent of degradation is dependent on the mineral constituents in the rock and the amount of time the water remains in contact with those minerals. The Raymond Mine is located

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7 Additional terms and conditions for environmental protection described in Chapter 2, page 2-17
high in the Emma Creek drainage and within 500 vertical feet of the upgradient drainage divide. The likelihood of significant groundwater quality degradation is low due to this short residence time of water at this elevation. In addition, the extension in underground mining would not itself degrade water quality, but could simply intercept groundwater flow paths with naturally poorer quality or intercept seasonally flowing fractures. The current water quality discharge from the Aurora tunnel meets all state water quality standards and should be indicative of what would likely be found in adjacent bedrock with similar characteristics. It is unlikely that any underground expansion would intercept groundwater of significantly lower water quality. Water discharging from the Aurora Tunnel ranges seasonally between 1 and 3 gallons per minute as measured between 2011 to present. Anecdotal information from the operator indicates that volumes have not changed substantially during his experience with the operation from the late 1970s. Short term higher adit discharges may occur as collapsed material is removed from the mine and any ponded water is released or if a fracture is encountered that produces seasonally flowing water, however it is not expected that the proposed level of activity will alter groundwater equilibrium in the mine area. A full analysis of the potential effects to groundwater from the proposed activity is a part of the project record.

While the mineralogy of the site indicates low acid-generating potential and the water draining from the Aurora Tunnel is not acidic, the Forest Service did assess acid drainage potential. A Field Leach Test (FLT) was conducted on the existing waste rock dumps to assess metals release via dissolution in precipitation. Three composite samples were taken from the lower dump, and one composite sample was taken from the dump below the mid-level adit. Synthetic Precipitation Leaching Procedure (SPLP) analysis was completed on the same composite samples in order to compare to the FLT results (Appendix C). Arsenic was detected in all of the samples, as could be expected due to ore and bedrock mineralogy. Arsenic in the leachate from the mid-level dump exceeded the drinking water MCL, but this exceedance has no practical significance since the leachate does not represent a drinking water source and the test does not account for sorption and dilution which would occur before a receptor is reached. There are no drinking water wells in the vicinity of the site. Emma Creek represents the closest receptor that could be impacted by dissolution of waste rock constituents into groundwater since lateral and downward movement of water through fracture zones is predominantly contributing to the base flow of Emma Creek. Sampling of Emma Creek upstream and downstream of the site indicate that the creek has not been impacted from mining activity. The resource protection measures described in Chapter 2 and monitoring of mining activity and water quality under the new Plan of Operations will ensure that Emma Creek will not be impacted or if conditions change measures outlined in the water monitoring plan can be taken to ensure no degradation would occur.

3.4.3.1.2 No Action

Under the “No Action” alternative, the plan of operations would not be approved and mining operations would not be authorized. The Raymond Mine area would continue to be used for recreation, wildlife habitat and other forest uses. The private gate at the end of Forest Road 077 would remain and continue to restrict access to the mine site. The Forest Service would be responsible for mine site reclamation as well as reclaiming the mine access road beyond the Emma Creek crossing.
Effects to water quality due to surface runoff from the mine site would be minor during and immediately following reclamation activities. Soil disturbance during reclamation could potentially mobilize some sediment however reclamation should include drainage features to direct water away from Emma Creek and nearly eliminate delivery of any short term increase in surface runoff or sediment. Improved soil conditions from reclamation (decreased compaction, increased infiltration and organic matter) and vegetative recovery would reduce surface runoff generation within a 3-5 year time frame.

With reclamation, soil recovery and hydrologic response would recover much more quickly than if disturbed areas were simply abandoned (Kolka and Smidt, 2004). Due to the shallow, poorly developed soils, and cold climate, recovery would occur relatively slowly without physical rehabilitation of the disturbed areas (MSU, 2010) as soil properties would change based solely on natural processes.

Reclamation would include applying clean cover to waste rock dumps as appropriate and plugging adits that could either decrease adit discharge or have no effect. Long term effects of adit discharge under this alternative would then be either equal to or less than current conditions. Since current adit discharge does not reach Emma Creek and is within water quality standards, this effect would remain very minimal and within acceptable levels.

3.4.3.2 Cumulative Impacts

Cumulative impacts include impacts from connected actions (see Section 2) or past or foreseeable future actions in the activity area. Connected actions would include road reconstruction on private land and stockpiling ore on private lands.

The activities that will continue into the future within the activity area and which may contribute to cumulative impacts on water quality include mining, motorized use of roads and trails, and livestock grazing.

The Cumulative Effects Study Area (CESA) for water quality is the Emma Creek Watershed (6,461 acres). The CESA is partially located in the Vienna Mining District and the historical mining activity focused on the development of silver, gold, lead and zinc from the Solace, WebFoot and Vienna mines all located within Blaine County, Idaho. The past disturbance associated with historic mining in the Vienna district is located on private patented mine lands located outside the Emma Creek watershed and therefore do not have impacts that overlap temporally or geographically with the Proposed Action.

Primary access to the Raymond mine is via Forest Road 077 (Smiley Creek Road) which then joins a narrow, limited access road located behind a locked gate at the end of the Smiley Creek road. The access is strictly limited by the patented Vienna Mine land owner, however design criteria are included in the Plan of Operations in order to improve drainage and address long standing resource concerns with the existence of this road. In addition to Forest Road 077, there is limited public access along the Emma Creek Trail #7603. This public access is limited to dirt-bikes, hikers and horseback riders. The area is categorized as semi-primitive motorized. The Raymond mine access road and the trail share an alignment for a short distance beyond the Emma Creek and Smiley Creek divide and both are considered a source of sediment to Emma Creek.
Current livestock grazing includes one band of sheep within the Emma Creek Drainage. The authorized (permitted) sheep can be directed around the mine area and therefore the grazing impact would be minimal, if any. The mine site is on the divide between the Smiley Creek S&G Allotment and the Elk Creek S&G Allotment. Conceivably, unauthorized grazing within the Emma Creek drainage from either band could take place but only one band is authorized on the allotment where Emma Creek exists. This situation is also not likely because the permittee is instructed to cross the watershed divide into Vienna Creek drainage which is different than the historic route that passed out of the head of Emma Creek and looping back into Vienna Creek. This route was changed approximately five years ago when the patented Vienna Mine owner complained about the impacts from multiple bands of sheep.

Cumulative effects to water quality appear to be within acceptable limits, since water quality in Emma Creek is well within drinking water standards (USDA, 2012) and state designations indicate the creek is fully supporting beneficial uses.

Reasonably Foreseeable Future Actions within the CESA that have the potential to affect water quality include livestock grazing, recreation, and mineral exploration. However, mineral exploration activities would be required to have spill prevention plans, handle hazardous substances in accordance with IDT and MSHA, and utilize BMPs, thus minimizing impacts to water quality. The incremental impact of the Proposed Action when combined with the past and present actions and RFFAs would be minimal because there are very few activities within the 6,461-acre Emma Creek CESA and all authorized activities must be consistent with state and federal regulations.

3.5 **Hazardous Waste and Previous Mining Operations**

3.5.1 **Forest Plan Direction**

The Forest Plan includes goals, objectives, standards, and guidelines to regulate hazardous materials and previous mining activity. Table 3-3 lists applicable standards and guidelines under the Forest Plan for assessing forest-wide impacts associated with these issues. Complying with the requirements of the Forest Plan will help support and maintain designated beneficial uses of NFS land.

<table>
<thead>
<tr>
<th>Number</th>
<th>Direction Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guideline SWGU11</td>
<td>Transport hazardous materials on the Forest in accordance with 49 CFR 171 in order to reduce the risk of spills of toxic materials and fuels during transport through RCAs.</td>
</tr>
<tr>
<td>Standard MIOB09</td>
<td>During site/project-scale analysis, evaluate mine waste material using accepted sampling methods and analytic techniques to determine its chemical and physical stability characteristics.</td>
</tr>
</tbody>
</table>

There are no specific applicable standards for hazardous waste or mining in the Upper South Fork/Upper Salmon River Valley Management Areas.
3.5.2 Affected Environment/Existing Condition

The activity area is the area of analysis for direct and indirect impacts on resources. This evaluation considers direct and indirect impacts of the storage and use of hazardous materials (diesel, gasoline, grease, hydraulic oils) associated with the Proposed Action and the environmental condition of preexisting waste rock dumps.

Underground mining and development of the Raymond Mine began in the early 1930s (Mineral Land Assessment, 1987), with continued sporadic operation by various members of the Williams family under annual operating plans since the early 1980’s. While the Raymond Mine is a part of the larger Vienna Mining District, the Raymond Mine is the only mining operation existing in the Emma Creek drainage. The resulting disturbance associated with the mine currently does not exceed one acre.

3.5.3 Recognized Environmental Conditions

As defined by the American Society for Testing and Materials Standard Practice for Environmental Site Assessments (Method E 1527-05), the term recognized environmental condition means:

“The presence or likely presence of hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property.”

The preexisting waste rock dumps represent a potential recognized environmental condition (REC) in the project area.

3.5.4 Environmental Consequences

3.5.4.1 Direct and Indirect Impacts

3.5.4.1.1 Proposed Action

Hazardous materials can affect the Proposed Action in two ways:

- Hazardous material releases directly from mining operations (e.g. a release of fuel to the ground or water course).
- Migration of hazardous materials or contaminants of concern from waste rock dumps as a result of new mining activity.

Hazardous Materials Use

Petroleum products (fuel, lubricants, and motor oil) would be used and stored as a part of the Proposed Action to support the equipment and ancillary needs. Chemicals could be released into the environment due to leaks from equipment, failure of a storage tank, or accidents such as a truck accident during transport activities associated with the mining operation. Such a release could potentially contaminate soils and groundwater and impact surface water.
As a part of mining operation procedures, gas and diesel fuel would be transported in hand-held containers in the bed of a 4-wheel drive truck or ATV as well as in internal vehicle fuel tanks. Volumes of fuel needed for the project would not exceed more than 20-30 gallons per week for actual mining operations. Transporting and hauling ore off site would be the most consumptive use of fuel. Lubricating grease would be transported in five-gallon tubs (or similar containers). All containers of hazardous substances would be labeled and handled in accordance with Idaho Transportation Department (ITD) and Mine Safety and Health Administration (MSHA) regulations. All petroleum products would be stored in appropriate containers on a properly lined staging area on site to ensure that any leakage or spills are contained.

In the event that reportable amounts of hazardous or regulated materials are spilled, measures will be taken to control the spill and the Forest Service, Idaho Department of Environmental Quality (IDEQ) and/or the Emergency Response Hotline would be notified as required. Spills would be cleaned up immediately and any resulting waste would be transferred off site in accordance with all applicable local, state, and federal regulations.

Project activities would not generate materials regulated as “hazardous” or “toxic” waste with the exception of the handling of fuel-related products. Solid waste generated in the Project Area would be removed from the site and disposed of in an appropriate disposal facility located off National Forest System Lands.

**Recognized Environmental Conditions**

A Site Investigation (SI) was conducted in August and October 2011 to assess the human health and ecological risks associated with the previous mining activity at the Raymond Mine. The objective was to screen for and identify any Contaminants of Concern (COCs) in the preexisting waste rock dumps and water draining from the Aurora Tunnel. To assess potential human and ecological risks at the site, soil, waste rock, and surface water COC concentrations from the samples were compared to BLM Risk Management Criteria (RMC) developed for site worker and recreational exposure scenarios (camper and ATV rider) (Ford, 2004). Contaminant concentrations in surface water were also compared with IDEQ Cold Water Biota Standards for acute and chronic exposures. COCs in surface water samples were compared to US EPA Primary and Secondary Drinking Water Standards. Potential impact to groundwater by COCs was evaluated by assessing the leachability and acid generation potential of waste rock samples and assuming that leachate could come into direct contact with groundwater. The human health risk and ecological risk findings are summarized in Appendix C.

A screening-level assessment with conservative assumptions was used to determine what reclamation and mitigation measures should be employed. In the case of the Raymond Mine, the screening-level assessment indicates that arsenic, cadmium and lead are of concern with respect to human health via the inhalation and incidental ingestion pathways. The surface exposure to this material by is minimal considering the small exposure area (<1 acre), remote location, restricted vehicle access, and no public ATV access in the area. Mining at the scale proposed by the operator is not expected to produce quantities of waste rock that would expand the current dumps beyond the level of current surface disturbance and waste rock material will be used to

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8 Explanation of Risk Management Criteria (RMC) located in Appendix C.
backfill underground workings to the extent possible during final reclamation. Rock dumps would not be allowed to encroach into the RCA and protection measures would be put into place to ensure that potentially hazardous materials would not migrate. A judicious course of action is to eliminate exposure pathways by requiring capping of waste rock piles as part of the reclamation plan. This reclamation requirement would also alleviate any concern with respect to terrestrial ecological receptors, as well as any concern with respect to potential mercury content.

3.5.4.1.2 No Action

Under the No Action Alternative, none of the Proposed Action activities would be implemented. No impacts from hazardous waste associated with new mining activity would occur. The Raymond Mine area would continue to be used for recreation, wildlife habitat and other forest uses. The private gate at the end of Forest Road 077 would remain and continue to restrict access to the mine site. The Forest Service would be responsible for mine site reclamation as well as reclaiming the mine access road beyond the Emma Creek crossing.

The existing waste rock dumps would be graded and recontoured in order to promote positive drainage and prevent the migration of COCs. Reclamation would include backfilling open workings with spent material as practical and apply clean cover to remaining waste rock as appropriate to eliminate exposure pathways and decrease surface-level exposure to metals.

3.5.4.2 Cumulative Impacts

Cumulative impacts include impacts from connected actions (see Section 2.2) or past or foreseeable future actions in the activity area. Connected actions would include road reconstruction on private land and transport and stockpiling activities located on private land.

Historical mining activity has created hazardous materials concerns in the activity area, including surface disturbance associated with roads, adit portals and landing areas. Past and ongoing activities have been considered in describing the current conditions of the activity area. The activities that could continue into the future in the activity area, and which may contribute to cumulative impacts, include dispersed recreation, mining, livestock grazing and motorized use of roads and trails.

The Proposed Action restricts the building of new roads and relies on established access to the activity area. Since all required rules and regulations, including final reclamation requirements would be followed to minimize the potential for future hazardous materials releases in the activity area, the Proposed Action would not be expected to result in negative cumulative effects from hazardous waste when combined with past, present, or reasonably foreseeable future actions.

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9 Protection measures identified in Chapter 2, page 2-17 and BMPs a part of SWPPP.

10 Mercury Sulfide is not a mineralogical component of the Raymond Mine ore body, nor has mercury been used on site for the purposes of ore benefication. For discussion regarding the application and implementation of capping, US EPAs Abandoned Mine Site Characterization and Cleanup Handbook, August 2000, Chapter 10-Remediation and Cleanup Options, pp. 10-7 and 10-8. (http://www.epa.gov/superfund/policy/remedy/pdfs/amscch.pdf);
4 CONSULTATION AND COORDINATION

List of Preparers

United States Forest Service, Sawtooth National Forest

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Erika Phillips Fisheries Biologist
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Persons, Groups, and Agencies Consulted

Federal Agencies

Mine Safety Administration
NOAA Fisheries
United States Fish and Wildlife Service
U.S. Army Corp of Engineers

State Agencies

Idaho Department of Fish and Game
Idaho Department of Water Resources
Idaho Department of Environmental Quality
Idaho State Historical Preservation Office

Tribes

Shoshone Bannock Tribe
# REFERENCES


Idaho Department of Environmental Quality (DEQ) 2009a. Idaho Administrative Code IDAPA 58.01.02, Water Quality Standards.


Appendix A:
Water Monitoring Program
Surface Water Monitoring

Raymond Mine – Aurora Tunnel

Background: The Aurora Tunnel represents the lowest elevation of underground mine development at the Raymond Mine. Mining was initiated in the early 1930’s and has continued sporadically through present time. Water derived from rain and snow melt migrate through the highly fractured granite host rock. Water can be seen emanating from joint surfaces and fractures within the granite exposed in the back of the Aurora Tunnel. This water accumulates at the floor of the tunnel, drains out the portal and discharges at the surface. During operations these waters have been redirected or diverted so as not to interfere with surface operations.

The submission of a new Plan of Operation with a 10-year operating period for continued underground mine development has created the need by the Forest Service to establish monitoring protocols for the water discharging from the Aurora Tunnel and additional terms and conditions for environmental protection. These protocols will provide critical data to monitor hydrologic conditions as well as any changes in water chemistry that may impact the environment. The operator will work with the Forest Service to collect and provide this data.

As groundwater monitoring wells do not exist in the area the monitoring program will focus on the existing hydrology relevant to the site; the water draining from the Aurora Tunnel; surface water samples from Emma Creek, both downstream and upstream of the mine; periodic sampling of a nearby unnamed spring within the Emma Creek drainage. This spring has been used in the past by the operator to provide water for the mining operation.

Surface Water Monitoring Program

Table 1 - Surface Water Monitoring Requirements

<table>
<thead>
<tr>
<th>IDENTIFICATION</th>
<th>PARAMETER</th>
<th>FREQUENCY*</th>
<th>REPORTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Emma Creek</td>
<td>Estimated flow (cfs), Record as Flowing/Stagnant/Dry</td>
<td>Sample Frequency to be based upon changes in adit waters. An increase in adit discharge or increase in metals would require additional surface water sampling.</td>
<td>Sample Location downstream and upstream to collect the following: pH, and field Specific Conductance (SC) as Total Dissolved Solids (TDS) and temperature Photos.</td>
</tr>
<tr>
<td>EC-1: Upstream of Mine Site – Sample to be taken below the crossing of access road with Emma Creek</td>
<td>Low flowing or stagnant water conditions collect the following: pH, and field Specific Conductance (SC) as Total Dissolved Solids (TDS) and temperature Photos.</td>
<td>Sample Frequency to be based upon changes in adit waters. An increase in adit discharge or increase in metals would require additional surface water sampling.</td>
<td>Sample Location downstream and upstream to collect the following: pH, and field Specific Conductance (SC) as Total Dissolved Solids (TDS) and temperature Photos.</td>
</tr>
<tr>
<td>EC-2: Downstream of Mine Site – Sample approximately 300 feet below lowest waste rock pile – Sample location flagged on stream bank</td>
<td>Low flowing or stagnant water conditions collect the following: pH, and field Specific Conductance (SC) as Total Dissolved Solids (TDS) and temperature Photos.</td>
<td>Sample Frequency to be based upon changes in adit waters. An increase in adit discharge or increase in metals would require additional surface water sampling.</td>
<td>Sample Location downstream and upstream to collect the following: pH, and field Specific Conductance (SC) as Total Dissolved Solids (TDS) and temperature Photos.</td>
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*The above monitoring frequencies may be exempted during the winter months of each year specifically for times when there are problems with site accessibility and due to dangerous travel conditions. The Operator shall document that local conditions are inaccessible for collecting samples during these periods.
<table>
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<th>PARAMETER</th>
<th>FREQUENCY*</th>
<th>REPORTING</th>
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- For flowing or stagnant water conditions collect the following: pH, and field Specific Conductance (SC) as Total Dissolved Solids (TDS) and temperature.

- Photos

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* The above monitoring frequencies may be exempted during the winter months of each year specifically for times when there are problems with site accessibility and due to dangerous travel conditions. The Operator shall document that local conditions are inaccessible for collecting samples during these periods.

⁺ If analytical results indicate a detrimental change in metals concentration then sampling frequency will increase – Plan of Operations may require modification.
General Monitoring and Reporting Requirements

Monitoring and Sampling Procedures and Protocols shall be consistent with standard “best sampling practices” set by e.g. EPA, USGS, ASTM, etc. The operator will specify what method is being followed and will be consistent with that method throughout the sampling program. The USFS may approve other procedures/protocols based on site specific conditions.

All required reports shall be submitted to the USFS both as a hard copy and electronically. All laboratory analytical results and field data (pH, SC, TDS & temperature) shall be provided in an appropriate spreadsheet format.

SAMPLING AND ANALYSIS REQUIREMENTS:

1. Samples and measurements taken for the purpose of monitoring shall be representative of the monitored activity.
2. For each measurement or sample taken, the Operator shall record the following information:
   a. The exact place, date, and time of the inspection, observation, measurement, or sampling; and
   b. The person(s) who inspected, observed, measured, or sampled.
3. Samples must be taken, preserved, and labeled according to approved methods.
4. Standard environmental monitoring chain of custody procedures must be followed
5. Samples shall be analyzed by a laboratory certified by the state of Idaho. The Operator must identify the certified laboratory used to perform the analyses, laboratory reference number, sample date and laboratory test date in bi-annual reports.
6. The accuracy of analytical results, unless otherwise specified, shall be expressed in mg/L and reliable to at least two (2) significant digits. The analytical methods used must have a lower level of detection equal to or less than one-half the MCL for constituents analyzed.

REPORTING REQUIREMENTS

MONTHLY REPORTS

The Operator shall submit monthly reports which are due to the Forest Service on or before the 15th day of the month following the reporting month and must contain the following:

1. Surface Water Monitoring Program:
   a. Flows (estimated cfs), field pH, and field Specific Conductance (SC) as Total Dissolved Solids (TDS) data. Data shall be provided to Forest Service on the supplied templates.
   b. Flowing/Stagnate/Dry status Data shall be provided to Agencies on the supplied templates.
   c. Photos – Photo documentation showing high flow conditions (May-June) and low to no flow conditions (August – November).
Appendix B:
Issues and Concerns not analyzed in Detail
Effects to Wildlife

Potential effects to wildlife were analyzed and the results documented in and addressed through a separate Wildlife Specialist Report and a Biological Analysis / Biological Evaluation (BA/BE), both of which can be found in the project record. The Wildlife Specialist Report and the BA/BE concluded that, where terrestrial wildlife habitat was present, the proposed mining activity would maintain current conditions for wildlife. Both reports concluded that the proposed mining activity would result in no effect to wildlife species.

In addition to the BA/BE and Wildlife Specialist Report, a preliminary Site Investigation was conducted in August and October 2011 to in part assess ecological risks potentially present at the Raymond Mine. The objective of the investigation, in part, was to screen for and identify any Contaminants of Concern (COCs) in the preexisting waste rock dumps and water draining from the Aurora tunnel that wildlife may be exposed to. The preliminary Site Investigation concluded that, with adherence to project design criteria, management of waste rock material, and requirements of final reclamation, there should be no effects from COCs to wildlife resulting from the proposed action. A summary of the preliminary Site Investigation can be found in the BA/BE. The BA/BE and the detailed Site Investigation reports are included in the project record.

For these reasons, wildlife will not be carried forward as a key issue in this analysis.

Soils

Detrimental soil disturbance (DD) is the alteration of natural soil characteristics that results in immediate or prolonged loss of soil productivity and soil-hydrologic conditions. Determination of DD excludes existing or planned classified transportation facilities, dedicated trails, and landings, mining dumps or excavations, parking areas, developed campgrounds, and other dedicated facilities. Total Soil Resource Commitment (TSRC) is the conversion of a productive site to an essentially non-productive site for a period of more than 50 years. Similar examples include those described above. The Forest Service has limited authority to influence certain activities or uses—such as mining and hydropower development—on its administered lands. However, the agency does have authority to require reasonable terms, conditions, or measures to minimize or mitigate the effects of some of these activities or uses. Based on the description of the proposed action, no new disturbances outside of the existing disturbance footprint of the mine will occur and all disturbances will be reclaimed as part of an approved reclamation plan. Therefore, there would be no net increase and probable decrease to DD and TSRC due to the reclamation requirement and adherence to mine site BMPs.

Mining Claim Validity

The Forest Service is not required to conduct mining claim validity examinations as part of processing plans of operations. While the US has the authority to conduct exams, the results of validity exam on unpatented mining claims located on NFS lands open to mineral entry would have little or no bearing on a Forest’s non-discretionary obligation under the 36 CFR 228A regulations to process a proposed plan of operations.

Travel Analysis

As described in Chapter 2, no new roads will be established under this proposal. The access roads have been long established roads and provide reasonable access to the mining claims as
well as private patented mining claims. There are no proposed changes to the travel routes with this proposal. This access has long been closed to the public and no easement exists with private landowners to provide for access to the public, therefore it will not be evaluated for longer term consideration for inclusion in the Sawtooth Motorized Vehicle Use Map (MVUM). The incorporation of the access road into the MVUM would also be inconsistent with the Roadless Management Theme for the Smokey Mountain IRA.

**Consider implementing the No Action Alternative (denying the project)**

As described in Section 1 of the EA, the FS is required to respond to a proposed PoO to conduct mining operations pursuant to the mining laws. Under 36 CFR 228.5, the FS must determine whether to approve the PoO as it is proposed, or to require changes or additions deemed necessary to meet the requirements of the regulations for environmental protection. Because the FS has no statutory authority to deny the proposed PoO, the No Action Alternative is provided solely as a baseline from which to evaluate the environmental effects of the action alternatives.

**Additional Action Alternatives, based on bonding, should be explored.**

As described in Section 2 of the EA, the Responsible Official will be establish and require bonds for those activities subject to bonding after a decision on the analysis has been issued, but before the project is implemented. Forest Plan management guidelines call for bonding to be sufficient to ensure the full costs of reclamation, reasonable Forest Service administrative costs, restoration of productivity, and maintenance of long term physical, chemical and biological stability. Approved plans would include requirements for regular (annual) review of bonds. To create new alternatives based on bond calculations would be misleading. Bonding procedures are based on regulation and policy and must be followed. The underlying elements of the mining actions would not vary, thus the environmental effects would remain the same – only the amount of the bond would change. Please see Section 2 – “Alternatives Considered but Dismissed from Detailed Analysis” for further explanation.

**Disclosure of costs borne by the Taxpayers**

Regulations at 36 CFR 228.4 (f): The Forest Service will prepare any environmental statements that may be required. An operator may choose to contract the services of a third party contractor to prepare an environmental statement however the Forest Service is required to review these documents. While the Forest Service is not required to outline the cost of the preparation of an environmental statement, that information could be calculated and made available. More importantly, the environmental effects of the mining actions are what drive the analysis, not a cost-benefit analysis. We are required to ensure that “operations are conducted so as, where feasible, to minimize adverse environmental impacts on National Forest surface resources” (36 CFR 228.8). The Forest Service is legally required to respond to the mining proponent’s request to authorize mining based on the proposed plan of operations (36 CFR 228.4).
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Appendix C –
Screening Data from Site Investigation (SI)
Risk Management Criteria (RMC)

BLM has developed multimedia criteria for chemicals of concern at abandoned mine sites (heavy metals - antimony, arsenic, cadmium, copper, lead, manganese, mercury, nickel, selenium, silver, and zinc) as they relate to recreational use and wildlife habitat. These risk management criteria (RMC) provide numerical action levels for metals in environmental media.\textsuperscript{11} They were designed to both assist land managers in making natural resource decisions and to support ecosystem management. When comparing sample results to the RMC, risks were designated as follows:

- Less than RMC (criteria) = low risk;
- 1-10 times the criteria = moderate risk;
- 10-100 times the criteria = high risk; and
- Greater than 100 times the criteria = extremely high risk.

BLM suggests that moderate risk may be addressed by management or institutional controls, whereas high, or extremely high, risk may require remediation. Additionally, the criteria may be used as target cleanup levels if remedial action is undertaken.

The human RMC may be modified to be less stringent if the number of metals present is fewer or if background concentrations are locally elevated. Regarding the ecological risk evaluation, BLM has developed different RMC for different species of wildlife. For this evaluation, the sample concentrations were compared to a median RMC value for each contaminant. The median RMC represents a value appropriate for protecting groups of species as a whole (Ford, 1996).

Rather than develop a site-specific comprehensive risk assessment, the FS believes it is more prudent to use a screening-level assessment with conservative assumptions. A screening-level assessment provides sufficient information to determine what reclamation and mitigation measures should be employed. In the case of the Raymond Mine, where the screening-level assessment indicates that arsenic, cadmium and lead are of concern with respect to human health via the inhalation and incidental ingestion pathways, a judicious course of action is to eliminate these exposure pathways by requiring capping of waste rock piles as part of the reclamation plan. This reclamation requirement would also alleviate any concern with respect to terrestrial ecological receptors, as well as any concern with respect to potential mercury content.\textsuperscript{12}

Relative Bioavailability (RBA)

The concept of Relative Bioavailability is important for all types of contaminants of concern, but is especially important in the case of metals and other inorganics that commonly occur at

\textsuperscript{11} RMC designed to protect human receptors for the metals of concern were developed using available toxicity data and standard U.S. Environmental Protection Agency (EPA) exposure assumptions. RMC designed to protect wildlife receptors for the metals of concern were developed using toxicity values and wildlife intake assumptions reported in the current ecotoxicology literature. Ingestion of soil, sediment, and plants is assumed to be the predominant source of metal exposure for wildlife receptors (Ford, 1996).

\textsuperscript{12} For discussion regarding the application and implementation of capping, US EPAs Abandoned Mine Site Characterization and Cleanup Handbook, August 2000, Chapter 10-Remediation and Cleanup Options, pp 10-7 and 10-8. (http://www.epa.gov/superfund/policy/remedy/pdfs/amscch.pdf);
mining-related sites. This is because metals in soil and mine waste may occur in a wide variety of chemical and physical forms, not all of which are readily absorbed when ingested.

Accurate assessment of the health risks resulting from oral exposure to metals requires knowledge of the amount of metal absorbed from the gastrointestinal tract into the body. When reliable data are available on the bioavailability of metals in a site medium (e.g., soil, dust) this information can be used to improve the accuracy of exposure and risk calculations at that site.

RMCs are based on the conservative assumption that 100% of the substance is bioavailable, even though the geochemical species present in soils at mining sites are expected to be of lower solubility (Ford, 1996). For arsenic, in 26 test materials at a variety of mining and smelting sites in the Rocky Mountain West, U.S. Environmental Protection Agency (EPA) Region 8 found that the relative bioavailability of arsenic ranged from 8 – 61% with a mean of 34%. Of the 26 test materials, only five exceeded 50%, and one exceeded 60%. Based on this and other bioavailability studies, EPA Region 8 has concluded that a relative bioavailability of 50% can be considered a generally conservative default value for arsenic in soil.

The RMC can be considered to be the concentration below which no adverse effects are expected. BLM generated the RMCs using certain exposure assumptions, which are likely overly conservative for the Raymond Mine given the remote location of the mine area, infrequent visitation by recreationists, no dispersed camping, and small and isolated footprint of waste rock material. If actual exposure is less, the RMC for the site can be increased by a proportional amount. For example the BLM’s generic RMC for arsenic is 20 ppm for campers. This value was calculated based on the assumption that a person would camp at the site for 14 days per year for 30 years. If the actual exposure frequency is half (7 days per year for 30 years), the site-specific RMC would be double to 40 ppm.

Similarly, the bioavailability of a contaminant lower than 100% would also proportionally increase the RMC (a person can tolerate higher concentrations if only a portion of the chemical can actually be absorbed into the body). Consider the generic RMC of 20 ppm arsenic for campers. If the bioavailability of arsenic is only 50%, then the site-specific RMC would be raised to 40 ppm (20 ppm divided by 50% bioavailability). These factors (exposure frequency and bioavailability) are multiplicative. Using the example above, beginning with a generic RMC of 20 ppm, then dividing by 50% in consideration of an exposure frequency that is half as much, divide again by 50% in consideration of 50% bioavailability, we calculate a site-specific RMC of 80 ppm.

**Human Health Risk Summary**

**Soil Exposure Pathway**

Arsenic levels measured by field portable X-ray Fluorescence (XRF) in 20 of the 23 total samples from waste rock dumps exceeded the BLM RMCs for workers and campers (Appendix C). Five samples exceeded concentrations for ATV drivers with respect to arsenic. Cadmium concentrations exceeded RMCs for workers and campers in 4 samples. For lead, only 3 samples exceeded concentrations for campers and ATV drivers. Zinc concentrations were well below the RMCs for workers, campers and ATV drivers in all measured locations. Based on comparison with BLM RMCs for campers, ATV drivers and site workers, the risk to human health from
exposure to contaminated waste rock is considered high with respect to arsenic and low to moderate with respect to cadmium and lead. Exposure to other COCs detected in soil and waste rock samples is considered low or inconclusive, where detection limits were above BLM criteria.

**Surface Water Exposure Pathway:**

Analytical results for surface water samples were compared to BLM RMCs for the camper scenario. Camper RMCs were available for all analyzed constituents except barium, chromium and iron. The levels of arsenic, cadmium, copper, lead, mercury, nickel, selenium, silver and zinc were below the RMCs, indicating a low risk to human receptors from surface water at the Site. The surface water ingestion pathway is also incomplete because the creek is not a drinking water source; regardless, the surface water ingestion pathway is not a concern with respect to the existing operation because contaminant levels in creek samples were well below Maximum Contamination Limits (MCLs) and RMCs. There were no measurable contaminant levels in the creek which is protective of human health with respect to fish consumption.

**Groundwater Exposure Pathway**

No groundwater wells exist in the vicinity of the Raymond mine. Samples of the water from the Aurora Tunnel and background samples from a nearby spring may be viewed as discharges of groundwater. An assessment of potential impact to groundwater from acid rock drainage was based on the analysis of waste rock leachate samples. To further evaluate the potential for leaching of metals from the waste rock, a Field Leach Test (FLT) analysis was performed on three of the four composite waste rock samples collected in October 2011. Synthetic Precipitation Leaching Procedure (SPLP) was performed on the same composite samples to compare to the Field Leach Test.

Field Leach Test values were compared to available drinking water MCLs. For the analyzed metals, EPA has established MCLs for arsenic, cadmium, copper, lead and mercury. There are no MCLs for manganese, iron and zinc, but there are secondary MCLs which are non-enforceable drinking water guidelines established for aesthetic concerns. While MCLs are not applicable to the leach test results because leachate is not considered a drinking water source, they are used here to make a determination as to whether metals in the leachate are elevated. Values for manganese were above the secondary MCL action level and therefore are considered elevated for purposes of this evaluation. Arsenic was elevated above the MCL in the leachate sample from the mid-level waste rock dump (LO-4). Arsenic was not elevated in leachate samples from the lower level dumps. Values for all other metals were below the MCLs and indicate that leachate from the rock dumps does not present a threat to groundwater as a non-point source for those metals.

The results of samples collected of adit drainage were also compared to drinking water MCLs and RMCs for campers. This comparison may be more relevant than the FLT/MCL comparison as the spring and adit waters could be viewed as discharges of groundwater rather than simulated

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15 Point and NonPoint Source Pollution, Encyclopedia of Hydrological Sciences, 2005, pp 1427.
leachate. However, it should be noted that neither the sample locations nor the leachate represent actual drinking water sources nor does the test account for sorption and dilution which would occur before a receptor is reached\textsuperscript{16}. The comparison is presented simply to make a determination as to whether metals levels are elevated with respect to drinking water standards. The levels of all analyzed elements were below the drinking water primary and secondary MCLs. Based on the analyses completed to date and continuation of monitoring protocols, the Site has a very low potential to impact groundwater.

**Ecological Risk Summary**

RMCs have been developed for wildlife exposure to six constituents of concern including mercury, arsenic, cadmium, copper, lead, manganese, nickel and zinc. Metals concentrations in waste rock and soil samples were compared to these BLM wildlife RMCs. For the Raymond Mine site, potentially applicable criteria are those for bighorn sheep, mule deer, mallard, elk and deer mouse. For the overall risk evaluation, however, the concentrations were compared to a median RMC value for each contaminant, which represents the criterion appropriate for protecting groups of species.

IDEQ cold water biota criteria for chronic and acute effects were used to evaluate the risk associated with contaminant concentrations in surface water at the Site. Where IDEQ criteria were not available (as was the case for iron and mercury), analytical data were compared to EPA National Recommended Water Quality Criteria for freshwater habitat. Chronic and/or acute aquatic life criteria were available for all analyzed constituents except for barium. The stream sediment and groundwater exposure pathways were not considered. Tables are presented in Appendix C and results of the ecological risk evaluation are summarized below.

**Soil Exposure Pathway**

No milling or ore beneficiation has occurred on site that would require the use of mercury for amalgamation or separation processes and mercury is not a mineral constituent of the ore body thus Mercury was not analyzed using field XRF. The risk levels for copper were determined to be low for ecological receptors. Risk from manganese, antimony, nickel, selenium, and silver in soil could not be assessed because there are no ecological RMCs for these metals. The risk level for lead was determined to be moderate. The majority of XRF samples suggest moderate risk levels however four sample locations indicate high risk to ecological receptors. The risk level for zinc was determined to be moderate. The risk level for cadmium was determined to be high in seven of 23 waste rock locations. All other samples returned values below detection limits. The information presented is relevant to fauna only. While the existing impacted area is small, the volume of waste rock will expand slightly within the existing footprint during mining. The cadmium levels would be of concern if no reclamation (ie: clean cover) were required. Reclamation and capping waste rock with clean cover material eliminates this risk\textsuperscript{17}.

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\textsuperscript{16} Natural attenuation processes important at mining sites include pH buffering and acid neutralization, adsorption at the mineral-water interface, mineral precipitation, and dilution/dispersion (Wilkin, R. 2007, EPA National Risk Management Research Laboratory)

\textsuperscript{17} At the Eureka Mills National Priorities List Site in Utah, EPA and Utah DEQ oversaw the capping of lead- and arsenic-contaminated mine waste piles with soil or rock covers. Cleanup was completed in 2009. See description at [http://www.deq.utah.gov/envrpt/cleanland/toxicchemicals.htm](http://www.deq.utah.gov/envrpt/cleanland/toxicchemicals.htm). For relevant excerpt from the 2002 Record of Decision see [http://www.epa.gov/superfund/sites/rods/fulltext/r0802069.pdf](http://www.epa.gov/superfund/sites/rods/fulltext/r0802069.pdf).
**Surface Water Exposure Pathway**

A comparison of surface water samples collected from Emma Creek above and below the Raymond Mine to the IDEQ cold water biota criteria indicate that the levels of metals were below the acute and chronic criteria, indicating a low risk to aquatic life. There were no confirmed exceedances for any contaminants of concern. Cadmium, copper, iron, manganese, mercury, nickel, selenium, and silver were not detected in the samples. The detection limit for cadmium was above the acute and chronic criteria so a determination cannot be made with respect to either category. The detection limits for lead were below the acute criteria but above the chronic criteria.

The surface water ingestion pathway is incomplete because the creek is not a drinking water source. Regardless, the surface water ingestion pathway is not a concern with respect to the existing operation because contaminant levels in creek samples were below MCLs and RMCs. Contaminant levels in the creek were also below surface water quality criteria, which are protective of human health with respect to fish consumption.

**Groundwater Exposure Pathway**

Although no groundwater samples have been collected from the site, an indirect evaluation can be made regarding ecological risk of exposure to groundwater based on analytical results for waste rock leachate. Leachate from FLT analysis of composite waste rock samples was analyzed for a list of primary and secondary inorganic chemical (IOC) contaminants. Metals concentrations were compared to IDEQ Cold Water Biota Standards. This comparison indicates that zinc concentrations in waste rock leachate from composites collected from the lowest waste rock dump exceed the IDEQ cold water biota standards for acute and chronic exposures. However, the groundwater ingestion pathway is incomplete because a drinking water well installation to further characterize groundwater would be unlikely given the remote location of the site and the surface disturbance created in order to support drilling equipment in the roadless area. Geologic conditions, including the impermeable granitic host rocks and the short resident time for surface water to infiltrate at the high elevation at the mine site would also preclude a successful well construction that would contribute to the collection of meaningful data. Nevertheless, it is unlikely that MCLs would be exceeded in a perceived future well, considering that sorption and dilution would reduce contaminant levels.¹⁸

There is no regulatory threshold or guideline for FLT results. The results were compared to cold water biota criteria because the stream is the closest receptor. If the FLT results were below the criteria, there would be no concern. But having the higher results is not necessarily cause for concern. The elevated zinc would have to reach the receiving stream in sufficient volumes and concentrations to adversely impact the stream. The in-stream results are most relevant.

¹⁸ Additional Discussion regarding fate and transport of metals and natural attenuation as a remedial alternative see [http://www.epa.gov/superfund/health/conmedia/gwdocs/pdfs/proto1.pdf](http://www.epa.gov/superfund/health/conmedia/gwdocs/pdfs/proto1.pdf)
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**XRF Soil Sampling Results Compared to BLM Risk Management Criteria**

- **Low Risk**: <1 times the lowest RMC value
- **Moderate Risk**: 1-10 times the lowest RMC value
- **High Risk**: 10-100 times the lowest RMC value
- **Extremely High Risk**: >100 times the lowest RMC value

**Laboratory Results Available**

- Overrides XFR result
- Higher than RMC Value indicates detection limit
### Analysis of leachate from Field Leach Test (FLT) and SPLP compared to IDEQ Cold Water Biota Standards and MCLs.

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<tr>
<th>Constituent</th>
<th>IDEQ Cold Water Biota Standard - CMC (Acute)</th>
<th>IDEQ Cold Water Biota Standard - CCC (Chronic)</th>
<th>IDEQ Groundwater Standard (T)</th>
<th>IDEQ Drinking Water Standard MCL (mg/L)</th>
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<td>0.00479 &lt;0.025</td>
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<td>0.084 0.144</td>
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<td>LO-4 Composite: Dump below mid-level adit (FLT)</td>
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**Notes:**
- ND - Not Detected within sensitivity of instrument
- *secondary MCL

Yellow shading indicates that the sample concentration exceeded the MCL or action level.

Orange shading indicates sample exceeds both acute and chronic standards (assuming a hardness of 25 mg/L (CaCO3)).

Green shading indicates sample exceeds chronic standards (assuming a hardness of 25 mg/L (CaCO3)).
## Total Recoverable Metals Analysis from Aurora Tunnel adit drainage

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* secondary MCL (T) - Standard in Total (H) - Hardness dependent *25 mg/L