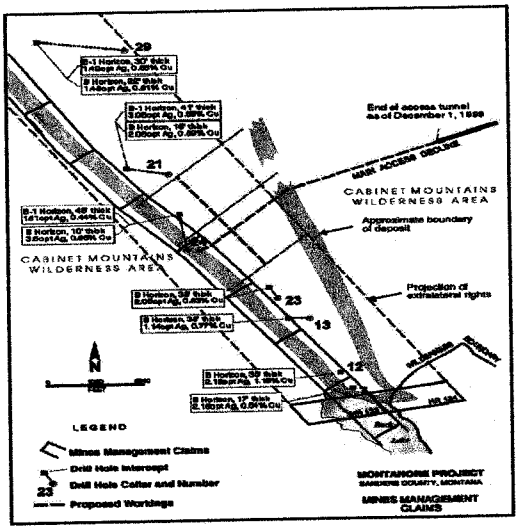
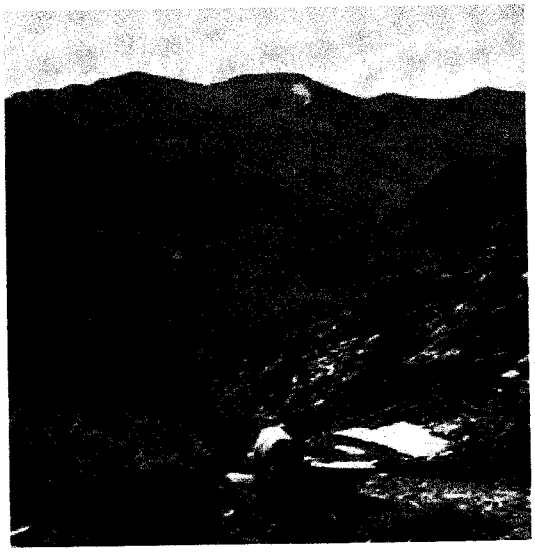
MONTANORE PROJECT

AMENDED APPLICATION

HARD ROCK OPERATING PERMIT

AMENDED PLAN OF OPERATIONS





Appendix G – Visual

Appendix H – Noise

Appendix I Socioeconomics

December 2004

Mines Management, Inc.

VISUAL RESOURCE

VISUAL RESOURCES STUDY

MONTANA PROJECT

BEAR CREEK ROAD (U.S.F.S. #278)

Prepared for:

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August 17, 1989

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

map 52

VISUAL RESOURCES STUDY

MONTANA PROJECT

BEAR CREEK ROAD (U.S.F.S. #278)

1.1 INTRODUCTION

In response to the DSL Completeness Review Comments (June 30, 1989), the visual resource inventory for Bear Creek Road is provided as per the approved Plan of Study in this report. A field inventory was conducted July 27, 1989 with Jon Jeresek, visual resource specialist, U.S. Forest Service (USFS). Portions of the inventory were previously compiled and are displayed in Appendix G, Volume 7, Visual Resource Baseline Study of the Noranda Permit Application. References will be made regarding the baseline information supplied in Appendix G. The length of the Bear Creek Road segment studied is 13.6 miles. The mill site access road would depart the Bear Creek Road at milepost 13.6 and extend south and west to Ramsey Creek. Table 1.1 summarizes the results of the baseline inventory.

1.2 BASELINE INVENTORY

The Bear Creek Road includes two variety classes. Mileposts (MP) 0.0-8.0 and 9.9 to the mill site are class B. The segment from 8.0 to 9.9 is classified as Class C (see map 1, Appendix G). The Bear Creek Road is recognized by the Forest Service as a sensitivity level two (see Map 2, Appendix G). The visual quality objectives (VQO) is mixed between retention and partial retention. Retention (R) occurs between MPs 1.2-2.4, MPs 3.6-10.4 and MPs 13.6 to the mill site.

TABLE 1.1 VISUAL RESOURCES SUMMARY

BEAR CREEK ROAD

Inventory Category	Description by Milepost		
Variety Class	B/0.0-8.0	B/9.9-mill site	
	C/8.0-9.9		
Sensitivity Level	Two		
Visual Quality Objectives (VQO)	*R/1.2-2.4	R/3.6-10.4	R/13.6-mill site
	**PR/0.0-1.2	PR/2.4-3.6	PR/10.4-13.6
Visual Absorption Capability (VAC)	Unit 7/0.0-3.0	(moderate to high)	
	Unit 6/3.0-6.5	(moderate)	
	Unit 3/6.5-mouth Ramsey Creek	(moderate to high)	
Visibility of Road	low/0.0-9.0	low/9.2-10.4	
	low/10.9-13.6	mod.to high/9.0-9.2	
	mod.to high/10.4-10.9		
	13.6-mill site ?		

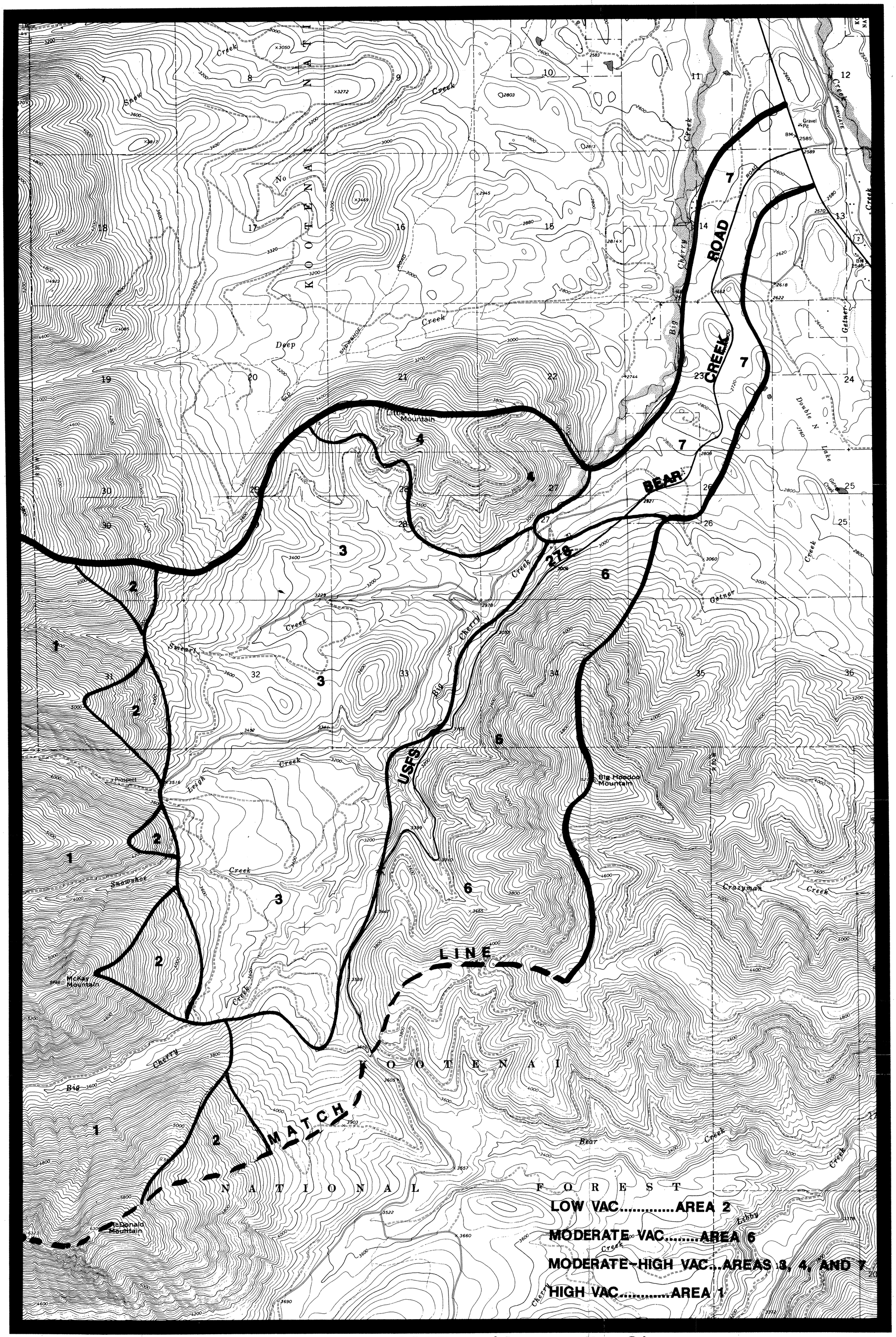
* R: retention

** PR: partial retention

Partial retention (PR) VQO is located at MPs 0.0-1.2, 2.4-3.6 and 10.4-13.6 (see Map 3, Appendix G). The inventory process for variety class, sensitivity levels, and visual quality objectives are described in Appendix G.

The visual absorption capability (VAC) for the Bear Creek road crosses three different landscape units: Valley Plain (Unit 7, moderate to high VAC, MPs 0.0-3.0), Vegetated Mountain Faces (Unit 6, moderate VAC, MPs 3.0-6.5) and Intermountain Valley Floor (Unit 3, moderate to high VAC, MP 6.5 to mouth of Ramsey Creek) (see Map 4, Appendix G). The VAC process is described in Appendix G. The VAC for the northern portion of the Bear Creek Road is displayed on Figure 1.1. The computerized visibility analysis generated for the permit application (Map 5, Appendix G) shows that from the eleven viewing locations studied, including three within the Cabinet Mountains Wilderness, most of the Bear Creek Road was rated low visibility (seen from 1 to 2 viewpoints). The segments MP 9.0-9.2 and MP 10.4-10.9 were moderately to high visibility (seen from 5 to 6 viewpoints).

Two vista points were identified. Both vista points are panoramic views of the Cabinet Mountain range. These are located at MP 6.4 and MP 7.8.



MAP 5a(Appendix G)

VISUAL RESOURCE STUDY

VMS INVENTORY

VISUAL ABSORPTION CAPABILITY

SUMMER 1989

NORANDA MINERAL CORP. MONTANA PROJECT
LINCOLN COUNTY AND SANDERS COUNTY, MONTANA

Prepared by: R.D.S. Date: 8/21/89

Fig 1-1

5A

Visual Resource Baseline Study
Montana Project
Lincoln County, Montana

Prepared for

Noranda Minerals Corp.

Libby, Montana

February 1989

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF MAPS

LIST OF APPENDICES

SUMMARY

The results of the visual resource baseline are displayed in Table 3-1 and summarized below. All plant site alternatives are located in variety Class A. The Little Cherry Creek tailing disposal site alternative is found in variety Class B and C. The Poorman Creek alternative is in variety Class B. The northern transmission line alternative is in variety Classes A, B and C and the southern alternative is located in variety Classes A and B.

All plant site alternatives contain hiking trails which are defined as sensitivity Level 1 travel routes. However, these trails are not regarded by USFS as major access ways into the Cabinet Mountains Wilderness. Poorman Creek tailing disposal site alternative is located in sensitivity Level 2 and 3 and Little Cherry Creek is in sensitivity Level 2. The northern transmission line alternative generally parallels a private logging haul road not maintained for public use and a Level 2 sensitivity forest road. The southern alternative generally follows US Highway 2, Level 1 sensitivity, and a Level 3 sensitivity USFS road.

Majority of all project facilities which are seen are located in the middleground distance zone. Portions of both transmission line routing alternatives are in foreground or middleground distance zones.

The visual quality objective (VQO) for Libby Creek and Ramsey Creek plant site alternatives is Retention. The VQO for Rock Creek is Modification-Maximum Modification. Both Little Cherry and Poorman Creek tailing disposal alternatives are located in mostly Partial Retention. The northern transmission line alternative contains 7.8 miles of Retention and 0.6 miles of Partial Retention VQOs. The southern transmission line alternative is located in 6.4 miles of Retention, 0.6 miles of Partial Retention and 2.0 miles of Modification-Maximum Modification.

The Rock Creek plant site alternative was rated as very low visibility. Both Ramsey Creek and Libby Creek plant site alternatives were rated low visibility. Little Cherry Creek tailing disposal site alternative was rated moderate visibility and Poorman Creek alternative moderate to high. The southern transmission line alternative was rated mostly low to moderate visibility. The northern transmission line alternative was rated low with segments having moderate visibility levels.

The visual absorption capability (VAC) for all plant site alternatives was rated high. The VAC for both tailing disposal site alternatives was moderate to high. The VAC for both transmission line routing alternatives was rated moderate to high. Mostly high VAC was recorded for locations of the tailing pipeline and access roads.

1.0 INTRODUCTION

The Montana Project visual resource baseline study was conducted to examine potential environment impact brought about by the proposed mining project. Visual resources are defined in the study as visually sensitive use areas where the maintenance of the surrounding visual environment is important to people's enjoyment or use of an area; and general landscapes having natural scenic values. The study was prepared to describe the visual resources of the study area as defined in the approved Plan of Study for the Montana Project. In addition to the baseline inventory a discussion is presented on the mitigation principles and general techniques to reduce visual contrast. Specific mitigation planning will be described in the Montana Project EIS. A copy of Section 12, Visual Resources, of the Plan of Study is presented in Appendix A.

The project facilities for the proposed Montana Project study include three alternative plant sites, two alternative tailing disposal sites and two alternative transmission powerline corridors. The alternative plant sites include Alternative G, located in the upper portion of Libby Creek, Alternative H, located in the upper portion of Ramsey Creek, and Alternative F, located in the upper portion of Rock Creek drainage. The alternative tailing disposal sites are located adjacent to each other. The Poorman Creek Alternative is located adjacent to the north and west of the Poorman Creek and Libby Creek confluence. The Little Cherry Creek Alternative is located in the Little Cherry Creek drainage adjacent to the north and west of the Poorman Creek Alternative. These facility locations are displayed in Figure 2-1 of the Project Description (Section 2.0).

An electrical transmission line would be routed to the plant site. The two routing alternatives include a northern alternative originating north of Libby, then paralleling a private logging road south to either Libby or Ramsey Creek plant site. The northern alternative ranges in length from 24.5 miles for Ramsey Creek site to 25.6 miles for Libby Creek site. The

southern alternative would originate near Sedlak Park in Pleasant Valley and would connect northwest to one of the plant site alternatives. The length of the southern alternative ranges from 15.5 miles for the Libby Creek site to 16.4 miles for the Ramsey Creek site.

2.1 OVERVIEW

This baseline study was initiated by U.S. Borax as part of the licensing requirements for the development and mining of a silver/copper deposit located underneath the Cabinet Mountains Wilderness Area in the Kootenai National Forest, Sanders and Lincoln Counties, Montana. Whereas the State of Montana, Department of State land and the Kootenai National Forest have primary responsibility for permitting these activities, the two agencies and U.S. Borax developed a Plan of Study that defined the nature and extent of the baseline work. This work was initiated in the Spring of 1988 and has been conducted in accordance with the terms of the Plan of Study.

A number of alternative sites were identified for portals, processing plant, tailing disposal and ancillary facilities. The area encompassing and adjacent to these sites then became the focus of the baseline work (see Figure 2-1).

In September of 1988 Noranda Minerals Corp. and Montana Reserves formed a venture and purchased the silver/copper deposit from U.S. Borax and continued with project development under the "Montana Project" name. Noranda Minerals Corp. (Noranda) was designated the project manager.

Noranda continued to build from the data and information that had been generated by U.S. Borax and after reviewing the many alternative sites developed the proposed mining program detailed in the Application for a Hard Rock Operating Permit from the Montana Dept. of State Lands. The application also serves as a proposed Plan of Operation to the Kootenai National Forest. Basically, the application describes a 20,000 ton per day operation accessed from two (twin) portals in Ramsey Creek, a mill site located adjacent to the Ramsey Creek drainage for ventilation and emergency access, and a tailing impoundment in the Little Cherry Creek drainage.

Access to the Ramsey Creek mine site would be over the existing Bear Creek Road. A new transmission line from Pleasant Valley to the mine site would provide electrical energy for the operation. The total labor force is expected to number approximately 400 people. These positions would be filled by hiring locally as much as possible.

3.1 METHODS

The objectives of the visual resource baseline inventory were to identify, describe, and map all significant visual resources which may be affected by the construction and operation of the proposed silver/copper mine and ancillary facilities. The baseline data were recorded in sufficient detail for assessment of direct and indirect impacts of the project. The visual resource study was conducted in compliance with federal guidelines established by the Forest Service Visual Management System and was designed to provide information suitable for inclusion in the Montana Project EIS.

This investigation addressed an area of visual influence containing the proposed alternatives and activities associated with the construction and operation of a silver/copper mine, tailing disposal site, and linear facilities including a transmission line, tailing pipeline and access road. The study area was defined by means of a generalized visual analysis of the relationship of the alternative plant sites, tailing disposal sites and alternative linear facilities to the surrounding topographic and vegetative patterns. The purpose of the analysis was to describe the existing visual condition of the affected landscape and identify potential obstructions or modifications of present views. The United States Forest Service (USFS), Kootenai National Forest and Kaniksu National Forest conducted in 1981 a visual resource inventory which includes the study area. The USFS Visual Management System (VMS) included inventories of variety classes, sensitivity levels for travel routes, visual quality objectives (VQO) and visual absorption capability (VAC). The inventories with the exception of the VAC inventory were compiled from existing USFS data. The VAC inventory was developed by Woodward-Clyde Consultants with the assistance of the USFS. Appendix B is a glossary of visual resource terminology commonly used throughout this report.

3.2 INVENTORY PROCESS

3.2.1 Variety Class

Levels of variety classes (scenic quality) were based on a set of VMS criteria used in interpreting visual characteristics present in the landscape. The USFS' Visual Management System (VMS) establishes the scenic quality of landscapes into units and subunits through an analysis of landscape character types and landscape character subtypes. Landscape character type is a unit of physiographic area having common landscape features of landforms, rock formations, water forms, and vegetative patterns. Its delineation is based upon physiographic sections as described by Nevin M. Fenneman (1931). The importance of the character type is its establishment of a regional framework in which the scenic quality of a specific area can be determined.

Landscape character subtypes are local refinements of a particular landscape type. Landscape character subtypes have been defined as divisions of major character types which are significantly different in visual character from each other. The subtypes are used to identify portions of major character types having different degrees of visual diversity.

The characteristic landscape is the naturally established landscape being viewed. It visually represents the basic vegetative patterns, landforms, rock formations and water forms which are in view. It usually makes up a small portion of a character subtype depending on how much is viewed. The following considerations developed by the USFS are critical physical and perceptual factors in evaluating and ranking scenic values in the characteristic landscape.

- Expected Images Exist - Although studies of people's images of forest areas result in varied response from one geographic region to another, one factor generally remains constant. People expect to see a naturally appearing landscape character within each general region.

- Aesthetic Concern Varies - Aesthetic concern varies among forest users. Those people most concerned about aesthetics are those who are in an area because of, or have a major interest in, the scenic qualities, e.g., recreation area visitors and travelers.

- View Duration Is Critical - The visual impacts of project activities increase as the duration of view increases.

- Number of Viewers Is Critical - The visual impacts of a project activities become more important as the actual or potential number of viewers increases.

- All Lands Are Viewed - Because all National Forest lands can be seen from aircraft or high vista points, a minimum visual quality objective should be determined.

- Viewing Distance Is Critical - The visual impact of project activities usually increases as viewing distance decreases.

- Viewing Angle Is Critical - Visual impact of project activities increases as the viewer's line of sight tends to become perpendicular to the slope upon which a proposed activity is to take place.

- Diverse Landscape Character Is Important - All landscapes have a definable character and those with the greatest variety or diversity have the greatest potential for high scenic value.

- Retention Of Character Is Desirable - Landscapes with distinctive variety in form, line, color and/or texture should be retained and perpetuated.

- Focus Of Viewer Attention Is Critical - The visual impact of proposed activities increases as the amount of landscape alteration increases.

- Alteration of Character May Be Desired - Landscapes with little or no variety may be enhanced by alteration.

Through an examination of USGS 7.5 minute topographic quadrangle sheets, color aerial photographs, USFS visual resource inventory, field reconnaissance, and Fenneman's (1931) description of physiographic provinces, landscape types and subtypes were delineated.

For each landscape subtype variety classes have been determined by classifying lands which are most important from those lands which are of lesser value from only the standpoint of scenic quality of the natural landscape. The classification is based on the premise that all landscapes have some value, but those with the most variety or diversity have the greatest potential for high scenic value.

The degrees of visual diversity are termed "variety classes" in the VMS system, and provide a means of measuring inherent scenic quality. There are three variety classes recognized by the USFS:

Class A - Distinctive - areas where features of landform, vegetative patterns, water forms, and rock formations are of unusual or outstanding visual quality. They are usually not common in the character type.

Class B - Common - areas where features contain variety in form, line, color and texture or combinations thereof but which tend to be common throughout the character type and are not outstanding in visual quality.

Class C - Minimal - areas whose features have little change in form, line, color or texture. Includes all areas not found under Classes A or B.

Variety class evaluations were supplemented by an inventory of cultural modifications including such areas as clearcut harvesting. The USFS mapped data were verified with ground reconnaissance to refine variety class mapping.

3.2.2 Visual Sensitivity

The Forest Service visual sensitivity inventory was based on identification and evaluation of road and trail activity and sensitive land uses and cultural features. User volume data were examined to define numbers of viewers present along travel routes in the study area. Additionally, judgments about attitudes of residents and visitors toward visual change in the study area were compiled.

Sensitivity levels were identified in the study area. The sensitivity level most sensitive to the visual resource is Level 1. These areas include all seen areas from primary travel routes where a significant number of users or travels have a major concern for the scenic qualities. Sensitivity Level 1 includes all primary roads including major highways and primary hiking trails leading into the Cabinet Mountains Wilderness.

Sensitivity Level 2 is where a smaller volume of travelers and visitors have concern for scenic qualities that are seen from travel routes or use areas. Sensitivity Level 3 includes all seen areas from travel routes and use areas which very few users or travelers have concern for scenic quality.

3.2.3 Distance Zone

A distance zone inventory to the alternative project sites, tailing disposal sites and transmission lines was based on the physical viewing distances of the alternative project facilities from travel routes and use areas. Ground reconnaissance was used to develop and verify the extent of visibility, visual frequency, and visual distances of the alternative project facilities.

There are three identifiable distance zone levels recognized by the USFS; foreground, middleground and background. Foreground distance zone is the visible area which extends from the observer out to 1/4 to 1/2 mile away from the observer. Normal foreground visual limits will include discernable texture and individual landscape forms. Middleground extends from the area visible from the foreground zone to 3 to 5 miles from the observer. The outer boundary of the zone is defined as the area where texture and form of individual shrubs and trees are no longer apparent in the landscape. Texture is more characteristic in masses of tree stands of uniform tree cover. Individual tree forms are only distinguishable in very open or sparse stands or in open areas and edges of clearcut harvesting. Background zone is the seen area which ranges from middleground to infinity. Texture in uniform tree stands of tree cover are weak or not discernible. In open, sparse, or areas of clearcut activity texture is seen as groups or patterns of trees.

3.2.4 Visual Quality Objective

The USFS combines the component inventories into Visual Quality Objectives (VQO). VQOs are standards by which visual resources of an area are managed by the USFS. VQO levels are determined by synthesizing in matrix form the inventories of variety classes (scenic quality), visual sensitivity, and distance zones. A VMS rating system is applied to distinguish VQO levels. Each VQO level describes a different degree of modification allowed in the basic elements of the landscape. VQO levels are broken down by the USFS into five classes:

PRESERVATION P

This visual quality objective allows ecological changes only. Proposed activities, except for very low visual impact recreation facilities, are prohibited.

This objective applies to Wilderness areas, primitive areas, other special classified areas, areas awaiting classification and some unique forest management units which justify special classification.

RETENTION R

This visual quality objective provides for the management of proposed activities which are not visually evident.

Under Retention activities may only repeat form, line, color, and texture which are frequently found in the characteristic landscape. Changes in their qualities of size, amount, intensity, direction, pattern, etc., should not be evident.

Immediate reduction in form, line, color, and texture contrast in order to meet Retention should be accomplished either during construction or

immediately after. It may be done by such means as seeding vegetative clearings and cut-or-fill slopes, hand planting of large stock, painting structures, etc.

PARTIAL RETENTION PR

Management of proposed activities remain visually subordinate to the characteristic landscape according to the partial retention visual quality objective.

Activities may repeat form, line, color, or texture common to the characteristic landscape but changes in their qualities of size, amount, intensity, direction, pattern, etc., remain visually subordinate to the characteristic landscape.

Activities may also introduce form, line, color, or texture which are found infrequently or not at all in the characteristic landscape, but they should remain subordinate to the visual strength of the characteristic landscape.

Reduction in form, line, color and texture to meet partial retention should be accomplished as soon as possible after project construction completion or at a minimum within the first year of operation.

MODIFICATION M

Under the modification visual quality objective management of proposed activities may visually dominate the existing characteristic landscape. However, activities which alter vegetative and landform must borrow from naturally established form, line, color, or texture and at such a scale that its visual characteristics are those of natural occurrences within the surrounding area of character type. Additional parts of these activities such as structures, roads, slash, cuts and fills, etc., must remain visually subordinate.

Activities which are predominately introduction of facilities such as buildings, signs, roads, etc., should borrow naturally established form, line, color and texture that its visual characteristics are compatible with the natural surroundings. Reduction in form, line, color, and texture should be accomplished in the first year of operation

MAXIMUM MODIFICATION MM

Management activities of vegetative and landform alterations may dominate the characteristic landscape. However, when viewed as background, the visual characteristics must be those of natural occurrences within the surrounding area or character type. When viewed as foreground or middle ground, they may not appear to completely borrow from naturally established form, line, color or texture. Alterations may also be out of scale or contain detail which is incongruent with natural occurrences as seen in foreground or middleground.

Introduction of additional parts of these activities such as structures, roads, slash, and root wads must remain visually subordinate to the proposed composition as viewed in background.

These visual quality objectives are keyed to the values set forth in the variety classes and sensitivity levels. Except for preservation, each describes a different degree of acceptable alteration of the natural landscape based upon the importance of aesthetics. The degree of alteration is measured in terms of visual contrast with the surrounding natural landscape.

3.2.5 Visual Absorption Capability

Each characteristic landscape has some capability to accept alteration without losing its inherent visual character. Within the study area, this

capability results from the interaction of the physical factors vegetation, topography, and soil productivity. For example interactions would include and the ability for vegetation to recover after disturbances. Additionally perceptual factors are critical. These include viewer position, viewer duration, number of viewpoints, whether views are parallel or perpendicular to the slope, and number of viewers.

In order to determine the visual impact of the proposed alternatives, the extent of the change that can take place in the landscape without affecting its natural visual character must be considered. This capability is called the Visual Absorption Capability (VAC). The Visual Absorption Capability determines the extent to which project activity changes can take place in the landscape while maintaining the visual quality objectives. In some landscapes, it may be easier to meet a retention objective than modification objective due to the physical capability of the land to visually absorb a specific project activity. The VAC provides a basis to determine whether or not landscape modifications can meet the established Visual Quality Objectives, or how well the landscape will recover visually from such modifications.

Lands managed by the USFS vary in their capability to absorb visual modification. Different landscape types have unique characteristics and no standard analysis can be established which applies to all landscapes. A VAC inventory was conducted by USFS for the entire forest during 1981-1983. After field verification of the VAC inventory it was found to be very general and did not accurately reflect the correct VAC levels for the project area. No supporting documentation to the VAC inventory was available from the USFS. Therefore with the assistance of the USFS the VAC inventory was revised by Woodward-Clyde Consultants for the project area.

The Visual Absorption Capability revised inventory identified nine physical or perceptual conditions that have been evaluated to establish the VAC for the study area. Following is a brief description of the physical and

perceptual factors inventoried for the project area and its effect on the Visual Absorption Capability:

1. Landform Diversity

   Landscapes of greater diversity or variety have a higher capability to absorb visual modification. Project activities on uniform landforms have a higher potential for creating contrasts in form, line, color, and texture. Also, depending on the observer's position, areas behind rises in topography may not be seen.

2. Aspect Relative to Viewer

   The apparent size and visual impact of the silver/copper mine development activity is directly related to the angle between the viewer's line-of-sight and the slope being viewed. As this angle nears 90° to the observer's line of sight, the activity reaches its maximum visual exposure.

3. Slope

   The apparent size of the activity is directly related to the vertical angle at which it is being viewed. Project activities on lands with steeper slopes are generally more visible than those on lesser slopes. Also, lesser slopes generally have a higher capability to revegetate after being disturbed than steeper slopes.

4. Aspect

   For the latitude of the study areas, the sun's rays strike the soil much more obliquely on the north-facing slopes than on the south-facing slopes. Therefore, more moisture is retained on the

north-facing slopes, making their vegetative regeneration potential substantially greater. A project activity on a north-facing slope may meet a higher visual quality objective than the same activity on a south-facing slope because vegetative screening is obtained much sooner.

5. Soil Productivity Relative to Growth Rates

Landscapes with suitable soils, soil depths, and growing conditions have higher capabilities to absorb visual modification than landscapes with soils of low fertility and shallow soils.

6. Potential Soil Color Contrast

Lands with the least color contrasts between subsoils or freshly exposed rock and the existing surface with vegetative colors have the highest capability to absorb visual modification.

7. Erosion Hazard Ratings and Soil Stability

Stable landscapes have higher capabilities to absorb visual modification than unstable landscapes due to better vegetative regeneration.

8. Vegetation

Even-age stands of trees and landscapes with little variety in vegetative forms, colors and textures have less capability to absorb a visual modification than landscapes with a high percent of vegetation class variety.

9. Vegetative Height and Density

The potential screening ability of vegetation is directly proportional to its height and density. Relatively tall, denser stands of trees have a higher capability to absorb visual modification due to their lower transparency. However, this does not apply when the observer viewing project activities from a higher elevation or viewpoint.

The process for revising the VAC map included interpretation and analysis, with the assistance of USFS, using stereo aerial photographs, orthophoto quadrangle maps, and vegetative cover-type maps. Each of the inventoried variables was drawn manually on an overlay with appropriate ratings. A set of computer generated visibility map overlays were prepared. After weighting these overlays, a composite VAC map was developed manually.

The degree to which constructed features on the landscape adversely affects scenic quality depends upon the amount of visual contrast created between the facilities proposed for construction and the existing landscape character. Consideration of the ability of the landscape to absorb visual change must also be considered. The amount of contrast between a proposed project and the existing landscape character can be measured by separating the landscape into its major features (land and water surface, vegetation, and structures), and then predicting the magnitude of change in contrast to each of the basic elements (form, line, color, and texture) to each of the features. Assessing the project's contrast in this manner indicates the severity of impact and guides the development of mitigation measures to reduce the contrast to the point where the requirements of the VQO classes may potentially be met.

In order to minimize visual impacts of the construction and operation of the project facilities, mitigation planning should be considered. There are three basic principles of mitigation techniques: 1) strategic

location; 2) minimization of disturbance; and 3) repetition of the basic landscape elements (form, line, color, texture). Through proper implementation of these principles visual contrast can be significantly reduced.

3.3 INVENTORY RESULTS

This section provides a description of inventory results of the visual resource investigation. Maps have been prepared displaying inventories of variety classes, sensitivity levels, distance zones, visual quality objectives and visual absorption capability and are included in this report.

3.3.1 Variety Class

The study area is located in the Columbia Rockies section (landscape type) of the Northern Rocky Mountain Physiographic Province (Fenneman, 1931). Four landscape character subtypes were identified including 1: Cabinet Mountain Valleys, 2) Intermountain Valley, 3) Mountain Terrain, and 4) Valley Plain. The first subtype is the deeply dissected Cabinet Mountain valleys and uplands comprised mainly of quartzitic rock and some granite rocks. The visual character of the Cabinet Mountains, particularly the much higher peaks, have been sculptured by glacial activity which contain narrow ridges and steep slopes. Much of this subtype is visually unmodified and protected as wilderness. The alternative plant sites (Libby, Ramsey and Rock Creek) are located at the base of this character subtype. The second subtype is an intermountain valley or basin. This subtype contains numerous and visually evident modifications consisting of clearcut harvesting and roads. Riparian stands are lined along drainage bottoms. The alternative tailing disposal sites and portions of transmission corridors are located in this landscape subtype. Adjacent to the north and east of the intermountain basin lies a third character subtype identified as mountain terrain. The mountain terrain supports both open

and vegetated faces. The open faces include rock outcrops. The vegetated faces include nearly homogeneous stands of lodge pole/hemlock/Douglas fir forest. Clear cut harvesting dominates some mountain faces. Horse Mountain is located in this subtype. Portions of both transmission alternatives are found here. The valley plain landscape subtype consists of the Libby and Miller Creek drainages and the Fisher River. This area ranges from narrow to broad flat bottoms with side drainages and separated by steep rolling ridges. Numerous modifications are evident including clearcut harvesting, pasture lands, residential areas, roads, overhead electrical and telephone lines. A portion of the transmission alternatives are located here.

As displayed on Map 1, most of the study area is located in Class B variety class. However, the alternative plant sites including Libby Creek, Ramsey Creek and Rock Creek are found in variety Class A. Poorman Creek alternative tailing disposal site is located in variety Class B. North half of Little Cherry Creek tailing disposal alternative is found in variety Class C and the south half is Class B. The northern transmission line alternative is mostly contained in Class B with some portions in Class C. The Southern Alternative is contained entirely in variety Class B.

3.3.2 Visual Sensitivity and Distance Zones

Map 2 illustrates locations of all inventoried sensitivity levels for travel routes in the study area. The USFS identified two categories of sensitivity Level 1 travel routes. These include U.S. Highway 2 and hiking trails leading to the Cabinet Mountains Wilderness. These hiking trails include Poorman, Ramsey, Libby and Rock Creek trails. Level 2 travel routes included State Route 482 and USFS roads of 278, 231, 4779, and portions of 2317, 4781, 6201 and 2316. Level 3 sensitivity travel routes included USFS roads 6212, 4774, 4776, 385, 4725, 4724 and hiking trails of Libby Creek Divide (716) and Teeters Peak (300) and trail 505.

Most of the alternative project facilities are located in primarily the middleground distance zone. The alternative transmission line corridors are located in foreground, as well as middleground zones.

3.3.3 Visual Quality Objectives

All Visual Quality Objective classes are represented in the study area and are displayed on Map 3. The Cabinet Mountains Wilderness is located in Preservation. Two of the alternative plant sites, Libby Creek and Ramsey Creek are located in Retention. The Rock Creek site is located in Modification-Maximum Modification. The Little Cherry Creek tailing site alternative is located in Partial Retention. The Poorman Creek alternative is located partially in Retention and Partial Retention. Both north and south transmission line alternatives contain corridor segments located in Retention and Partial Retention. The southern alternative also contains a segment in Modification-Maximum Modification.

3.3.4 Visual Absorption Capability

The revised VAC inventory identified 7 different characteristic landscape units. These are displayed on Map 4. These were distinguished by an analysis of the physical and perceptual characteristics of the landscape unit. Below is a brief description prepared with assistance of USFS of the physical characteristics including topography, vegetation and soils and perceptual characteristics of the viewer to compile a VAC rating. The numbers located on the VAC map correspond to the VAC units described below.

1. Cabinet Canyons - High VAC

   Project facilities located in this unit include all alternative plant sites. Topography consists of high diversity. There is a high diversity of vegetation types or classes. Soils provide for

a moderate productivity and relatively short term vegetation recovery period. Viewer position is inferior; focal points are strongly oriented toward the Cabinet Mountain Wilderness. The foreground is screened to the uphill side.

2. Cabinet Shoulders - Low VAC

A small portion of Poorman Creek alternative tailing disposal site is located here. Topography is primarily steep slopes and low diversity. Vegetation is generally homogeneous variety, low diversity and solid timber canopy. Soils provide a moderate productivity. Viewer position is inferior. Intermittent views break up view duration. Focal points of the Cabinet Mountains Wilderness are dominant. There are strong perpendicular views of slopes.

3. Intermountain Valley Floor - Moderate to High VAC

Both tailing disposal site alternatives and portions of both transmission line alternatives are located in this VAC unit. Topography contains gentle slopes. These is a diversity of manmade vegetation classes, colors and heights. Soils are very productive and offer rapid revegetation potential. Viewer position is normal. Generally vegetative screening is in the foreground. Views are parallel to the slope. Strong adjacent scenery dominates visual interests.

4. Open Mountain Faces - Moderate to High VAC

A portion of the southern transmission line alternative is located here. Topography is steep and contains well dissected slopes. Vegetation diversity is evident in class and color. Soil productivity is lower with low vegetation recovery. Soil color surface

to subsurface is darker to lighter. Viewer position is inferior and views are perpendicular to the slope. This VAC unit contains secondary focal points.

5. Riparian Valley - High VAC

A portion of the southern transmission line alternative is found here. Topography is characteristic of gentle slopes, low diversity and poorly dissected. Diversity of vegetation is displayed in class, color and variety of pattern. Soils are productive with rapid vegetation recovery. Viewer position is inferior to normal. Foreground vegetation screening is common. Manmade modification dominates foreground view.

6. Vegetated Mountain Faces - Moderate VAC

Portions of both transmission line alternatives are located in this VAC unit. Topography is generally steep sloped. There are scattered pockets of dissected slopes. Vegetation contains a low diversity of classes and heights. Soils are productive with good vegetation recovery. Viewer position is inferior with views approaching a perpendicular angle to the slope. Northern portions of VAC unit contain dominant man-made modifications.

7. Valley Plain - Moderate to High VAC

Portions of both transmission line alternatives are located in this VAC unit. Topography is gentle to flat. Vegetation contains diversity of classes, color and pattern which is largely manmade. Soils are very productive with rapid vegetation recovery. Observer position is normal. Some foreground screening does breakup viewer duration. Views are parallel to slope. Foreground focal points of rural settings are common and background focal points of Cabinet Mountains are occasional.

3.3.5 Computer Generated Visibility

The final component of the Visual Absorption Capability inventory is identification of seen and unseen areas as viewed from representative viewpoints. For the study area all viewer locations were identified with the assistance of the Forest Service which included travel routes, residential and recreation areas. Eleven critical viewpoints were selected and a computer visibility analysis was compiled to determine seen and unseen locations for each selected viewpoint. Table 3-2 is a summary of the visibility inventory.

Viewpoints were ranked according to data provided from the sensitivity levels inventory. A composite overlay was made for each sensitivity level and for all eleven viewpoints to determine the visibility level for all alternative project facilities. Level one sensitivity viewpoints included three viewpoints from the Cabinet Mountains Wilderness (Snowshoe Peak, Bald Eagle Peak and Libby Lakes), and Great Northern Mountain and Howard Lake campground. Level two viewpoints included Libby Creek and Ramsey Creek roads, two points along USFS Road 231 (Mileposts 5 and 6 approximately) and one point along USFS 278. The USFS Road 4776 at Horse Mountain saddle was the only level three sensitivity viewpoint analyzed.

Map 5 is a composite visibility map which identifies how visible each of the project facilities are from the eleven representative viewpoints. The composite visibility map showed the visibility of the Ramsey Creek plant site was low, only being visible from Horse Mountain Saddle. Libby Creek plant site was rated low and the Rock Creek site very low. Little Cherry Creek tailing disposal site overall, was rated moderate with portions of the site seen from Snowshoe Peak, Great Northern Mountain, Bald Eagle Peak, Horse Mountain saddle and USFS Roads 278 and 231. Poorman Creek alternative was rated moderate to high with larger areas of the site visible from the same viewpoint described for Little Cherry Creek. The

three portal locations were rated very low. The linear facilities of the alternative transmission line corridors, tailing pipeline and access road were rated low to moderate.

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TABLE 3-1

MONTANA PROJECT LIBBY AND SANDERS COUNTY, MONTANA

VISUAL RESOURCE INVENTORY SUMMARY

Project Facilities	Variety Class	Sensitivity Level of Travel Route	Distance Zone	Visual Quality Objective		Visual Absorption Capability
Plant Site Alternatives						
• Libby Creek	A	1,2	MG	Retention		High
• Ramsey Creek	A	1	MG	Retention		High
• Rock Creek	A	1	MG	Modification-Maximum Modification		High
Alternative Tailing Disposal Sites						
• Poorman Creek	B	2,3	MG	Partial Retention, Retention		Moderate to High
• Little Cherry Creek	B/C	2	MG	Partial Retention		Moderate to High
Transmission Line Alternatives						
• Northern Route (25 miles ±)	B/C	2	FG,MG	Retention	7.8 miles	Moderate to High
				Partial Retention	0.6 miles	
				Modification-Max. Mod.	0 miles	
				(Not Rated private land)	16.0± miles	
• Southern Route (16 miles ±)	B	1,3	FG,MG	Retention	6.4 miles	Moderate to High
				Partial Retention	0.6 miles	
				Modification-Max.Mod.	2.0 miles	
				(Not Rated private land)	7.0± miles	

FG - Foreground
MG - Middleground
Note: Portions of some facilities may cross or be located on private lands and therefore may not be included in the VMS inventory.

TABLE 3-2

MONTANA PROJECT LIBBY AND SANDERS COUNTY, MONTANA

VISUAL RESOURCE VISIBILITY INVENTORY SUMMARY

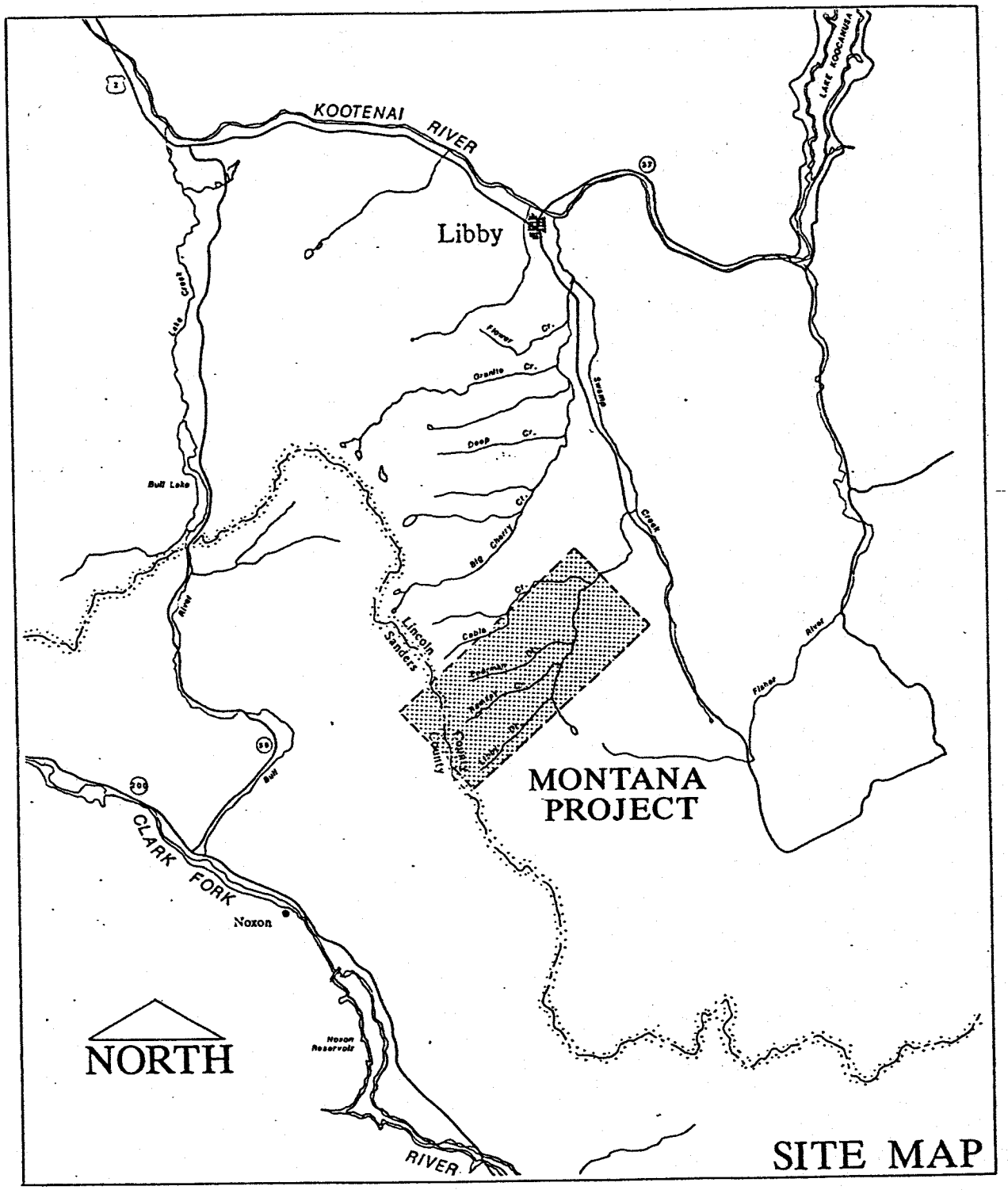
Project Facilities	View Point[1] Level One Sensitivity					Level Two Sensitivity					Level Three Sensitivity	No. Times Seen[2]			
	Snowshoe Peak	Bald Eagle Peak	Libby Lakes	Great Northern Mountain	Howard Lake	Libby Creek Road	Ramsey Creek Road	USFS Road 278	USFS Road 231 MP5[3]	USFS Road 231 MP6	Horse Mountain Saddle	Level One 5	Level Two 5	Level Three 1	All View Points 11
Plant Site Alternatives															
• Libby Creek	No	No	M/H	M	No	L	No	No	No	No	M	2	1	1	4
• Ramsey Creek	No	No	No	No	No	No	L	No	No	No	M/H	0	1	1	2
• Rock Creek	No	No	No	No	No	No	No	No	No	No	No	0	0	0	0
Alternative Tailing Disposal Sites															
• Poorman Creek	M/H	L	No	M/H	No	No	L	M/H	M	M/H	H	3	4	1	8
• Little Cherry Creek	M/H	L/M	No	M	No	No	No	H	M	M/H	H	3	3	1	7
Transmission Line Alternatives															
• Northern Route	L	L	L	M/L	No	M/L	M/L	L	L	L	L	4	5	1	10
• Southern Route	L	L	M/L	M	M/H	L	M/L	No	No	No	L	5	2	1	8

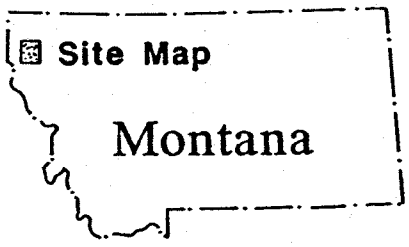
Visibility:

H High
M/H Moderate to High
M Moderate
M/L Moderate to Low
L Low

Notes:

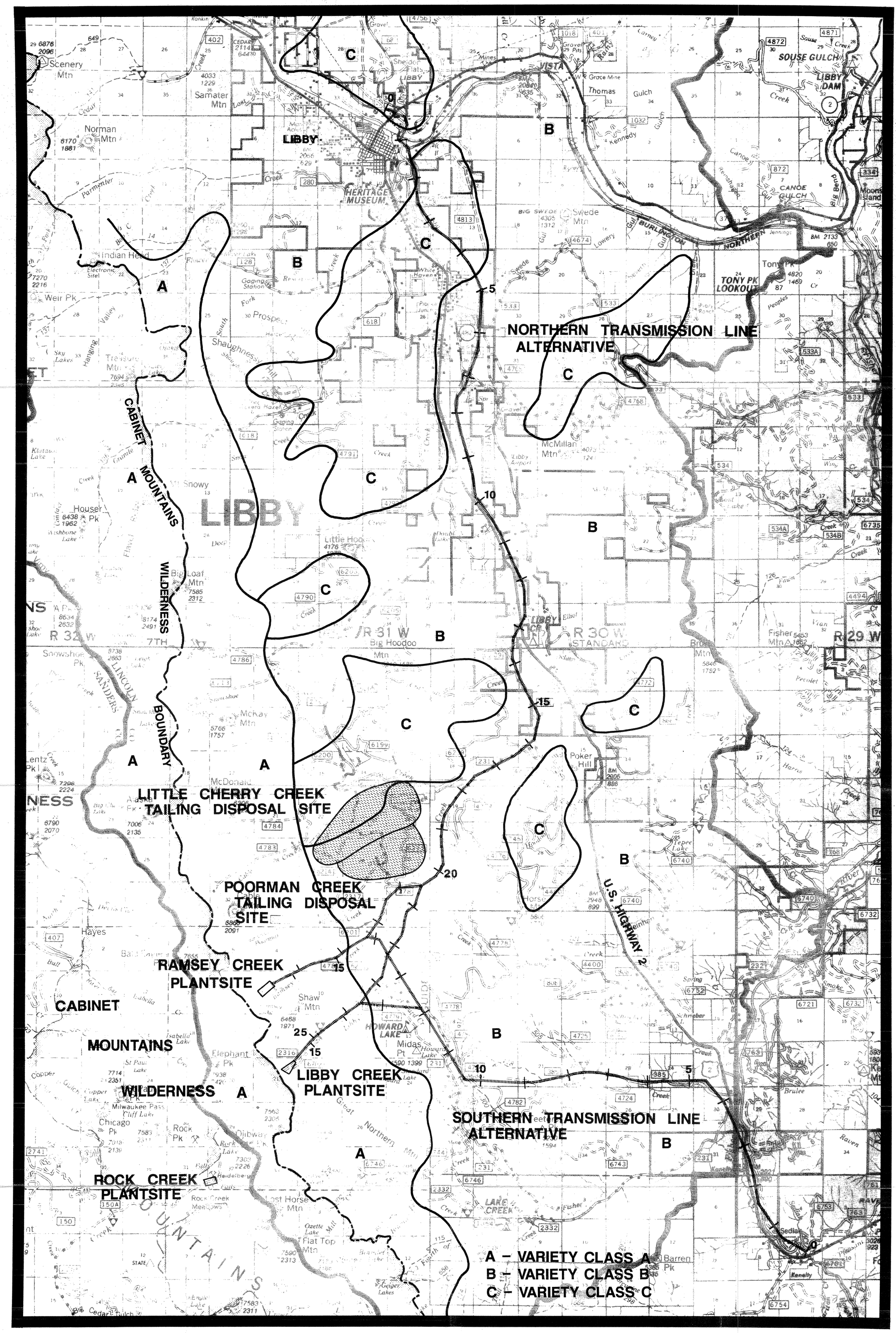
1. Visible - yes or no. If yes, level of visibility.
2. Number of times seen refers to how many of the eleven viewpoints a facility site alternative was visible or partially visible.
3. MP - Milepost.





Job No. : 22134	LOCATION MAP
Prepared by : K. B. E.	
Date : 1/31/89	

FIG. 2-1



VISUAL RESOURCE STUDY

VMS INVENTORY

NORANDA MINERAL CORP. MONTANA PROJECT
LINCOLN COUNTY AND SANDERS COUNTY, MONTANA

SCALE
0 1 2 3
MILES

NORTH

VARIETY CLASSES

WINTER 1989

Prepared by: R.D.S.
Date: 1/31/89

MAP 1

LIBBY

NORTHERN TRANSMISSION LINE ALTERNATIVE

CABINET MOUNTAINS WILDERNESS

LITTLE CHERRY CREEK TAILING DISPOSAL SITE

POORMAN CREEK TAILING DISPOSAL SITE

RAMSEY CREEK PLANTSITE

LIBBY CREEK PLANTSITE

ROCK CREEK PLANTSITE

SOUTHERN TRANSMISSION LINE ALTERNATIVE

U.S. HIGHWAY 2

LEVEL 1

LEVEL 2

LEVEL 3

VISUAL RESOURCE STUDY

VMS INVENTORY

NORANDA MINERAL CORP. MONTANA PROJECT
LINCOLN COUNTY AND SANDERS COUNTY, MONTANA

SCALE
0 1 2 3
MILES

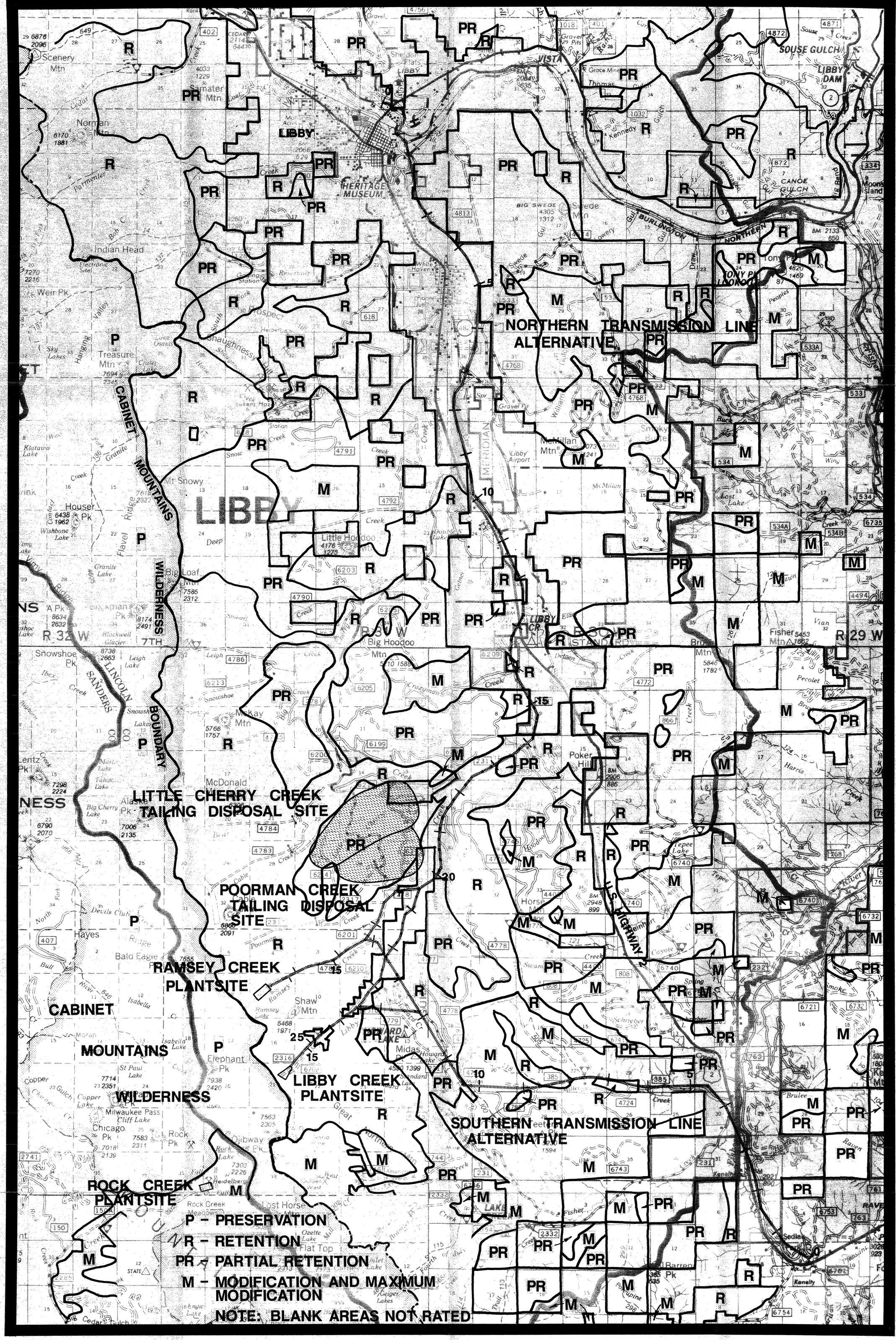
NORTH

VISUAL SENSITIVITY

WINTER 1989

MAP 2

Prepared by: R.D.S.
Date: 1/31/89



VISUAL RESOURCE STUDY

NORANDA MINERAL CORP. MONTANA PROJECT
LINCOLN COUNTY AND SANDERS COUNTY, MONTANA

VMS INVENTORY

SCALE
0 1 2 3
MILES

NORTH

VISUAL QUALITY OBJECTIVES

WINTER 1989

MAP 3

Prepared by: R.D.S.
Date: 1/31/89

LIBBY

CABINET MOUNTAINS WILDERNESS

NORTHERN TRANSMISSION LINE ALTERNATIVE

SOUTHERN TRANSMISSION LINE ALTERNATIVE

LITTLE CHERRY CREEK TAILING DISPOSAL SITE

POORMAN CREEK TAILING DISPOSAL SITE

RAMSEY CREEK PLANTSITE

LIBBY CREEK PLANTSITE

ROCK CREEK PLANTSITE

LOW VAC..... AREA 2
MODERATE VAC..... AREA 6
MODERATE-HIGH VAC.. AREAS 3, 4 AND 7
HIGH VAC..... AREAS 1 AND 5

VISUAL RESOURCE STUDY

NORANDA MINERAL CORP. MONTANA PROJECT
LINCOLN COUNTY AND SANDERS COUNTY, MONTANA

VMS INVENTORY

SCALE
0 1 2 3
MILES

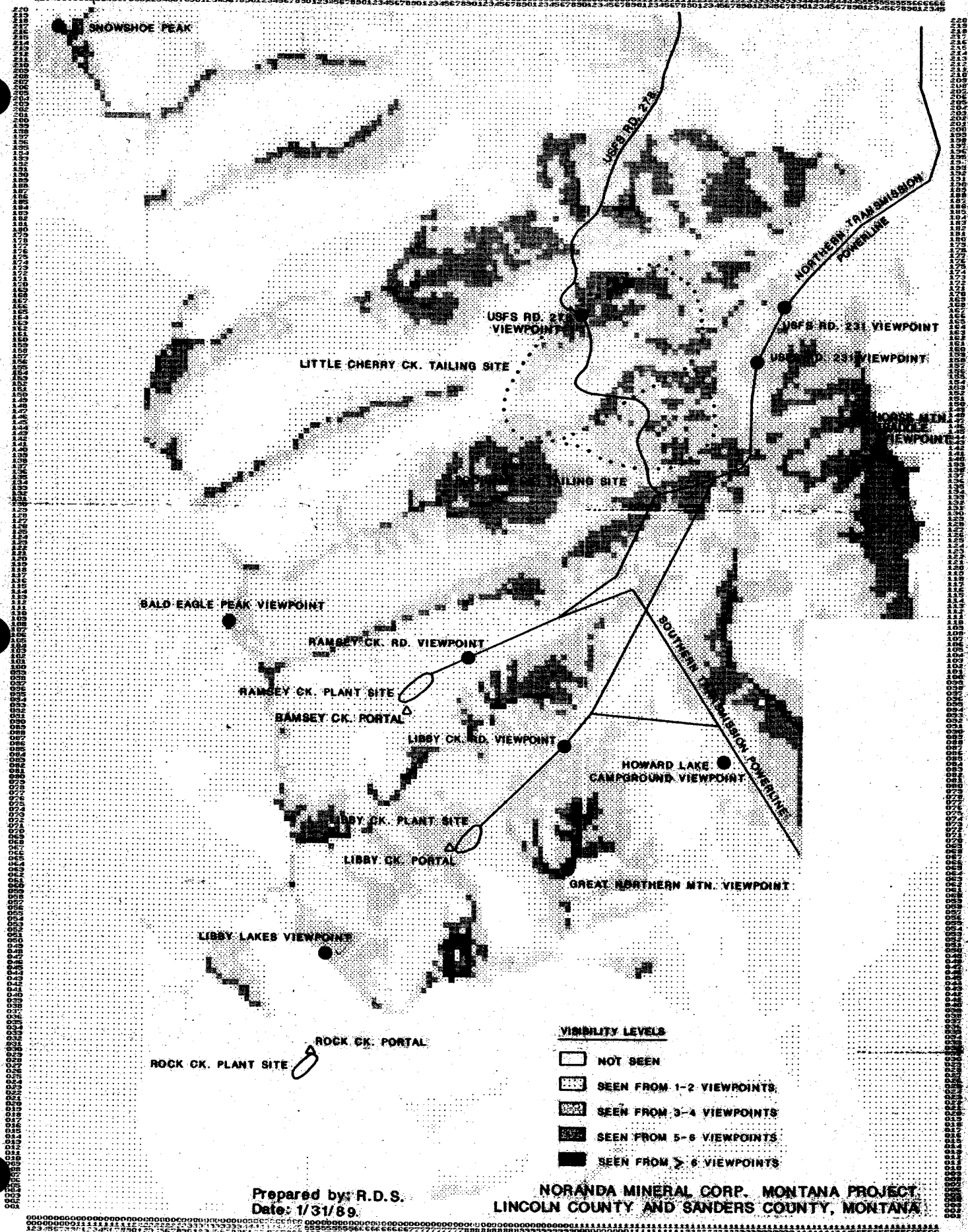
NORTH

VISUAL ABSORPTION CAPABILITY

WINTER 1989

Prepared by: R.D.S.
Date: 1/31/89

MAP 4



Prepared by: R.D.S.
Date: 1/31/89

NORANDA MINERAL CORP. MONTANA PROJECT
LINCOLN COUNTY AND SANDERS COUNTY, MONTANA

NORTH

0 1/2 1
MILES

COMPOSITE VISIBILITY

✓ ELEVEN VIEWPOINTS MAP 5

SECTION 12 - VISUAL RESOURCES

Section 12

VISUAL RESOURCES

U.S.Borax will retain specialist to describe the visual resources of the area and to develop a plan to mitigate the visual modification of the area.

The Forest Service basic visual inventory will be used to analyze the project area for its Visual Absorptive Capability (VAC). This will identify those areas most compatible to development needs. Special conditions appropriate to wilderness will be discussed at this point.

The existing visual condition, visual quality objectives, and the relationship of viewpoints, distances, and contrasts with foreground and background views will be described. Visual baseline data should be of the same standard, level of detail, and displayed consistently between developmental alternatives and sites.

APPENDIX B
VISUAL RESOURCES GLOSSARY

APPENDIX B
VISUAL RESOURCES GLOSSARY

AREA OF VISUAL INFLUENCE. That portion of a landscape falling within a person's cone of vision.

BACKGROUND. The area of a distance zone which lies beyond the foreground-middleground. Usually from a minimum of 3 to 5 miles to a maximum of about 15 miles from a travel route, use area, or other observer position. Atmospheric conditions in some areas may limit the maximum to about 8 miles or increase it beyond 15 miles.

BASIC ELEMENTS. The four major elements (form, line, color and texture) which determine how the character of a landscape is perceived.

LANDSCAPE CHARACTER TYPE. Large physiographic area of land which has common characteristics of landforms, rock formations, water forms, and vegetative patterns.

LANDSCAPE CHARACTER SUBTYPE. A division of a major character type which is significantly different in visual characteristics from the other subtypes.

CHARACTERISTIC LANDSCAPE. The established landscape within an area being viewed. The term does not necessarily mean a naturalistic character. It could refer to a farming community, a rural landscape, a primarily natural environment, or other landscape which has an identifiable character.

CONTRAST. The effect of a striking difference in the form, line, color or texture of the landscape features within the area being viewed.

CULTURAL MODIFICATION. Any man-caused change in the land or water form or vegetation or the addition of a structure which creates a visual

contrast in the basic elements (form, line, color, texture) of the naturalistic character of a landscape.

DISTANCE ZONE. The area that can be seen as foreground, middleground, background, or seldom seen. Areas of the landscape denoted by specified distances from the observer. The term is used as a frame of reference to discuss landscape characteristics or activities of man.

FOREGROUND. The detailed landscape found within 0 to 1/4-1/2 mile from the observer.

INTRUSION. A feature (land or water form, vegetation, or structure) which is generally considered out of context because of excessive contrast and disharmony with the characteristic landscape.

LANDSCAPE CHARACTER. The arrangement of a particular landscape as formed by the variety and intensity of the landscape features and the four basic elements (form, line, color, and texture). These factors give the area a distinctive quality which distinguishes it from its immediate surroundings.

LANDSCAPE FEATURES. The land and water forms, vegetation, and structures which compose the characteristic landscape.

MAXIMUM MODIFICATION. A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.

MIDDLEGROUND. The space between the foreground and the background in a picture or landscape. The area located from 1/4-1/2 to 3-5 miles from the viewer.

MODIFICATION. A Visual Quality Objective meaning man's activity may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.

OBSERVER POINT. One or a series of observer positions on a travel route or at a use area or a potential use area used to determine seen area.

OBSERVER POSITION. The placement and relationship of a viewer to the landscape which is being perceived.

PARTIAL RETENTION. A Visual Quality Objective which in general means man's activities may be evident but must remain subordinate to the characteristic landscape.

PHYSIOGRAPHIC PROVINCE. An extensive portion of the landscape, normally encompassing many hundreds of square miles, which has common qualities of soil, rock, slope, and vegetation of the same geomorphic origin.

PRESERVATION. A Visual Quality Objective that provides for ecological change only.

RETENTION. A Visual Quality Objective which in general means man's activities are not evident to the casual forest visitor.

SCENIC AREA. An area whose landscape character has a high degree of a variety, harmony, and contrast among the basic visual elements which result in a landscape pleasant to view.

SCENIC QUALITY. The degree of harmony, contrast, and variety within a landscape.

SEEN AREA. That portion of the landscape which can be viewed from one or more observer positions. The extent or area that can be viewed is normally limited by landform, vegetation, or distance.

SENSITIVITY. As applied to visual resource management, that degree of concern expressed by the user toward scenic quality and present or proposed visual change in a particular characteristic landscape.

USE VOLUME. The total volume of visitor use each segment of a travel route or use area receives.

VARIETY CLASS. The value (A, B, or C) assigned to a scenic quality rating unit by applying the scenic quality evaluation key factors which indicate the relative visual importance of the unit to the other units within the same physiographic region.

VIEW. Something, especially a broad landscape or panorama, that is looked toward or kept in sight. The act of looking toward this object or scene.

VISUAL MANAGEMENT SYSTEM (VMS). The planning, design, and implementation of management objectives to provide acceptable levels of visual impacts for all USFS resource management activities.

VISUAL QUALITY OBJECTIVE. Indicates the degree of visual change that is acceptable within the characteristic landscape. It is based on the physical and sociological characteristics of any given homogeneous area and serves as a management objective.

VISUAL RESOURCE. The land, water, vegetative, animal, and other features that are visible on all lands (scenic values).

VISUAL SENSITIVITY LEVEL(S). An index of the relative degree of user interest in scenic quality and concern and attitude toward present or proposed changes in the landscape features of an area in relation to other areas in the planning unit.