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Department of  
Agriculture

Forest  
Service

San Bernardino  
National Forest

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File Code: 2810

Date: December 03, 2001

Dear Interested Party:

The San Bernardino National Forest proposes to approve an expansion proposal submitted by OMYA (California) for the expansion of Sentinel Quarry. An Environmental Assessment has been completed and a copy of that assessment is enclosed. Based on the assessment, my current preference is to choose Alternative 1 – *approve the proposal as submitted*. Prior to making my decision, however, I welcome any additional comments you may have regarding the proposal. I will consider all comments received prior to making my final decision.

The comment period ends 30 days following publication of notice in **The Sun** newspaper of San Bernardino. Further information regarding this project may be obtained from Lands, Minerals and Resources Director, Doug Pumphrey at the above address or by calling (909) 794-1123.

Thank you for your concern and interest in this project. We look forward to receiving your comments.

s/ GENE ZIMMERMAN  
Forest Supervisor

Enclosure



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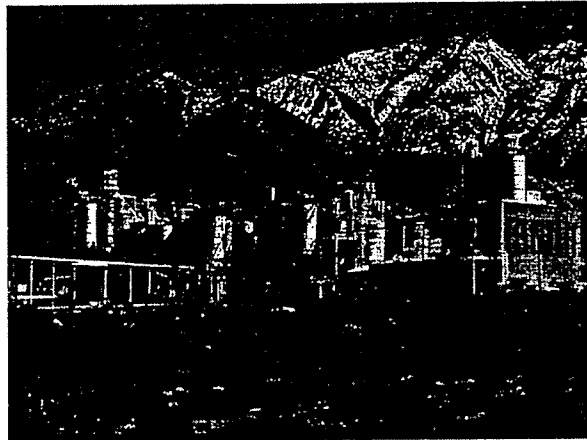


**UNITED STATES DEPARTMENT OF AGRICULTURE**

**Forest Service  
Pacific Southwest Region**

Sentinel Quarry Expansion  
Environmental Assessment

**San Bernardino National Forest  
San Bernardino County, California**



Responsible Official: Gene Zimmerman, Forest Supervisor  
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**ENVIRONMENTAL ASSESSMENT FOR PROPOSAL TO EXPAND OMYA  
(CALIFORNIA) SENTINEL QUARRY EXPANSION PROPOSAL  
USDA Forest Service, San Bernardino National Forest  
Mountaintop Ranger District  
San Bernardino County**

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## **I. INTRODUCTION**

### **A. Proposed Action**

#### *1. Project Description*

The San Bernardino National Forest (SBNF) proposes to approve a supplemental mining Plan of Operation (POO). This POO, submitted by OMYA (California) Inc. proposes to expand Sentinel Quarry, a quarry under an existing Plan of Operation, and reclaim the disturbed land as directed in Forest Service Surface Use Regulations, 36 CFR: 228§. The proposal would result in an additional disturbance of 7.7 acres for mining limestone and 24.4 acres for non-toxic, non-carbonate mine waste rock storage, for a total of 32.1 additional acres of National Forest System (NFS) land. The proposed action includes no new construction of haul or access roads nor would it change the prescribed management for the area as described in the SBNF Land and Resource Management Plan (LRMP) (USDA 1989).

#### *2. Environmental Protection Measures*

To reduce potential impacts from the project, OMYA incorporated several measures into the proposed action. To compensate for losses of carbonate plant habitat and pinyon/juniper woodlands, OMYA would relinquish 80 acres of Rattlesnake Mining Claims (14-17), 60 acres of which are carbonate substrate. To help better understand and control potential impacts associated with dust created during mining operations, OMYA would:

- 1) Conduct quantitative measurements of on-site dust emissions around their operations;
- 2) Conduct quantitative measurements of dust deposition on non-sensitive plant species;
- 3) Conduct growth measurements of a non-endangered species of buckwheat; and
- 4) Implement additional measures and controls to reduce dust emissions, as described in the Proposed POO and Supplement to reduce dust emissions.

#### *3. Implementation*

The SBNF proposes to implement the Proposed Action immediately subject to a valid existing rights determination as required under the LRMP Standards and Guidelines No.24. If the claims were determined not valid, a contest action would be initiated through the Department of Interior to declare these claims null and void. All mining

within the two placer mining claims involved would cease subject to due process. Appendix I contains management direction and regulations pertinent to this proposal.

**B. Location**

The project area (**Figures 1, 2, and 3**) is in Township 3 North, Range 1 West, Sections 24 and 25, San Bernardino Base Meridian (SBM).

**Figure 1. Generalized Regional Locality Map**

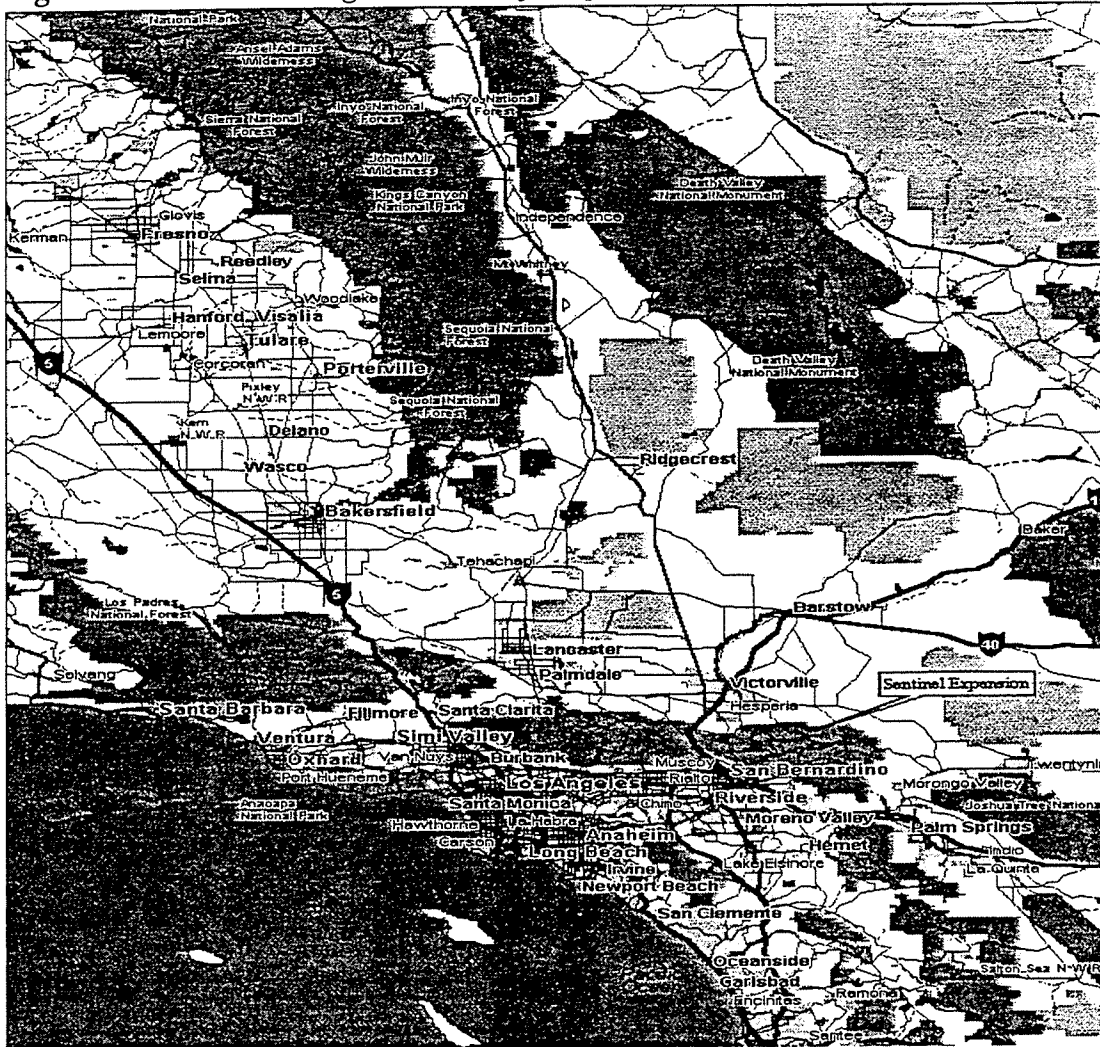


Figure 2. Vicinity Map

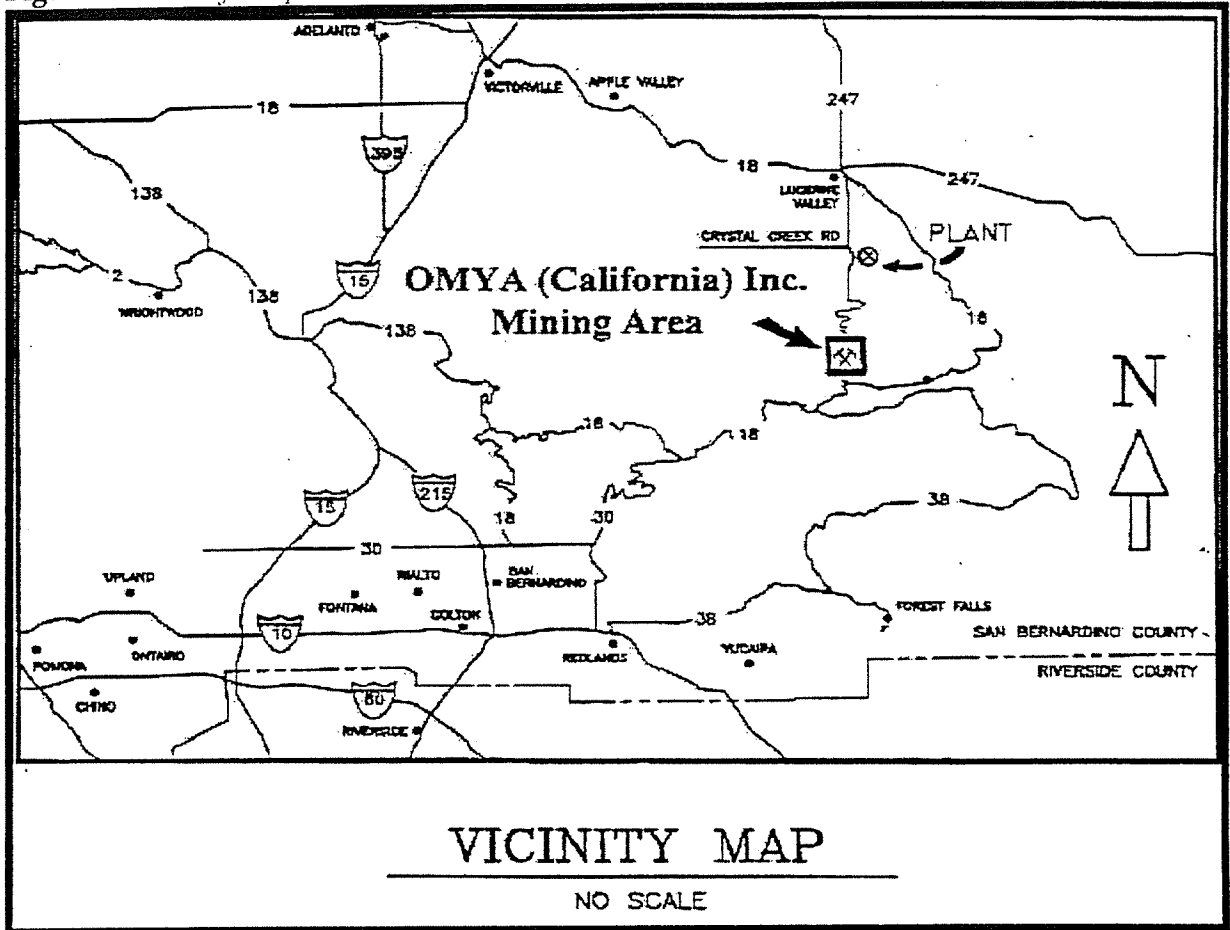


Figure 3: Project Area (U.S. Geological Survey, Fawnskin 7.5-minute topographic map)



### **C. Purpose and Need**

The purpose and need for this proposal include:

- Allow the production of mineral resources for mining claimants with valid existing rights under the General Mining Act of 1872.
- Protect and conserve federally listed Threatened and Endangered Species (T/E) and their habitats, as under the Endangered Species Act of 1973.
- Protect other surface resources and surface values as identified in the LRMP developed under the National Forest Management Act of 1976.
- Ensure that mined lands are adequately reclaimed as prescribed by federal and State laws and regulations.

### **D. Mining History and Plan**

Limestone mining activities for high-grade limestone on the northslope of the SBNF are significant and will likely continue well into the 21st century. Pure chemical grade limestone is locatable under the 1872 Mining Law, which gives claimants a statutory right to extract minerals, subject to applicable regulations.

Approximately 30,000 acres of carbonate substrate occur on the northslope of the San Bernardino Mountains with most of it under mining claims. Less than 15 percent of this acreage is valuable for mining. Three multi-national corporations mine limestone for various products including cement, filler, and pharmaceutical uses.

Mining of limestone at this operation began in the late 1950s and has been more or less continuous since 1958. The sites were originally mined by the Sentinel Mining Company and then by La Habra Products. Pluess-Staufer, now called OMYA, took over operations in 1977, with a POO issued in 1978.

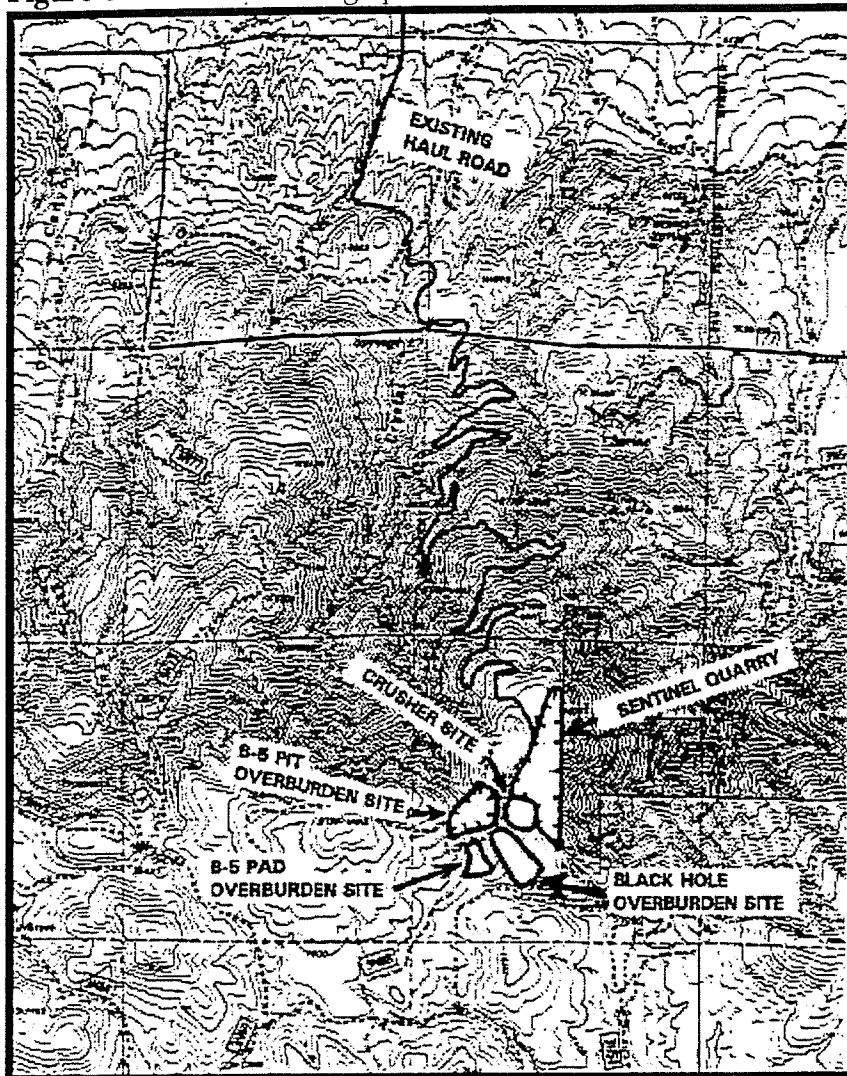
OMYA currently operates under a POO approved January 11, 1988 that allowed continued extraction of limestone at two existing quarries (N. Sentinel and B-3), reclamation of three quarries (B-4, B-5, and Claudia), expansion of N. Sentinel Quarry to the south (S. Sentinel), and development of a new quarry (Cloudy) (**Figure 4**). All of OMYA's placer claims holdings are on NFS lands and most of them are under lease from other claim owners.

OMYA currently has two active quarries on NFS lands, with 95% of their product obtained from Sentinel Quarry and 5% from the B-3 quarry. Additionally, there are several inactive quarries: B-5 quarry is currently being backfilled by waste rock from Sentinel Quarry; B-4 Quarry has been reclaimed; B-1 and B-2 Areas have an undeveloped ore body and are not currently covered in the areas approved for mining, and; Claudia and Cloudy Quarries are currently being reclaimed.

Sentinel Quarry is a multi-bench open pit mine with 2-3 levels being mined at a time. The ore body is high purity, moderate to high brightness limestone, and nearly devoid of impurities. The quarry operates all year with mining of ore grade limestone restricted during winter months when mostly overburden removal and quarry development occur. The Sentinel deposit is mined in 20-



Figure 4. OMYA's mining operations



25' cuts with a safety bench every 40-50'. Bench height varies by geologic structure. Face angle averages 70 degrees. Benches are generally 20' wide but may be greater if wall height is over 40'. In general, bench width is 1/2 wall height. The pit is designed with a 1:1 overall slope. The highest elevation of the pit is 7600'.

Ore drilled and/or blasted from the quarry is taken by front-end loaders to a haul truck and transported to a crusher 1/4-mile south of the pit where it is crushed, screened, and sorted. Crushed ore is hauled 8 miles on the Crystal Creek haul road to the processing plant in Lucerne Valley.

Under the current POO, six mining phases were approved with Phase 4 in progress. Phase 4 and 5 (1996-2005) would progressively develop (push back) to the currently permitted southern mining limit, and eastward to the Specialty Minerals Inc. property line. The final phase allows the pit to be mined to the 7150' level, which is the final footwall (bottom) limit of the ore. Currently, the pit is triangular-shaped, about 2100' long, 800' wide, and 200' deep. The approved

POO states that about 150,000 tons/year are mined from the Sentinel Quarry. The existing POO allows quarry production until 2022.

Currently, OMYA does not use the Black Hole area for overburden placement. The backfilling of B-5 pit is 75% complete. As Sentinel quarry is mined down, the overburden that was placed in upper Furnace Canyon is being accessed and moved to the B-5 pit as backfill.

The SBNF approved the B-3 quarry for mining under the June 28, 1978, POO. The ore is low-grade and therefore requires blending with high-grade ore. OMYA has opened up between 30-40% of the reserve in this deposit, with about 90% still remaining. The quarry life is about 15 years (OMYA 1998). The development approved in the POO includes 20 acres for quarry and overburden and 1 acre for the access road.

The Crystal Creek haul road is approximately 8 miles long from the Sentinel Crusher site to the Lucerne Valley plant. This road, constructed in 1958, extends another 2.5 miles south from the Sentinel Crusher to Cloudy Quarry. Approximately 6.5 miles are on the SBNF.

The County of San Bernardino approved OMYA's Reclamation Plan on June 11, 1994. The plan outlines specific actions to be taken for each reclamation site. OMYA's Revegetation Plan (1995) details the specific actions for each reclamation site, typically including:

1. Roads: Ripping; pulling back down slope berms; revegetation.
2. Facilities: Rip surfaces; scatter organic matter; use growth media depending on site.
3. Overburden site treatments vary by site. May include: recontouring, ripping, shaping, placement of growth media, seed spreading, and/or planting of nursery stock.
4. Quarries: Revegetate 30% of accessible level sites; spread stockpiled growth media on quarry bottoms and some benches.

Water from two wells are used for dust control: a well at the company's plant in Lucerne Valley; a well and a spring in Crystal Creek Canyon near Turn 5 of the haul road. Water runoff does not generally occur. Water is mixed with Magnesium Chloride and sprayed on roads one or two applications per year. OMYA's records indicate about 877,000 gallons of water used for dust control, with about 75% used on the haul road. Without the use of Magnesium Chloride, the company notes that their water needs would be far greater (2-4 times more) and that dust control would be less effective.

### **E. Decision To Be Made**

The Forest Supervisor of the SBNF will decide whether to adopt the Proposed Action (expand Sentinel Quarry), adopt an entirely different strategy that still fully meets the Purpose and Need for action, or take No Action at all (which would mean OMYA would continue to operate under their existing POO).

### **F. Public Involvement**

On February 19, 1999, the SBNF sent letters to sixteen interested agencies, organizations, and individuals requesting comments on the proposed action. Included in the three letters of

response were comments about bighorn sheep, reclamation plans, and the management of the Bighorn Mountain Wilderness.

### **G. Issues**

There were several preliminary issues raised by the public during the scoping outreach. Each issue was considered for significance relative to the Proposed Action. The summary below describes the issue that was raised and why each was considered non-significant in this analysis. Non-significant issues are not analyzed for potential effects in the EA.

1. A management plan for the Bighorn Mountain Wilderness has not been done by the SBNF. That plan would be a good way to provide for recreation and protection of plant habitat. Suggested that the management plan would be good mitigation. (Burk—Sierra Club)  
Reason not carried forward as an issue in this analysis: This project is located over 8 miles from the Bighorn Wilderness, and OMYA is relinquishing claims within the wilderness as part of this proposal. Tying the development of a wilderness management plan to this Proposed Action is outside the scope of this project.
2. Roads not needed for mining should be reclaimed after they no longer serve their purpose. (Burk—Sierra Club)  
Reason not carried forward as an issue in this analysis: The Proposed Action includes a Reclamation Plan, which addresses reclamation of roads. There is no disagreement with the proposed action.
3. Efforts to enhance bighorn sheep habitat on site are commendable. (Burk—Sierra Club)  
Reason not carried forward as an issue in this analysis: No disagreement with the Proposed Action.
4. OMYA's proposal adequately addresses potential impacts. (Touslee—San Bernardino County Land Use Service Dept)  
Reason not carried forward as an issue in this analysis: No disagreement with the Proposed Action.
5. San Bernardino County, as the SMARA Lead Agency, will ultimately need to process an amendment to the SMARA Reclamation Plan and that when the EA is completed they want to review and possibly comment as they would expect to later be able to utilize it to satisfy the California Environmental Quality Act process. (Touslee—San Bernardino County Land Use Service Dept)  
Reason not carried forward as an issue in this analysis: No disagreement with the Proposed Action. These are steps in the process for approval to operate.
6. Seal the quarry floor to create a pond of rainwater/snowmelt for wildlife. (Burk-Sierra Club)  
Reason not carried forward as an issue in this analysis: Wildlife habitat enhancement is not the focus of this proposal, although other measures have been included in the Proposed Action to provide water for wildlife. Suggestion is outside the scope of this project.
7. No comments at that time. Request to be kept on the mailing list for the EA and any other documentation issued pertaining to the project. (Walsh—Sierra Club)  
Reason not carried forward as an issue in this analysis: No disagreement with the Proposed Action.

## II. ALTERNATIVES

### A. Alternative 1 – Proposed Action

Under the Proposed Action, the SBNF would approve the proposed Plan of Operation, including Supplement and Reclamation Plan. This plan was developed by OMYA after several modifications to the original proposal and after an informal consultation with the U.S. Fish and Wildlife Service. OMYA submitted the original proposed Plan of Operation to the Forest Service on January 8, 1998. OMYA subsequently modified this plan to design a storage pad for waste rock entirely on non-carbonate substrate to avoid T&E plant habitat. OMYA's final version of the proposed Plan of Operation was dated October 1999. The proposal documents OMYA's analysis and rationale for choosing a site to dispose waste rock in a non-sensitive area. The Proposed Action includes measures to avoid and minimize impacts to the T/E carbonate endemic plants and their habitat.

OMYA has been mining on NFS land since 1971. Six phases of mining have been previously-approved for the Sentinel Quarry. The Proposed Action (**Figure 5**) includes three additional phases, one of which is already approved (Phase 9 allows the quarry to be mined to the 7150' level). This proposal includes the following actions: 1) expanding the northwest end of Sentinel Quarry 1.25-acres to the west; 2) relocation of the existing haul road to the far west side of the quarry (so a portion of the existing haul road can be mined); expansion of the south end of Sentinel quarry 6.54-acres to the south and east (including the existing crusher site); 3) moving the crusher to the Black Hole overburden site; 4) expanding the B-5 overburden pad from 3.5-acres to 27.9-acres (an additional 24.4 acres); and, 5) closing and restoring Forest Service road 3N87 from the junction of 3N16 on the west to the junction of 3N54 on the east (approximately 1 mile).

The expansion would add an additional 15 years of mining at an increased production rate in Sentinel Quarry. Quarry operations would occur year-round with mining of ore occurring for 8 months of the year and overburden and quarry development occurring during winter months. All of the National Forest system lands that are being actively mined by OMYA are currently closed to public recreation use and, under the Proposed Action, would continue to be so until mining is complete (2035) a total of 132.5 acres of NFS land.

OMYA estimates that between 1998-2035 (37 years) 18,000,000 tons of ore and waste rock (10,000,000 tons of ore grade limestone and 8,000,000 tons of overburden and waste rock) would be removed from the Sentinel Quarry. The proposed Sentinel Quarry expansion would begin by 2006 with final closure of the quarry occurring in 2035. Reclamation of the quarry and overburden site would be concurrent with mining so that the reclamation would be completed in 2037, with a ten-year monitoring period ending in 2046 (**Tables A and B**). The entire expansion project totals 32.2 acres of new development (**Table A and Figure 5**). All other aspects of the OMYA's operations including other quarries, overburden sites, haul roads, and reclamation are covered in the existing approved plans and would not change.

Figure 5. Existing and proposed new disturbance areas in Sentinel Quarry expansion.

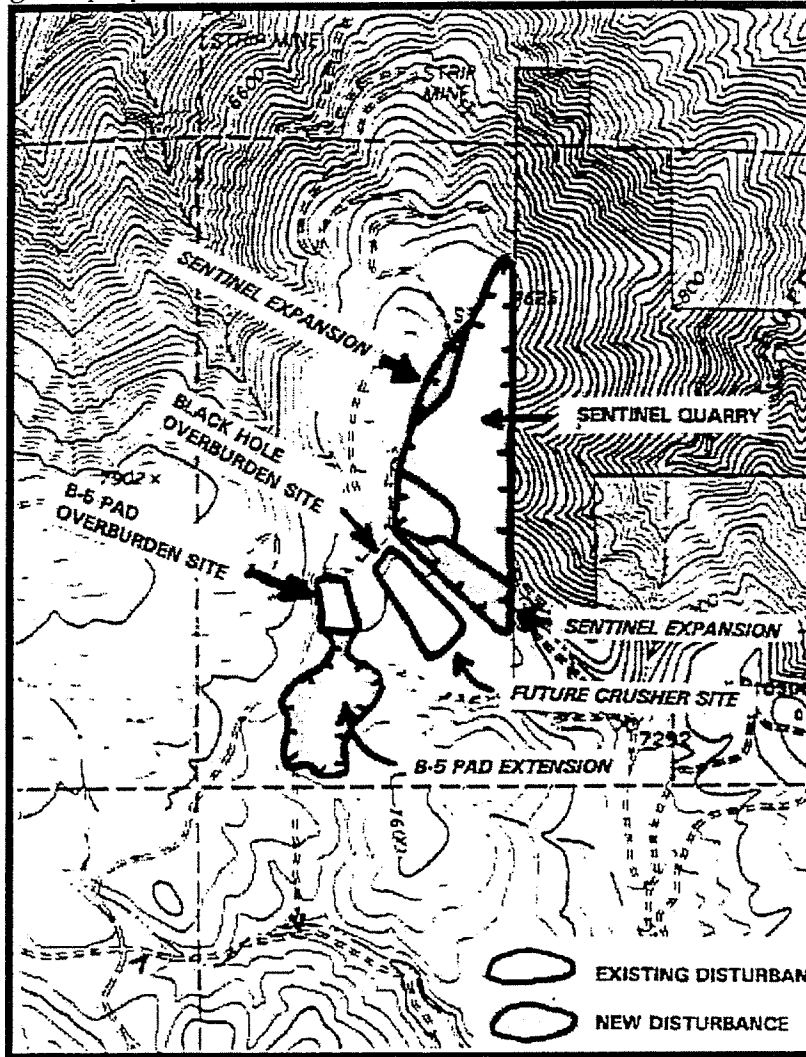


Table A. Summary of Sentinel Quarry expansion proposal.

<b>IF PROPOSED ACTION IS APPROVED:</b>	<b>VITAL STATISTICS</b>
Total material that would be excavated from Sentinel Quarry:	18,000,000 tons
Volume of ore that would be produced:	10,000,000 tons
Volume of waste that would be produced:	8,000,000 tons
Number of years mining would be extended at Sentinel:	15 years
Months of operation per year:	12 months/year
Duration of mining operation at Sentinel:	1999-2035
Year concurrent reclamation at Sentinel and B-5 overburden site would be complete:	2037
Year monitoring at Sentinel and B-5 would be complete:	2046
Total acres of new disturbance (quarry plus overburden site):	32.2

**Table B. Project Detail**

<b>Location</b>	<b>Legal Description</b>	<b>Acres to be disturbed</b>	<b>Remarks</b>
West Quarry Expansion (phase 6)	T3N, R1W, SE-¼ NW-¼ of Section 24	1.25 acres	Expands to the west. The permitted Crystal creek haul road (3N88) would be relocated to the west to allow mining to the west. Mining would start in 2006 and end in 2010.
South Quarry expansion (phase 7)	T3N, R1W, NE-¼ SW-¼ of Section 24	6.54	Existing crusher would be moved to allow mining of existing site. Mining would start in 2011 and end in 2015. Phase 9, currently permitted, would allow mining to the 7150' level (the bottom limit of the pit).
Crusher Relocation to Black Hole (phase 8)	T3N, R1W, NE-¼ SW-¼ of Section 24	0	In 2015, the crusher would be moved to the Black Hole overburden site. This would delay the reclamation on the 6.5-acre site. The crusher would remain at site from 2015-2035. Reclamation would begin in 2035.
Forest Road 3N87 Closure and Rehab.	T3N, R1W, S-½ SW-¼ of Section 24	0	The road would be closed and rehabilitated after approval of the Proposed Action. Drainages would be re-established and the roadbed would be ripped and revegetated.
Crystal Creek Haul Road	T3N, R1W, Section 24	0	Hauling would end in 2035. Reclamation would begin in 2036 and end in 2046. There is a 10-year monitoring period ending in 2056.
B-5 Pad overburden Extension site	T3N, R1W, S-½ SW-¼ Section 24 and N-½ NW-¼ Section 25	24.4	Existing pad 3.5 acres. Start overburden dump upon approval of the Proposed Action and end in 2035. Reclamation would start in 2005-2037. Final monitoring 2037-2046.

Overburden materials generated by the Sentinel Quarry are presently being used as fill in the mined out Butterfield-5 (B-5) Quarry, which is expected to be filled by about 2003. Overburden material would also be placed as backfill into mined-out portions of the Sentinel Quarry, though logistics and volume necessitate an additional overburden site. This proposal includes an expansion of the B-5 overburden pad. It is expected to provide for disposal of all overburden material (in excess of backfill into the quarry) to be generated by existing and proposed OMYA operations on the SBNF. An additional 24.4-acres would be developed to form a southern extension of the existing 3.5-acre pad, located on the east side of the 3N88 Haul Road. The configuration of the B-5 pad extension was designed entirely on non-carbonate material, avoiding any potential future affects to colonization of carbonate endemic plants onto nearby carbonate substrates.

The proposal includes several measures to protect an occurrence of *Oxytheca* (an endangered plant species) and other carbonate plant habitat (described below): This proposal meets the Purpose and Need for action by providing for mining while protecting resources and ensuring reclamation.

Proposed Action—Reclamation Actions:

The proposed POO includes detailed descriptions of measures to reclaim the expanded quarry and overburden sites, including revegetation with native species on quarry benches and overburden areas. Reclamation within the Sentinel quarry is to be concurrent with ongoing mining, beginning in the year 2009, and continuing beyond the completion of mining. Revegetation planning, implementation, and monitoring are designed to meet requirements of the California Surface Mining and Reclamation Act and the District Reclamation Standards.

If the SBNF approves the Proposed Action and Reclamation Plan, OMYA would then submit the Reclamation Plan to the San Bernardino County to meet the State of California's requirement under the Surface Mining and Reclamation Act (SMARA). County approval of a Reclamation Plan is required to implement the Proposed Action.

Proposed Action—Environmental Protection Measures

A number of measures were incorporated into the Proposed Action to help avoid/minimize or mitigate for impacts associated with the proposal: a) relinquishment of 80 acres of mining claims (60 acres of carbonate substrates); b) reduction of dust emissions through implementation of additional measures and controls; c) to help with future management, a study of dust emissions and impacts to adjacent vegetation; d) changing the backfilling schedule for Sentinel Quarry; e) OMYA continuing to fund bighorn sheep studies; f) education of OMYA employees about desert tortoise; g) cessation of mining activities upon discovery of heritage resources; and, h) measures to reduce visual impacts. **Table C** summarizes the environmental protection measures that are included in the Proposed Action. Under the Proposed Action, the Plan of Operations will include these measures.

**Table C. Avoidance/Minimization and Environmental Protection Measures**

<b>Why—Reason for the measure</b>	<b>How—Description of Avoidance/Minimization Measure</b>
To mitigate for the loss of carbonate plant habitats and piñon/jumper woodland wildlife habitat.	OMYA to relinquish 80 acres of unpatented mining claims within the Bighorn Wilderness to the SBNF: 60 acres are carbonate substrate + 20 acres of non-carbonate claims (Rattler claims 7,14,15, &16). T2N, R3W, SE-¼ SW-¼ Section 7. T2N, R3W, NE-¼ NW-¼ Section 18. T2N, R3W, NW-¼ NE-¼ Section 18.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitats.	Phase development of overburden site so that acreage of exposed, disturbed areas is kept to a minimum.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Phase development so that the part of B-5 overburden site closest to the occurrence is disturbed last.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	When possible, avoid use of B-5 overburden site during the summer. Try to have most use during the winter months.
To limit dust impacts on air quality and adjacent vegetation, including adjacent Oxytheca occurrence.	Schedule operations to minimize use of the B-5 pad overburden site during the Oxytheca growing season (June through August).
To retain wildlife habitat as long as possible and limit dust impacts on adjacent vegetation, including carbonate plant habitat.	Retain existing vegetation on B-5 pad for as long as possible before using for overburden storage.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Through scheduling and phasing, minimize the number of roads and exposed disturbed surfaces at any one time.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	To reduce dust amounts and dispersal zone, periodically use dust suppressant on entire operation.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Limit amount of exposed disturbed sites at any one time by educating truck operators to conserve and locate dumpsites to minimize active area.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Water exposed dump sites during dumping operations.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	When possible, restrict dumping at B-5 pad when wind is blowing towards adjacent Oxytheca occurrence.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Concurrently reclaim and revegetate quarry and overburden site during mining operations.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Eliminate or reduce amount of crusher fines produced; water stored fines piles; attempt to establish market for fines, and; incorporate fines with waste rock used to backfill overburden site.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Use 150 feet buffer zones around known T/E plant occurrences near B-5 overburden area. Reroute ramp and road in the B-5 overburden site to avoid Oxytheca habitat.
To protect T/E plant habitat.	Educate road maintenance equipment operators to the sensitivity of the area and the Endangered Species Act.
To protect T/E plant habitat.	Monitor haul road conditions and implementation of maintenance needs in a timely manner. Monitor occupied T/E plant occurrences to ensure compliance with avoidance/minimization measures and protection of habitat.



Why - Reason for the measure	How - Description of Avoidance/Minimization Measure
To protect T/E plant habitat.	Eliminate future sidcasting of materials downslope from haul/ access roads.
To protect T/E plant habitat.	Ensure that materials collected in sediment basins and check dams are not pushed over the sides onto adjacent habitats. Instead, materials would be collected and moved to pre-approved sites.
To protect T/R plant habitat.	Create a barrier of boulders around the perimeter of the buffer zone to prevent rocks from rolling into Oxytheca habitat.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	When winds are blowing towards Oxytheca occurrences, employ water spray on fill areas in order to reduce the volume of dust blowing from disposal areas towards the plant habitat.
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	OMYA will fund dust studies (details below).
To limit dust impacts on air quality and adjacent vegetation, including carbonate plant habitat.	Install dust collector bag house at the screen on the crusher (to comply with EPA AP42 manual).
To mitigate impacts to bighorn sheep population.	OMYA will continue financial support of California Department of Fish and Game (CDFG) bighorn sheep studies to help to obtain additional knowledge of these animals and possibly lead to their ultimate survival.
To reduce disturbance to bighorn sheep and their habitat and allow continued use of the water guzzler.	Delay backfilling of Sentinel Quarry for 5 years. Start backfilling quarry from the quarry floor working up.
To reduce impacts to bighorn sheep population and allow continued use of the water guzzler.	OMYA to continue maintenance of the guzzler water source.
To reduce impacts to bighorn sheep habitat.	In order to hasten re-establishment of bighorn sheep habitat, implement concurrent reclamation/revegetation of backfilled quarries with native plant species.
To reduce likelihood of impacts to desert tortoise.	Increase employee awareness about desert tortoises along mine access roads in order to reduce probability of adverse effects. OMYA to be proactive to educate and orient new as well as existing employees. With USFWS and SBNF guidance, develop employee guidelines about desert tortoise.
To minimize likelihood of impacts to heritage resources.	When heritage resources are encountered during mining/reclamation, immediately stop mining and contact SBNF archaeologist.
To reduce visual impacts of non-vegetated areas.	Follow revegetation recommendations in the OMYA Plan, Appendix 4, as written by Tierra Madre Consultants dated November 1996 (SBNF and SMARA approved Revegetation Plan).
To reduce visual impacts of non-vegetated areas.	Use commercially available non-toxic coloring agents on cuts above existing haul roads and fills that face towards, and are visible from, Big Bear Ski Areas (Figure 6). Review other coloring techniques and alternatives that may be an improvement to reduce color contrast, reduce cost of implementation, and increase the longevity of the material installed. As new technologies are developed there may be opportunities for OMYA and the SBNF Landscape Architect to collaborate on specifying any new products or processes that would help to improve the visual quality of the Sentinel Quarry expansion operations.
To reduce visual impacts of non-vegetated areas.	Collect and stockpile topsoil and growth media slopes. The topsoil and growth media would be planted with native species according to the revegetation recommendations.
To reduce visual impacts of non-vegetated areas.	Reduce final fill slopes to 2:1 or less.
To reduce visual impacts of mined areas.	Review on a regular basis to a minimum of one year, progress being made with the expansion, land contouring, revegetation activities and coloring implementation.
To provide for public health and safety and to increase habitat available to wildlife.	Reduce public access to active mining areas by closing and restoring Forest Road 3N87 to natural habitat.

Under the Proposed Action, OMYA would fund dust studies centered on the B-5 Overburden Expansion Site. The dust study includes several items: quantitative measurements of on-site dust emissions; quantitative measurements of dust deposition on non-sensitive plants; and growth measurements of a non-endangered species of buckwheat as part of the dust impact analysis. OMYA's proposal describes details of the studies. This alternative includes the following changes to further reduce potential impacts and improve the dust study (Table D). Under the Proposed Action, the Plan of Operations will include these measures.



**QTable D.** Dust study changes from original proposal submitted by OMYA.

Measure	Detailed Description	Purpose
Reporting	Include provisions for reporting study results to the SBNF in the study protocol for the High Volume Air Sampling.	To limit dust impacts on adjacent vegetation, including carbonate plant habitat.
Sampling protocol	Change the sampling protocol for the Dust Deposition Effect on Plants Study to exclude sampling dry weight of <i>Oxytheca parishii</i> var. <i>goodmaniana</i> plants. Instead, sample <i>Erigonum microthecum</i> var. <i>corymbosoides</i> with the <i>Chrysothamnus</i> (rabbitbrush) in the shoot growth study.	To prevent impacts to endangered <i>Oxytheca</i> occurrences.
Sampling protocol	Sample for <i>Erigonum microthecum</i> var. <i>corymbosoides</i> within the <i>Oxytheca</i> occurrence along a linear transect to the west. Extend the sampling area for ¼ mile beginning at the east end of the <i>Oxytheca</i> 37 occurrences on the east side of the 3N88 haul road. Avoid individual <i>Oxytheca</i> plants while sampling in this location.	To prevent impacts to endangered <i>Oxytheca</i> occurrences.

**B. Alternative 2 – No Action Alternative**

Under this alternative, the SBNF would take no action to approve the proposed supplement to OMYA’s current Plan of Operation and Reclamation Plan. Under this alternative, OMYA would not be able to fully exercise their statutory rights under the General Mining Act of 1872. OMYA could continue mining in the approved portion of the Sentinel quarry but would not be able to mine the additional ore reserves developed in the south Quarry. One million tons of excess waste rock developed with the permitted quarry would have to be stored on NFS land. Existing sites for backfilling of mined quarries would be filled to capacity, thus requiring NFS land to hold the additional waste rock. **Figure 5** displays the currently-approved disturbance areas of the mining operation. The following results could be expected under this alternative:

- 39 acres of the quarry would not be back filled.
- Ten million tons of proven white limestone would not be mined.
- Societal demand for the limestone would have to be met from other sources.

The No Action Alternative would not meet the Purpose and Need for Action because there would be no provision for mining.

C. Comparison of Alternatives  
**Table E. Comparison of Alternatives**

	Alternative 1: Proposed Action	Alternative 2: No Action (Existing Plan of Operation)
Year Plan of Operation approved	N/A	1976 and 1988
Months per year mining would be done at Sentinel Quarry	~8 months (usually shut down in winter months due to snow)	~8 months (usually shut down in winter months due to snow)
Acres of new disturbance	32.1	0
Acres of new disturbance from mining	7.7	0
Acres of new disturbance from waste storage/overburden	24.4	0
Year mining at Sentinel Quarry would be complete	2035	2022
Year reclamation at Sentinel/B-5 would be complete	2037	2025
Year monitoring at Sentinel/B-5 would be complete	2046	2037
Total material that would be excavated from Sentinel Quarry	18,000,000 tons	8,000,000 tons
Average volume of ore and waste rock to be removed per year	486,000 tons/year	300,000 tons/year
Volume of ore that would be produced	10,000,000 tons	~6,000,000 tons
Volume of waste that would be produced	8,000,000 tons	~2,000,000 tons
Area of SBNF closed to public access for the duration of mining	~132 acres (areas along Crystal Ck haul road, around Sentinel Quarry, overburden site, and other reclamation sites)	~132 acres (areas along Crystal Ck haul road, around Sentinel Quarry, overburden site, and other reclamation sites)
Miles of SBNF roads closed to public use for the duration of mining	~1 mile (3N87)	0 miles
Off-site habitat acquisition	80 acres of mining claims	0 acres

**III. ENVIRONMENTAL CONSEQUENCES**

The Sentinel Quarry is located in a historic gold and limestone mining district. Gold was mined in the district starting in the mid-1800s. Currently, there are no active large-scale gold mines. After World War II, limestone mining became the primary mineral mined in the district. There are currently three multi-national companies mining limestone for cement and specialty uses. The OMYA Sentinel Quarry is located on National Forest System lands in the San Bernardino Mountains approximately 7 miles south of the community of Lucerne Valley at an elevation of approximately 7,500 feet. The quarry site is not visible from Lucerne Valley. The vegetation on the undisturbed land reflects the desert influence and is dominated by singleleaf pinyon pine, western juniper, curlleaf mountain mahogany, and rabbitbrush. The area proposed for quarry expansion lies at the top of the Furnace Creek drainage in relatively steep terrain. The area proposed for expansion of the overburden site is also at the top of the Furnace Creek drainage in somewhat gentler terrain on non-carbonate soils.

**A. Botanical Resources—Threatened and Endangered Plant Species**

A biological survey conducted by Scott D. White of Psomas and Associates and reported on 21 August 1997 (see Appendix 5 of OMYA's Supplement) determined that one federally-listed endangered species, Cushenbury oxytheca (*Oxytheca parishii* var. *goodmaniana*) occurs to the west of and adjacent to the proposed overburden site. Another endangered species, Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*) is located along the Crystal Creek haul road used to access Sentinel Quarry. A biological assessment of impacts to threatened and endangered species was completed for this project (Volgarino *et al.* 2000).

a) Environmental Consequences of the Alternative 1—Proposed Action: The Sentinel Expansion Project may affect but is not likely to adversely affect Cushenbury oxytheca (*Oxytheca parishii* var. *goodmaniana*) and Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*). No critical habitat has been designated for these species, therefore, none would be affected. This conclusion was reached in recognition of:

- Project planning which avoided direct effects to the *Oxytheca* occurrence by the B5 pad;
- Estimations of low dust levels covering the plants due to project distance from known plant occurrences and wind pattern;
- Existing road maintenance policy for the Crystal Creek Haul Road with required annual survey of plant occurrence along the road (Butler and Volgarino 1999);
- Additional avoidance and minimization measures to protect occurrences along the Crystal Creek Haul Road which are included in the proposed action;
- Reduction of dust emissions through implementation of additional measures and controls; and,
- Closure and rehabilitation of Forest road 3N87 is expected to provide a beneficial effect to potential *Oxytheca* habitat.

Recommendations to reduce indirect impacts included conducting future surveys to determine the status of the four carbonate plant occurrences along the Crystal Creek Haul Road. These occurrences were considered “lost and/or degraded”. If located, these occurrences should be monitored to better evaluate whether indirect effects of Haul Road use over time are measurably adverse.

The proposed Sentinel expansion, while extending the life of the quarry 15 years, would not extend the haul road use and reclamation schedule 15 years beyond the timelines in the existing POO. Due to concurrent/phased reclamation, reclamation would be completed in 2046, with the monitoring period ending in 2056.

The potential for dust impacts to this occurrence of Cushenbury oxytheca is increased due to the B-5 overburden pad extension and the movement of the crusher nearer the occurrence location. The species occurrence would be protected by creating a 100-foot wide buffer around the perimeter of the occurrence nearest the overburden disposal area. In addition, when the wind is blowing across the disposal area toward the population of *Oxytheca*, a water spray would be employed on the fill to reduce the volume of dust blowing onto the *Oxytheca*. Also, the dust from the crusher would be controlled, further reducing the likelihood of impacts to adjacent vegetation..

The botanical impact analysis determined that Cushenbury oxytheca (*Oxytheca parishii* var. *goodmaniana*) and Cushenbury buckwheat (*Eriogonum ovalifolium* var. *vineum*) might be affected by the proposed project, but are not likely to be adversely affected (Volgarino *et al.* 2000). Section 7 Informal Consultation with the Carlsbad Office of the Fish and Wildlife Service was initiated and they concurred with that determination (USDI Fish and Wildlife Service 2000).

b) Environmental Consequences of the Alternative 2—No Action: Under this alternative (the existing approved POO), mining at Sentinel Quarry would continue until 2035 and reclamation

activities until 2046. Impacts associated with the existing Sentinel quarry operations would continue at current levels. No new ground disturbance would occur and no further direct impacts to listed plants are expected. Indirect impacts from dust would continue at current levels without the benefit of avoidance/minimization measures associated with the Proposed Action. This alternative would result in mining ending 15 years earlier than the Proposed Action, so indirect impacts would be reduced for that period. The beneficial effects of mining claim acquisition and the dust study would not occur under this alternative.

### **B. Botanical Resources—Non-Threatened/Endangered Rare Species**

A biological evaluation of effects to sensitive and watch list plants was completed for this project (Volgarino 2001). Several special status plants were observed on the site of the proposed B-5 Overburden pad expansion: Parish's rock cress (*Arabis parishii*), pine green gentian (*Swertia neglecta*), Transverse Range phacelia (*Phacelia exilis*), San Bernardino Mountain buckwheat (*Eriogonum microthecum* var. *corymbosoides*), Heckard's paintbrush (*Castilleja montigena*), Alpine buckwheat (*Eriogonum umbellatum* var. *minus*), and Johnston's buckwheat (*Eriogonum microthecum* var. *johnstonii*).

#### **a) Environmental Consequences of the Alternative 1—Proposed Action:**

**Sensitive Species:** If approved, the proposed expansion may affect individuals but is not likely to result in a trend toward Federal listing of the following sensitive plant species which are known to occur at the proposed quarries and/or overburden sites: *Arabis parishii*, *Swertia neglecta*, and *Eriogonum microthecum* var. *johnstonii*. Only a few plants of *Arabis parishii* would be lost at the proposed 1.25-acre western quarry expansion area. The large number and broad geographical range of known Forest occurrences of this eastern San Bernardino Mountains endemic species make this loss insignificant. Likewise, only a few plants of *Swertia neglecta* would be lost during the 24.4-acre expansion of the B-5 overburden pad. This species is not endemic to the area (its distribution includes San Gabriel Mountains, Tehachapi Mountains, and the central Coast Ranges), so this small loss would not be significant. The *Eriogonum* being affected is believed to be *Eriogonum microthecum* var. *corymbosoides*, a watch list species, not the sensitive *E. microthecum* var. *johnstonii*.

These following species were not observed during surveys at the proposed quarries or overburden sites but have the potential to occur because the habitat appears to be suitable. Some are annuals that could have been missed due to the timing of the surveys. If approved, the proposed expansion may affect individuals, but is not likely to result in a trend toward Federal listing of the following sensitive plant species which are not known to occur within the federal action area but have the potential to occur: *Abronia nana* ssp. *covillei*, *Arabis shockleyi*, *Astragalus bicristatus*, *Astragalus lentiginosus* var. *sierrae*, *Canbya candida*, *Dudleya abramsii* ssp. *affinis*, *Erigeron uncialis* var. *uncialis*, *Heuchera hirsutissima*, *Lilium parryi*, *Linanthus killipii*, *Marina orcuttii* var. *orcuttii*, *Mimulus purpureus*, *Navarretia peninsularis*, *Phlox dolichantha*, *Senecio bernardinus*, and *Streptanthus campestris*.

These species, if they occur, could be affected by dust from the Haul Road, the Forest Road 3N87 rehabilitation or potential trampling during the dust study. Potential effects to *Abronia nana* ssp. *covillei*, and *Arabis shockleyi*, if they occur, would be mitigated by the relinquishment

of the 80 acres of Rattlesnake claims and subsequent withdrawal from mining as these species are present on the claims.

Watch List Species: Forest Watch List taxa known to occur at the proposed quarries and/or overburden sites include: *Eriogonum microthecum* var. *corymbosoides*, *Eriogonum umbellatum* var. *minus*, *Phacelia exilis*, and *Castilleja montigena*.

Individuals of *Eriogonum microthecum* var. *corymbosoides* would be destroyed at both quarry expansion sites (7.75-acres). This variety is known from a large number of occurrences on the Forest and loss of plants on 7.75-acres is not expected to have a substantial effect. A study on the effects of dust on this plant is incorporated into the proposed action and may therefore yield dust effect information that is currently lacking for these plant species. Impacts to this species at the quarries, from potential dust along the Crystal Creek Haul Road, and from clipping of stems in the dust study would be mitigated by the relinquishment of 80 acres of mining claims and subsequent withdrawal from mining where it also occurs.

Although *Eriogonum umbellatum* var. *minus* plants would be salvaged prior to mining the west side quarry or the Crystal Creek haul road reroute, it must be assumed that all plants would be lost to mining because of uncertainty over salvage survival. This is an isolated occurrence of this species, disjunct from other occurrences in the San Gabriel Mountains. Due to viability concerns, attempts to salvage all individual plants for propagation from seed should be made.

A few plants of *Phacelia exilis* would be destroyed at the 24.4-acre overburden expansion site. Loss of several plants is not expected to have a substantial effect on this species since it is widely distributed (southern Sierra Nevada from Kern and Tulare Counties south to Los Angeles, Ventura, and San Bernardino counties).

Individuals of *Castilleja montigena* would be lost at both the west and south quarry sites and the overburden pad where it currently occurs (uncommon to occasional at all three sites). This species may also occur in the 3N87 road rehabilitation area and in the dust study area. If it does occur within the dust study area, effects would be minimal and botanists would be instructed to avoid trampling this plant. If it occurs in the 3N87 road rehabilitation area, losses or damage to plants from machinery would be expected. This perennial is locally common and endemic to the eastern San Bernardino Mountains, where it grows in pinyon-juniper woodlands and upper montane coniferous forests. It is presumed to be a stable hybrid of *C. applegatei* ssp. *martinii* and *C. angustifolia*.

The following Forest watch list plant taxa are not known to occur within the federal action area but have the potential to occur: *Allium parishii*, *Androsace elongata* L. ssp. *acuta*, *Arabis dispar*, *Astragalus leucolobus*, *Castilleja plagiotoma*, *Chorizanthe xanti*. var. *leucotheca*, *Hulsea vestita* ssp. *parryi*, *Galium jepsonii*, *Phacelia mohavensis*, *Rupertia rigida*, *Senecio ionophyllus*, *Heuchera elegans*, *Muilla coronata*, *Oxytheca caryophylloides*, *Eriogonum foliosum* and *Syntrichopappus lemmonii*.

*Allium parishii* is known from the north slope of the San Bernardino Mountains at the base of Marble Canyon and Cushenbury Canyon. Other locations in the vicinity of the project area are

also known. This plant flowers in April and May and could have been missed during the June and July surveys, though it is unlikely since inflorescences remain intact throughout the season. The quarry and overburden expansion sites and the 3N87 road rehabilitation areas are thought to be higher in elevation than the known locations. However, there is the potential for this species to occur along the Crystal Creek haul road where, if present, could be affected by dust. Measures in the proposed action are designed to reduce dust effects along the haul road. Effects to this species are not expected to be substantial because of its wide-ranging distribution (southern California, western Arizona, Oregon and Baja California, Mexico).

*Androsace elongata* L. ssp. *acuta* is known from the north slope of the San Bernardino Mountains below 3900 feet. Since most of the project area is above this elevation, the only place where it could occur would be along the Haul Road out to Highway 18 in the northern portion of the Federal Action Area. If this species occurs there, it could be affected by dust from the road. No other effects would be expected. Because of its wide-ranging distribution, impacts to this species are not expected to be substantial. This plant is known from Kern County south to Baja California, Mexico.

*Arabis dispar* is known to occur between 2900 to 7900 feet, flowering in April and May. Since there was an unknown *Arabis* on the project species list, it is possible that this species could occur on the proposed south quarry expansion site. If it occurs, plants are expected to be lost during mining. There is also the potential for it to occur along the 3N87 road rehabilitation site, the dust study area, and along the Crystal Creek haul road. If it occurs along 3N87, plants could be lost during use of mechanical equipment during closure/rehabilitation. Lesser impacts would be expected if it occurs in the dust study site (possible trampling) or along the Crystal Creek haul road (dust).

*Astragalus leucolobus* is found in many locations in the Big Bear area, occurring between 6000' and 9500' feet in many habitat types. It is also known from the San Jacinto and San Gabriel Mountains and in San Benito County. It was not observed during the field surveys for the quarries or overburden site, therefore no effects are expected at those sites. There is the potential for it to occur along 3N87, Crystal Creek haul road, and the dust study site. Due to its ability to tolerate disturbance and regenerate well in disturbed locations, impacts to this species are expected to be minimal if it does occur.

*Castilleja plagiotoma* is a perennial species known to occur in great basin alluvial scrub, pinyon juniper woodlands, and Joshua tree woodlands between 950-8200 feet where it is a green root parasite on other plants. It was not observed during the field surveys for quarries or overburden pad, thus no effects are expected at those locations. There is potential for it to occur in the dust study area, along 3N87 road, or along Crystal Creek haul road to Highway 18. If it occurs, plants could be affected during use of mechanical equipment on 3N87 during the rehabilitation work. If it occurs along Crystal Creek haul road, this species (and its host plant) could potentially be affected by dust. Impacts from use and maintenance of Crystal Creek haul road are expected to be reduced due to measurements included in the proposed action. If present, plants could be affected by trampling during the dust study.

*Chorizanthe xanti* var. *leucotheca* is known from scattered locations in the eastern San Gabriel, San Bernardino, San Jacinto, and Santa Rosa Mountains in Mojavean desert scrub and pinyon-juniper woodland communities at elevations between 950 and 3900 feet. It is not documented from the project area and potential for it to occur there is low. If it occurs, it would be most likely along a short stretch of the Crystal Creek haul road just south of its junction with Highway 18. If present, impacts to this plant would be from dust generated by haul trucks.

*Hulsea vestita* ssp. *parryi*, *Phacelia mohavensis*, *Rupertia rigida*, and *Senecio ionophyllus* are perennial species known to occur within the project vicinity. If present, they should have been detected during the surveys of the sites. Since they were not observed, direct effects of quarrying or dumping of overburden are not expected to occur. It is possible that these species could occur along Crystal Creek haul road, within the dust study area, or along 3N87. If they exist along the Crystal Creek haul road, plants could be affected by dust deposition. As part of the proposed action, efforts to reduce direct effects to plants along the road would be implemented. During the dust study and the rehabilitation/closure of 3N87, plants would be avoided possible. These plants are often observed along road cuts and berms suggesting that these species can tolerate some level of disturbance.

*Galium jepsonii* is a perennial species endemic to dry, rocky, and gravelly sites in the San Bernardino and San Gabriel Mountains. It is not known from the northslope and has a low probability of occurrence. Since it is perennial, it should have been detectible during the field surveys at the quarries and overburden sites. It is possible that it could occur along Crystal Creek haul road, or along 3N87, but the probability is low. If it is present, plants could be affected by dust along Crystal Creek haul road or by mechanical equipment during 3N87 closure/rehabilitation. Since this species is most likely to occur in and around rock outcrops, effects from equipment are even more remote.

*Heuchera elegans* occurs in the San Gabriel Mountains and has the potential to occur in the San Bernardino Mountains. It is known historically from the Mountaintop District from a lower elevation and different vegetation type (near Fredalba Park) than the project area. Since this plant is perennial, it should have been detected during the field surveys if it was present. Presumed absent, no impacts are expected in the locations surveyed. Additionally, probability is low that it would be affected within the dust study area or by 3N87 closure/rehabilitation due to its tendency to grow within rock outcrops.

*Muilla coronata* is known from elevations between 3300 and 5300' along the northslope in elevational ranges and vegetation types within the project area. It is not expected to occur in the quarry or overburden expansion sites due to the elevation. If it is present, it may not have been detected during field surveys because it flowers from March to April and may be hard to see after flowering. Although this plant is not expected to occur at the quarry or overburden expansion sites, along 3N87, or in the dust study area, the potential for it to occur along Crystal Creek haul road to Highway 18 is high. If it does grow along Crystal Creek haul road, plants would potentially be affected by dust deposition. As part of the proposed action, efforts to reduce direct impacts from dust to plants would be implemented.

*Oxytheca caryophylloides* is known to occur between 3900 and 8500 feet elevation in vegetation types found within the project area. It is an annual species that flowers between July and September and most likely would have been detected during field surveys at the quarries and overburden expansion. While not observed during surveys, it is possible this species occurs along Crystal Creek haul road, along 3N87, and in the dust study area. If this species is present along 3N87, individuals could be expected to be affected by machinery. If it occurs along Crystal Creek haul road, dust could affect individuals and habitat. But direct effects along from sidecasting, etc. along the haul road would be reduced by implementation of measures the proposed action. If this species occurs within the dust study area, efforts to avoid trampling would reduce impacts.

*Eriogonum foliosum* is an annual species that has the potential to occur within the project area but was not observed during field surveys. Since it flowers between March and August, surveys performed at the quarries and overburden expansion sites during June and July would most likely have detected this species. It has the potential to occur along 3N87 and, depending on timing of implementation, could be affected by closure/rehabilitation of the road.

*Syntrichopappus lemmonii* is an annual species known to occur in the project vicinity but was not observed during the field surveys. This could be due to the timing of the surveys, which missed the April-May flowering window of this plant. This species has the potential to occur on gravelly soils in the overburden area and along 3N87 and could be affected by activities at either site. Occurrences are known from Los Angeles, San Bernardino, Riverside, Kern and Monterey counties. Due to its wide distribution, any impacts at this site are not expected to significantly affect this species.

#### b) Environmental Consequences of the Alternative 2—No Action:

Under this alternative (the existing approved POO), mining at Sentinel Quarry would continue until 2035 and reclamation activities until 2046. Impacts associated with the existing Sentinel quarry operations would continue at current levels. No new ground disturbance would occur and no further direct impacts to non-listed rare plants are expected. Indirect impacts from dust would continue at current levels without the benefit of avoidance/ minimization measures associated with the Proposed Action. This alternative would result in mining ending 15 years earlier than the Proposed Action, so indirect impacts would be reduced for that period. The beneficial effects of mining claim acquisition and the dust study would not occur under this alternative.

#### C. Wildlife Resources—Threatened and Endangered Species

A biological assessment of impacts to threatened and endangered species was completed for this project (Volgarino *et al.* 2000). Of the fifteen threatened and endangered wildlife species on the SBNF, only desert tortoise (*Gopherus agassizii*) (threatened), willow flycatcher (*Empidonax traillii extimus*) (endangered), and least Bell's vireo (*Vireo bellii pusillus*) (endangered) are known to occur from the general vicinity of the project site. Occasional overflights of the mining operations by bald eagles (*Haliaeetus leucocephalus*) (threatened) may occur. Desert tortoise habitat occurs north of the processing plant and is designated Category 3, defined as "not essential to maintenance of viable populations and low to medium population density not contiguous with medium or high density areas". Southwestern willow flycatcher and least Bell's vireo are known to nest 5 miles to the east of the processing plant (at Cushenbury Springs) but



are not known from the project area and no suitable habitat for these birds is known from the project site.

a) Environmental Consequences of the Alternative 1—Proposed Action:

No direct or indirect impacts to southwestern willow flycatchers, least Bell's vireos, or bald eagles are expected from the proposed action.

No direct impacts to desert tortoise are expected at the project site since most of the activities would occur above the elevational limit (~4400') for this species. However, at the lower elevations, there is a very low likelihood of indirect impacts associated with vehicles using the access road to the processing plant (Crystal Creek road). The proposal would extend the life of Sentinel Quarry 15 years, thus extending the period of vehicle traffic associated with the mining of Sentinel Quarry another 15 years. Injury or death of desert tortoises from vehicles accessing the processing plant through low quality Category 3 desert tortoise habitat is possible though vanishingly small. This road is a public road and use of it would continue when/if OMYA's operations no longer exist. Thus, there is a baseline low level of potential impact to desert tortoise from the existence of the public Crystal Creek road. OMYA's transport trucks and personal vehicle traffic increase the risk of collisions with desert tortoise slightly over the baseline. No designated desert tortoise critical habitat is within the project area; therefore, none would be affected.

To further reduce the likelihood of impacts to desert tortoise from vehicle traffic on roads accessing their facilities, the Proposed Action also includes OMYA adding desert tortoise information/regulations to their employee orientation information in order to increase awareness (advising employees to report sightings, not to pick up tortoises, observe speed limits, avoid running over tortoises, etc.). Increasing awareness of haul truck drivers as well as employees of the processing plant would help further reduce the probability of adverse effects.

b) Environmental Consequences of the Alternative 2—No Action:

No direct or indirect impacts to southwestern willow flycatchers, least Bell's vireos, or bald eagles are expected from the existing POO. No direct impacts to desert tortoise are known from the existing mining operations since most of the activities would occur above the elevational limit (~4400') for this species. However, at the lower elevations, there is a very low likelihood of indirect impacts associated with vehicles using the access road to the processing plant (Crystal Creek road). Under the No Action alternative, this low risk level would remain at the same level but would lessen 15 years earlier than under the Proposed Action since there would be reduction in the volume of traffic on Crystal Creek road after the mining ceased.

**D. Wildlife Resources—Non-Threatened/Endangered Species:**

A biological evaluation of impacts to non-threatened/endangered wildlife species was completed for this project (Butler 2000). Sign of three management emphasis species were observed during surveys: Nelson's bighorn sheep, California mule deer, and American badger. Southern sagebrush lizards, a sensitive species, were also observed. Gray vireo and mountain quail, both SBNF sensitive species, had previously been reported but were not observed during surveys. Many other sensitive species have potential to occur within the project area but were not observed during surveys.

a) Environmental Consequences of the Alternative 1—Proposed Action:

The proposed action may affect individual of SBNF sensitive species and SBNF species of concern, but is not likely to result in a trend toward Federal listing of the sensitive animal species.

Bighorn Sheep: The California Department of Fish and Game (CDFG) and the SBNF have cooperated in a bighorn sheep study ongoing for 4-5 years. A number of animals have been tracked with radio-telemetry equipment. Bighorn sheep usage in and around the Sentinel quarry is well-documented as far west as Butterfield #2 claims, south around the rim of Sentinel quarry, along the north edge of the quarry near Turn 15 on the Crystal Creek haul road, and east along the Furnace Canyon/quarry divide. Bighorn sheep are occasionally seen along the haul road. Sheep are also known to forage on the reclamation areas, including the B-5 pad. The CDFG has identified movement corridors, foraging, lambing, and escape area as a result of the studies. The CDFG installed a guzzler for bighorn sheep and deer several years ago (**Figure 6**).

**Figure 6.** Deer and bighorn sheep drinking from existing guzzler at Sentinel Quarry. A motion-detecting camera installed by California Department of Fish and Game captured images. (Supplied by Jim Davis--California Department of Fish and Game).



Potential impacts to bighorn sheep and their habitat include fragmentation of movement corridors, and losses of foraging and escape habitats. Additional impacts may include noise disturbance from occasional blasting as well as daily operations (crusher; haul truck traffic, etc.). Presence of humans and vehicles in the area also present a certain level of disturbance impact. Under the proposal, the life of the quarry would be extended 15 years. Thus, activities associated with the actual quarry work would continue for 15 years beyond the current approval. These activities include blasting, loading ore, crushing ore, and haul truck traffic in the quarry and on the haul road. Approval of the proposal would extend the duration of indirect disturbance

impacts to bighorn sheep for an additional 15 years. At that time, OMYA's work would be limited to reclamation/revegetation activities. The proposed expansion would not delay the ultimate revegetation/reclamation of the site since OMYA proposes to do concurrent reclamation during the mining and not alter their original timeline for completion of the work on site.

While bighorn sheep appear to be fairly tolerant of the ongoing activities on site, this population of sheep is experiencing continual and gradual losses of habitat and fairly constant levels of disturbance along the entire North Slope distribution. With such a small population, presumably relatively isolated, long-term viability is a concern. CDFG's ongoing study is aimed to eventually make a determination of viability.

There is a concern that the continued habitat fragmentation and disturbance to this bighorn sheep may, at some point, cause abandonment of the northslope. While bighorn sheep have exhibited a certain level of habituation to disturbance, there may be a threshold at which they can no longer tolerate the disturbance and habitat losses if those activities significantly interfere with their abilities to forage, escape predators, move between important habitat areas, and/or reproduce. The threshold level is unknown. As such, this population bears monitoring for indications in changes of stability. Such a small population, presumably relatively isolated, is at higher risks to extirpation than other local populations.

To reduce impacts to bighorn sheep, the following measures have been in the Proposed Action. The Supplement and Reclamation Plan called for beginning the backfill process from the top down. However, this site contains a water drinker and is the southern-most corridor for bighorn sheep and deer as they move laterally along the northslope from east to west. To allow continued use by bighorn sheep and deer and vegetation development of the area, the Proposed Action calls for dumping from the top to be delayed. Instead, the backfilling would start at the quarry floor until a point comes when further fill from the bottom is not feasible. At that point, dumping from the top would commence. A minimum of five years from commencement of backfill at the Sentinel quarry would be sufficient to accomplish these objectives. At that time, OMYA would use the road that goes to the guzzler as access to dump into the quarry.

Impacts to bighorn sheep could also be reduced by planning revegetation so as to provide some forage opportunities to continue prior to ultimate reclamation. To that end, revegetation concurrent with backfilling B-5 quarry (especially on the north and northwest portions along Crystal Creek and Dolomite Hill) and also on B-5 overburden pad would be beneficial and offset habitat losses elsewhere on the project site. Seeding mixes should reflect the abundance and diversity of species from adjacent undisturbed areas. Grasses and forbs are especially important to bighorn sheep and deer.

It is anticipated that the ongoing bighorn sheep study will continue for up to three more years at the increased level provided by the 1999 capture effort. Management recommendations and habitat enhancement/maintenance programs have been developed. Additional recommendations will likely be developed after the investigation is completed. A financial involvement from OMYA in these projects would help provide additional sound biological data and, ultimately provide better bighorn sheep population management and habitat protection measures.

Mule deer and other pinyon/juniper habitat species: The proposal to mitigate for the loss of 32 acres of suitable habitat by having OMYA relinquish 80 acres of claims near Tip Top Mountain, preventing future mining of those claims (and associated loss of pinyon/juniper habitat) is important. While off-site mitigation does not lessen the impacts of habitat fragmentation on the North Slope, this mitigation does contribute to long-term habitat protection in the mountain range.

b) Environmental Consequences of the Alternative 2—No Action:

The No Action alternative would result in continuation of current levels of impacts to individuals of SBNF sensitive species and SBNF species of concern, but it is not likely to result in a trend toward Federal listing of the sensitive animal species. Impacts include occasional disturbance to bighorn sheep and deer from mining operations. Since no new ground disturbance would be associated with this alternative, no direct impacts from habitat loss/modification would occur. Since this alternative would result in mining ending 15 years prior to that in the Proposed Action, the disturbance levels would be reduced earlier. Additionally, habitat restoration would be completed earlier, allowing earlier colonization/use by wildlife species.

**E. Heritage Resources**

Former Forest Archaeologist, Marilyn Mlazovsky provided an Archaeological Reconnaissance Report of the project site on 8/26/98 and Forest Archaeologist, Daniel McCarthy made an addendum on 2/4/00 (Mlazovsky 1999, McCarthy 2000). Two previous surveys, one by the Forest Service in 1972 for five open pit quarries to be developed by Pluess-Stauffer, and a second by Michael Lerch in 1984, also did not identify any heritage resources in the project area.

a) Environmental Consequences of the Alternative 1—Proposed Action:

Since no heritage resources are known from the project site, no impacts to heritage resources would be expected from the Proposed Action. As a result, no consultation with the State Historic Preservation Officer was needed. However, potential impacts include potential damage or destruction of heritage resources during mining operations (e.g., excavating, blasting, burying, etc.). To reduce the potential for those impacts, mining activities must be stopped immediately if any historic or prehistoric cultural remains are found and the Forest Archaeologist must be contacted immediately to evaluate the site and to recommend appropriate mitigation measures.

b) Environmental Consequences of the Alternative 2—No Action:

Under the No Action alternative, the impacts would continue as outlined in the existing Plan of Operation and accompanying EA.

**F. Forest Road 3N87 closure and Public Access**

Forest Road 3N87 is located on the south end of the current B-5 Overburden Pad. This road is relatively short (about 1 mile). Because this road, and several unclassified roads off of it, illegally access the Crystal Creek haul road, public safety is jeopardized and OMYA's facilities/materials/operations are less secure. The road does not access any specific recreation sites but offers a short driving opportunity through forested habitat. All of the National Forest system lands that are being actively mined by OMYA are currently closed to public recreation use and, under the Proposed Action, would continue to be so until mining is complete (2035). This is about 132.5 acres of National Forest System land.

a) Environmental Consequences of the Alternative 1—Proposed Action:

As the B-5 Overburden Pad is expanded to the south, the road 3N87 would be covered by the overburden. The Proposed Action would close 3N87 at Forest Road 3N16 on the south end and at Forest Road 3N54 on the east end (rather than replace the road south of the overburden after the mining is complete). Closing the road would reduce slightly recreational driving opportunities within the Holcomb Valley area. However, the beneficial effects include increased public safety (by preventing access to Sentinel Quarry) and increased security for OMYA's operations/facilities. Restoration of the road to support native vegetation would likewise provide 2.4 additional acres (assumes 1 mile of road at a 20'-width) of habitat for SBNF's rare plants and wildlife, as well as more common species like deer and quail. The botanical and archaeological surveys of this area showed that nothing of significance would be affected by the closure/rehabilitation measures.

b) Environmental Consequences of the Alternative 2—No Action:

Approximately 2.4 acres of road would remain as disturbed roadbed unable to support plant and wildlife habitat under the "No Action" alternative. Roughly 1 mile of road would remain open to the driving public of the SBNF. Motorized vehicle use of the road results in a certain level of disturbance to wildlife within several hundred feet of the road (width of disturbance zone varies with topography, vegetation, and wildlife species). Under this alternative, road-related disturbance to wildlife would remain at current levels.

**G. Impacts to Visual Quality**

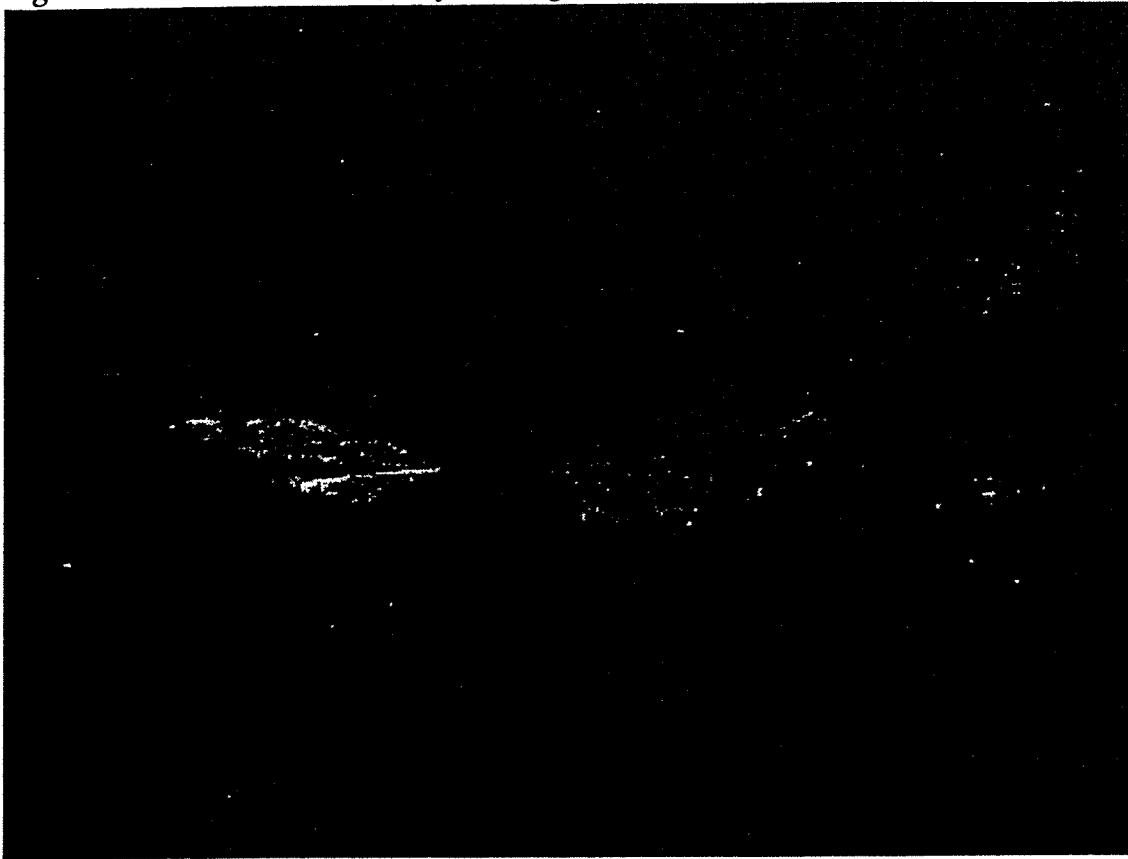
The LRMP designated the visual quality objective for this area as partial retention; which is defined to mean that management activities must remain visually subordinate to the characteristic landscape. The current visual conditions do not, and will not, meet this VQO until reclamation and permanent revegetation can occur. Visually-unmitigated limestone mining has so modified the north slope of the San Bernardino Mountains south of Lucerne Valley that many residents have become accustomed to seeing the large bare limestone faces and have come to view them as a part of the characteristic landscape. Part of this acceptance is related to the fact that many of the residents of Lucerne Valley are economically tied to the limestone industry. However, the non-resident visitor is more likely to find them discordant and visually disturbing.

Since the Sentinel Quarry lies below the natural ground level, it is only visible from a superior viewing position (**Figure 7**). The only frequent observation of the entire quarry is from airplanes flying over the area. Other observations of the quarry are infrequent and at a barely superior viewing position where only a small portion of the pit is visible (unless the viewer is at the edge of the quarry). Portions of Sentinel Quarry are visible from many vantage points at higher elevations in the Big Bear area, including Snow Summit and Big Bear Mountain ski resorts, parts of the Pacific Crest Trail, several Forest System roads, and much of the general forest at high elevations to the south of the quarry. The quarry is located 8.5 miles from the ski areas from where would be seen during the winter by skiers and during the summer by bicyclists and sight-seers using Snow Summit ski area. The quarry is visible but small in the background. Crystal Creek haul road is visible from Lucerne Valley, Hesperia, and much of the desert floor.

In contrast, the overburden site is above the natural ground level and is visible from some distant, even inferior, viewpoints. The nearest ground viewpoint of the overburden site is from Holcomb Valley and the Pacific Crest Trail on Bertha ridge, a distance of about 1 to 4 miles. Holcomb Valley is in an inferior viewing position and much of the disturbance is hidden from view by trees and topography.

From a visual standpoint, the longer limestone extraction can be focused on a given area, the more time would be available for reclaiming previously mined sites before impacting undisturbed sites. When it comes to restoration of the visual resource, time is its greatest ally and the longer disturbance of new areas can be avoided, the greater the amount of visual recovery that can occur. Ultimately, delaying the opening of new areas for as long as possible minimizes the total amount of un-reclaimed visual disturbance that exists at any one time. The visual impact of mining is so massive and has existed for more than forty years so that it would be little affected by either alternative.

**Figure 7.** View of Sentinel Quarry, looking from the west.



a) Environmental Consequences of the Alternative 1—Proposed Action:

Sentinel Quarry: Most of the Sentinel expansion would be in the quarry floor, thus visual impacts from Sentinel quarry's expansion would remain similar to current levels (except to viewers at the edge of the quarry). Since the Sentinel Quarry lies below the natural ground level, it is only visible from a superior viewing position. The only frequent observation of the entire quarry would be from airplanes flying over the area. Other observations of the quarry would be very infrequent and at a barely superior viewing position where only a small portion of the pit would be visible. Only viewers at the quarry edge would readily observe the deeper portions of the quarry.

Overburden Pad: The overburden site is above the natural ground level and is visible from distant, even inferior, viewpoints. To reduce the size of the footprint of the overburden site, the height was raised in the final proposal. The top of the overburden waste site would be lower than the existing high wall on the B-5 quarry and would thus minimize the visual impact when viewed from the southeast, from where it is most visible. There would be an increase in the visual impacts associated with the B-5 overburden pad. Currently, that 3.5-acre overburden site is partially revegetated and not very obvious from a distance. However, the Proposed Action would reverse that revegetation effort as well as enlarging the overburden pad an additional 24.4-acres (for a total of 27.9-acres), thus substantially increasing the detectibility from a distance. The overburden site would be more visible than the current disturbed landscape because it would be approximately 50 feet higher than current ground level and almost 8 times larger, and without

mitigation it would display a significant contrast in terms of form, line, color, texture, and composition.

The nearest ground viewpoint with any significant amount of viewing would be from Holcomb Valley and from the Pacific Crest Trail on Bertha Ridge, a distance of 1 to 4 miles. Holcomb Valley is in an inferior viewing position and much of the disturbance would be hidden from view by the trees. On Bertha Ridge, the additional 50' of height in the overburden pad would be about 9 vertical minutes, an amount almost unnoticeable to the naked eye and intermittent viewing by hikers on the Pacific Crest Trail; unless the viewer is focusing his/her attention on that area. The small amount of visible overburden adds variety to the landscape and is not perceived as discordant when viewed, intermittently, from a middleground or background distance. Nonetheless, the larger size of the overburden pad would make it more easily detected from a distance.

The visual impacts of modified form, line, color, texture, and composition would remain forever in the quarry. The visual impacts of modified color and texture on the overburden site would remain evident for up to 200 years as trees become reestablished to their pre-mining size. The modification of form, line, and composition would remain, essentially forever, but would become less noticeable as the vegetation matures.

To mitigate for visual impacts, the following measures for subsequent phases of the mine project have been included in the Proposed Action:

- Adhere to the OMYA's POO and Reclamation Plan for the Sentinel Quarry Expansion Revision dated October 10, 1998.
- Follow revegetation recommendations in the OMYA Plan, Appendix 4, as written by Tierra Madre Consultants dated November 1996.
- Use the commercially available and non-toxic coloring agents on all cuts and fills as well as overburden sites that face towards, and are visible from, the Big Bear Ski Areas, that would remain undisturbed for more than one year. Review other coloring techniques and alternatives that may be an improvement to reduce color contrast, reduce cost of implementation, and increase the longevity of the material installed. As new technologies are developed there may be opportunities for OMYA and the SBNF Landscape Architect to collaborate on specifying any new products or processes that would help to improve the visual quality of the Sentinel Quarry expansion operations.
- Collect and stockpile all topsoil that can be used to overcast as a cover on all man made slopes. The surface-casted topsoil would then be planted according to the revegetation recommendations.
- Round all tops and toes of fill and cut slopes that would remain untouched longer than one year.
- Review on a regular basis to a minimum of one year, progress being made with the expansion, land contouring, revegetation activities and colorizing implementation.

b) Environmental Consequences of the Alternative 2—No Action:

Under the No Action alternative, the visual impacts would continue as outlined in the existing Plan of Operation and accompanying EA. No additional vegetation, beyond that which has already been approved, would be removed. However, placement of overburden would not occur



in the existing quarry and its mitigating effect on the visual impact would not occur (although only viewers adjacent to the quarry would notice the backfilling; from a distance, it would not be very obvious). Mining and use of the approved quarry and overburden sites would be completed 15 years earlier. Reclamation of some areas would start earlier, slightly reducing visual impacts over those in the Proposed Action.

### **I. Impacts to soils**

The soils in the area of the B-5 Pad expansion are considered to be Lizzant family—Lithic Xerorthents, calcareous association, slopes vary from 15% to 50%, and the maximum erosion hazard is rated as moderate. The soils in the area of the quarry expansion are considered to be Lithic Xerorthents, calcareous—Rock outcrop complex, 50% to 100% slopes, and with maximum erosion hazard rating of very high.

#### **a) Environmental Consequences of the Alternative 1—Proposed Action:**

The undisturbed area to be impacted would either be excavated or covered so that all of the existing vegetation would either be displaced or destroyed. The soil would be removed and salvaged and used to form the basis for growth media to be used to reestablish vegetation in rehabilitating the surface of overburden sites. The quarry pit would be backfilled with overburden and crusher waste.

The native soil has a moderate erosion hazard rating and it would be necessary to incorporate organic material into the growth medium and to quickly establish vegetation in it after it is placed on the surface of the area being rehabilitated. It is likely, because of the shallow depth of the native soils and the shrinkage that occurs in salvaging and storing soil as growth medium, that there would not be sufficient growth medium to completely cover all disturbed areas. Depending on the erodibility of the areas not covered by growth medium, erosion could increase without other actions to control it.

The growth medium, supplemented by the addition of organic material, would be more fertile with greater water holding capacity and greater resistance to erosion than the native soil, which would result in greater density of vegetative cover. However, there is not enough top soil to cover all of the disturbed areas, and the volume of growth media generated on-site would need to be supplemented to achieve complete coverage.

#### **b) Environmental Consequences of the Alternative 2—No Action:**

Under the No Action alternative, the impacts would continue as outlined in the existing Plan of Operation and accompanying EA.

### **J. Impacts to Vegetation**

The vegetation on the undisturbed land in the project area reflects the desert influence and is dominated by singleleaf pinyon pine, western juniper, curlleaf mountain mahogany, and rabbitbrush.

#### **a) Environmental Consequences of the Alternative 1—Proposed Action:**

Vegetation on the 32.1-acres of quarry and overburden expansion would be removed, along with the topsoil and stored as part of the growth medium. The trees would be removed and cut into

logs. The limbs and brush that are removed would be incorporated into the growth medium. The logs, which help to catch wind-eroded soil particles until a complete vegetative cover is established, would be set aside to be placed on top of the growth medium cover when it is applied to the disturbed areas.

Reclamation and revegetation at the quarry site area would include partial backfill of the pit and revegetation of the quarry and overburden site with native species, totaling approximately 25 acres. It is estimated that it would take approximately 200 years to reestablish the pinyon/juniper cover that exists today. While the pinyon and juniper are growing to their current size, there would be a gradual increase of shade, pine nuts, and juniper berries. As needle litter increases, the rate of evaporation of soil moisture would decrease and thus promote growth of more vegetation.

This alternative would have beneficial effects associated with acquisition of 80 acres of mining claims, which would result in native vegetation on those claims being protected from disturbance/losses of future mining operations.

**b) Environmental Consequences of the Alternative 2—No Action:**

Under the No Action alternative, the impacts to vegetation would continue as outlined in the existing Plan of Operation and accompanying EA. No additional vegetation, beyond what has already been approved, would be removed. No additional direct impacts to vegetation would be expected. Dust generated by the mining operations and haul trucks would have some unknown level of impacts for the remainder of mining. These impacts would end 15 years earlier than in the Proposed Action. Additionally, revegetation would be a little further along at the reclamation sites under this alternative. Revegetation under the existing POO only involves 3.5 acres in Sentinel Quarry with no backfill. This alternative would not have beneficial effects associated with acquisition of 80 acres of mining claims, which would result in native vegetation on those claims being protected from disturbance/losses of future mining operations.

**K. Impacts to Watershed/Hydrologic Functions**

Watershed and hydrologic resources and resources values, other than those addressed elsewhere in this assessment, include quality of surface and ground water resources. Sentinel Quarry and its associated disposal sites, are located in a "top of the mountain" position within the Furnace Canyon and Crystal Creek sub-watersheds. Any impacts to surface water and groundwater from the mining operation could potentially result in down-slope and downstream impacts to water quality and quantity, slope instability, channel cutting, and erosion, etc.

The Sentinel Quarry and disposal area is primarily a groundwater "recharge" area that collects surface water and channels some of it through fractures, permeable rock, joint and fault systems to lower elevation aquifers. Bedrock fracture aquifers are present near the top of the watershed, but of minimal significance unless OMYA requires wells.

Water from three wells is used for dust control: a well at the company's plant in Lucerne Valley; a well and a spring in Crystal Creek Canyon near Turn 5 of the haul road. Water runoff does not generally occur. OMYA uses water and magnesium chloride to abate dust from haul roads once or twice a year. OMYA's records indicate about 4,238,000 gallons of water used for dust

control, with about 75% used on the haul road. Without the use of Magnesium Chloride, the company notes that their water needs would be far greater (2-4 times more) and that the dust control would be less effective.

Crusher fines have been accumulating at the Sentinel Quarry since 1981. At present, there are approximately 60,000 tons of fines stockpiled. From this stockpile, approximately 80 tons of material many have found its way towards Furnace Canyon. OMYA has constructed a temporary sediment pond to prevent further transportation into Furnace Canyon.

a) Environmental Consequences of the Alternative 1—Proposed Action:

Potential impacts to watersheds and hydrologic functions from mining activities could result from:

- Side casting or blasting excess or uncontrolled material over the steep slopes dropping into Furnace Creek;
- Leaving haul roads poorly drained and road cut-fill slopes un-vegetated and un-stabilized, causing excess erosion and sedimentation;
- Allowing water to pond within the pit, potentially saturating the subsurface and decreasing natural stability leading to slope failure into Furnace Creek;
- Locate disposal areas that alter existing drainage systems;
- Lower or deplete water tables by extraction for mining purposes;
- Chemicals and hazardous materials improperly stored;
- Errant crusher fines entering Furnace Canyon.

The specific design measures, environmental protection measures, Best Management Practice standards (BMPs), and Reclamation Plan (to be approved by the County) incorporated into the Proposed Action are expected to totally avoid or minimize potential impacts to water quality/quantity and hydrological function within and around the mining operation.

Thus, the Forest Service expects the potential for impacts described above to be low. If the Proposed Action is approved, OMYA, would move the crusher fines from the temporary sediment pond to the spoils pile, thus eliminating the possibility of sediment transport into Furnace Canyon.

The Sentinel Quarry expansion would not contribute to runoff. The only water entering the quarry is from rain or snow that falls directly into the quarry. The final quarry would form a pit 200-feet deep from which no water or sediment could escape. The Sentinel quarry expansion would also not contribute any sediment to any drainage so no direct degradation of water quality would occur. Some sediment transport may occur in runoff from the overburden site however erosion-control structures and use of BMPs are expected to keep it to a minimum.

The proposed project would not deplete any water table reserves. OMYA uses 296,716 gallons of water (0.91 acre-feet) for dust control in the existing quarry. This usage would increase by an estimated 10% due to avoidance/minimization measures that are a part of the Proposed Action. OMYA would transport water from a well in Crystal Creek. The proposed increase in water usage is nominal and would not jeopardize the water supply of any communities in the

immediate vicinity of the proposed project area in the Mojave Desert. OMYA is using only 50% of its allowed water allotment from the State Agency.

b) Environmental Consequences of the Alternative 2—No Action:

Under the No Action alternative, the impacts would continue as outlined in the existing Plan of Operation and accompanying EA.

**L. Impacts to Geological Functions**

Geologic Resources in this area include: a) groundwater (addressed above) and associated subsurface aquifers and recharge areas; b) valuable mineral deposits (including those that may become valuable in the future); c) cave and fossil resources; and, d) carbonate rocks that support rare plant species and other unique vegetation and animal associations.

The most direct impact to geologic resources is the mining operation itself. Mining, in and of itself, removes raw material from the earth to meet the demands of modern society. Limestone is a non-renewable resource and, therefore, mining results in a depletion of this resource. This depletion of mineral resources generally leads to deeper and more expensive mining operations, and in many instances, to greater haulage and milling costs. Another possible impact of mining occurs when low-grade limestone is discarded indiscriminately in waste areas. A grade of limestone that is presently non-commercial may be worth mining later as prices, markets, and technologies change.

Caves frequently occur within limestone rock bodies, and can be habitat for numerous species, as well as sites with archeological and paleontologic significance. Only one small cave or hollow area within the limestone has been uncovered during OMYA's past mining and OMYA is not aware of any others. OMYA has observed some fossils in the quarry but due to metamorphism of the limestone, they are not sufficient to determine age.

Geologic hazards in this area include: a) risk from landslides, rock falls, etc.; b) seismic risks; and, c) risk of destabilizing both natural and altered slopes, such as road cuts and fills, quarry cut faces, side cast materials and unstable waste disposal piles.

Seismic activity is common in the San Bernardino Mountains, especially with the San Andreas Fault and numerous smaller faults present in the area. The most earthquake-related damage in mountainous area is often the landslides triggered by seismic shaking.

a) Environmental Consequences of the Alternative 1—Proposed Action:

Under the Proposed Action, impacts to the valuable mineral deposits would continue due to the mining of limestone. Due to the large size of the limestone deposit on the North Slope of the San Bernardino Mountains and the relatively small size of the expansion proposal, this extraction of limestone resources is not considered significant. Potential impacts to future mining of deposits within the project area are unclear and difficult to predict because of the uncertainty of future markets and technologies. This document discussed potential impacts to groundwater above.

Geological hazards are not expected to increase under the Proposed Action. OMYA has designed Sentinel Quarry to meet current engineering standards to minimize any foreseeable

major structural failures and geological hazards. The quarry itself has numerous faults crossing the pit but there are no known records that any of them are active. The expansion proposal is not likely to alter failure levels due to earthquake.

Potential impacts to paleontologic resources and caves are expected to be low due to process steps built into the Proposed Action (**Table C**). Mining operations may inadvertently destroy or damage limestone caves in the carbonate substrates. Impacts may be avoided or lessened if operations cease upon discovery until the Forest Service can examine them. Mining operations also have the potential to damage fossil resources. As part of the Proposed Action, OMYA will collect fossils as they are discovered in order to allow the Forest Service to evaluate them for significance and to determine whether additional measures are necessary.

b) Environmental Consequences of the Alternative 2—No Action:

Under the No Action alternative, the impacts would continue as outlined in the existing Plan of Operation and accompanying EA.

**M. Air Quality Impacts**

Air quality in the area is somewhat affected by vehicle emissions and airborne pollutants from OMYA's limestone operation. State officials consider the emissions and pollutants from the cities and freeways of southern California as the major adverse impact on overall air quality in the area. The other major negative influence on air quality is summer wildfires and associated smoke.

Mojave Desert Air Quality Control Board (MDAQCB) monitors the air quality and ensures that air quality stays within regulatory standards. OMYA's permit from MDAQCB includes numerous specific conditions to meet air quality standards, including guidelines for dust control on haul roads, crusher sites, and other dust sources. Daily production rates are limited and monitoring is required.

OMYA uses water from three wells for dust control. Magnesium Chloride is mixed with water and sprayed on roads once or twice a year to limit dust dispersal. OMYA's records indicate about 4,238,800 gallons of water are currently used for dust control, with about 75% used on the haul road in 1996. Without the use of Magnesium Chloride, the company notes that dust control would be less effective.

a) Environmental Consequences of the Alternative 1-Proposed Action:

Under the Proposed Action, dust levels on the haul road would continue at close to current levels. Dust levels around the crusher site would be reduced as a result of measures included in the Proposed Action. Due to Mojave Desert Air Quality Management District regulations and monitoring, it is unlikely that significant changes in air quality levels could occur as a result of the proposed expanded mining operation.

b) Environmental Consequences of the Alternative 2-No Action:

Under the No Action alternative, the impacts would continue as outlined in the existing Plan of Operation and accompanying EA.

## N. Cumulative Impacts

Under the National Environmental Protection Act (NEPA), "cumulative impacts" are those impacts caused by past, present, and future federal, state, and private activities.

Projects that are ongoing or expected in the near future in the general area of the North Slope include:

- Mining and associated activities are continuing at all existing operations—SBNF and private lands: White Knob and Sentinel Quarry (OMYA), Arctic-Marble Canyon Quarry and Furnace Canyon Quarry (Specialty Minerals), Cushenbury Quarry (Mitsubishi). Approximately, two thirds of these operations are on private land.
- Specialty Minerals—private land: San Bernardino County recently approved an expansion of Marble Canyon and Furnace Canyon Quarries operating on private land.
- Mitsubishi—private land: San Bernardino County recently approved a mining expansion of 23 acres on private land.
- Mitsubishi—private land: Proposed expanding about 200 acres west from their existing quarry.
- SBNF—roads: Currently evaluating a proposal to restore about 100 miles of unclassified roads to natural condition on the Mountaintop Ranger District.
- SBNF—withdrawal: Submitted a request in summer 2001 to the Bureau of Land Management (BLM) to withdraw from mineral entry about 45,000 acres of T/E plant habitat.
- SBNF—carbonate habitat management strategy: The SBNF is currently involved in a collaborative effort with mining industry to develop a refugia area for T/E carbonate plant habitat that will ensure future viability of these species while providing for mining.
- SBNF—Right Star Incorporated: The SBNF has received a Notice of Intent (NOI) to mine from underground workings about 35 acres of carbonate claims in the Lone Valley (Smart Ranch Claims 11 and 16).
- Reclamation of past mining activities—private and federal lands: Ongoing reclamation and revegetation efforts are occurring at all three of the large limestone mines in previously-mined areas. Lands disturbed for mining before 1974 are not subject to reclamation laws and may not necessarily be reclaimed.
- Sand and gravel mining—private land: An operation near Cushenbury Springs has current County approval and a desert tortoise "take permit" from U.S. Fish and Wildlife but has not started operation.

1. Cumulative Impacts to Botanical Resources, including Threatened, Endangered, and Sensitive Species: Three large limestone-mining companies currently operate on the north slope of the San Bernardino Mountains (OMYA, Specialty Minerals, and Mitsubishi). Land management agencies have currently permitted 615.7 acres for mining limestone operations. Assuming a total carbonate substrate of 28,000 acres, mining companies have approximately mined or mining 2% of this acreage. All the 28,000 acres are neither economically viable limestone deposits nor suitable habitat for carbonate plants. Impacts to the plants occur by: direct removal of plants/habitats; deposition of waste on plants/habitats; construction/use of mining roads on plants/habitat; alterations of hydrology; deposition of dust which may interfere with transpiration, photosynthesis, and water infiltration; and, removal of recolonizing plants during

reclamation and recontouring of mine sites, etc. Effects are likely to be long-term as revegetation in that habitat is slow and uncertain.

Most of the already-approved carbonate mining activities on NFS and non-NFS lands have already completed their surface disturbances. As such, the direct impacts of actual acres of plant habitat lost to approved mining have already occurred. Additional direct impacts may result when mining operations dump overburden on carbonate substrates, but, generally, waste materials are not placed on carbonate substrates since the companies may ultimately want to mine those areas. Indirect effects from ongoing mining operations will continue for years. Those effects include erosion of habitat, sediment deposition on habitat, dust deposition on plants, interference with pollinators/seed dispersal, etc.

A potential threat to carbonate plant habitat is loss of habitat associated with future mining efforts and/or patenting. **Table F** displays the areas currently under claim that have the potential to be patented. Under the mining laws, claimants may apply to patent (purchase) the land and minerals in the claim if a valuable deposit is located. If approved, those lands go from Federal management to private ownership, thus falling under County and State laws instead of Federal. The potential impact of carbonate claims becoming private land is a substantial cumulative threat to the carbonate endemic plants because Endangered Species Act provisions do not provide as much protection of listed plant species on private lands.

Lands currently mined by Mitsubishi, OMYA, and SMI all include areas that were once Federal land that became privately-owned through patenting. Approximately 2500 acres of land on the North Slope was previously NFS land and is now in private ownership. There has been a Department of Interior moratorium on patenting since 1992, resulting in no NFS land becoming private since then. There is still one pending patent application on the SBNF. Since the patent application process has not typically included NEPA analysis, T/E species protection has not been considered in the process to issue patent. Patent applications meeting the mining law requirements of 'discovery' are generally approved regardless of impacts and other considerations.

Since T/E plants on private lands carry a lesser degree of Endangered Species Act protection, the occurrences on private lands are at a greater threat of impacts/losses due to mining, development, and other activities. With between 13 and 27% of known occurrences of four of the carbonate endemic plant species on private land (**Table F**) and carrying lower levels of protection, the threat of loss of those occurrences substantially increases the potential cumulative to these species.

**Table F.** Approximate mining claims of T/E occurrences on NFS lands (derived from 1998 database).

SPECIES	Total acres of occurrence				Acres of occurrence under claim				Acres of occurrence not under claim				Percentage of occurrences under claim			
	OX	AS	ERP	ERO	OX	AS	ERP	ERO	OX	AS	ERP	ERO	OX	AS	ERP	ERO
NFS lands	430	989	554	1056	372	852	436	785	58	138	118	271	87	87	79	74
BEM lands	2	154	232	82	2	68	194	51	0	87	38	31	100	44	84	62
Private lands	76 (15%)	154 (13%)	288 (27%)	198 (15%)	-	-	-	-	-	-	-	-	-	-	-	-
TOTALS	508	1232	1074	1336	374	920	630	836	58	225	156	302	87%	80%	80%	73%

\*OX=*Oxytheca parishii* var. *goodmaniana*; AS=*Astragalus albens*; ERP=*Erigeron parishii*; ERO=*Eriogonum ovalifolium* var. *vineum*

Indirect effects of mining operations and development include habitat fragmentation, fugitive dust, night lighting, weed spread, and impacts to pollinators. Although the direct loss of occupied habitat may occur in a short time-period during initial ground-disturbing efforts, indirect impacts may occur for many years. In some cases, the lifetime of a quarry can be 50 years, resulting in long-term indirect impacts from daily haul truck traffic, from disturbance to pollinators, etc.

The mining activities of all the operations on the North Slope cumulatively result in greater amounts of fugitive dust produced from generated by blasting, excavation, and the use of haul roads by construction equipment, vehicles, and trucks carrying overburden and ore to mill sites and waste dumps. Dust can have several direct impacts on plants, including disrupting physiological functions, inhibiting pollination and seed germination, suppression of photosynthesis and transpiration. Dust deposition on the soil surface may reduce the water permeability of the soil, reduce soil moisture, and increase erosion. Fugitive dust layers on the ground may also change water infiltration and drainage patterns, soil pH, soil chemistry, and light penetration to soil seed banks.

In the case of the carbonate plant habitat, some of the activities from the large-scale mining operations have resulted in creation of large areas of inhospitable unsuitable habitat for carbonate plants. Abandoned quarries and haul roads, in most cases, are bare rock lacking an organic layer cover. Many of those areas have numerous vertical faces where topsoil and plant establishment would be difficult if not impossible. If carbonate plant seeds do make it into these areas, germination is unlikely. While these areas may ultimately revegetate hundreds of years from now, they present barriers to seed and pollen dispersal in the near future and may result in genetic isolation and increased vulnerability of occupied carbonate plant habitat. The distribution of the carbonate species is naturally patchy so the fragmentation effects may not be as severe as for those species that are distributed contiguously.

Removal of vegetation from a site may alter the local microclimate by raising ground temperatures, changing water infiltration and evaporation, changing wind patterns, and changing light levels. All of these factors can affect adjacent vegetation communities, including T/E plant populations.

Many of the mining operations are approved long into the future (as long as 50-60 years). The continued human presence in these sensitive habitat areas results in a magnification of all of the previously-discussed impacts. It is likely that vegetative communities adjacent to quarries, haul roads, and processing sites may have already suffered a decreased level of vigor and reproductive success.

Road construction, use and maintenance, power line construction and utility corridors, unauthorized vehicle use, OHV use, unauthorized target shooting, unauthorized grazing from trespass cattle straying off BLM lands, wildfire suppression and ecological restoration activities may also affect vegetation to a lesser degree.

A substantial threat to carbonate plant habitat is the potential for future mining and/or patenting of occupied habitat (**Table F**). An objective of the Carbonate Habitat Management Strategy's collaborative effort includes designing and implementing a refugia system that provides long-



term habitat protection and recovery as well as designating areas for future mining. The SBNF will withdraw the refugia areas from mineral entry. Such a refugia system would alleviate the threat of future habitat loss of associated carbonate plant occurrences.

In light of the ongoing collaborative effort, the cumulative impacts to threatened and endangered carbonate plant species from various activities along the North Slope are not considered significant. The cumulative impacts to sensitive plant species, watch-list plant species, and general vegetation from various activities along the North Slope are not considered significant. Additionally, many recent efforts by the SBNF to provide increased protection and restoration to TES habitats have resulted in beneficial effects to those habitats.

Once reclaimed long into the future, all of the mined areas would again support vegetative communities, including some of the rare species. Additionally, the relinquishment of 80 acres of claims within the Bighorn Wilderness would effectively mitigate for the loss of vegetation at the project site.

2. Cumulative Impacts to Wildlife: The past, present, and foreseeable future mining activities on the north slope of the San Bernardino Mountains is likely to result in continued fragmentation and degradation of important wildlife habitat. Of particular concern are impacts to a small, relatively isolated population of Nelson's bighorn sheep. Large-scale mining has broken up their habitats and movement corridors, reduced the available forage and water, and increased the level of disturbance, potentially making individuals more susceptible to predation by mountain lions.

Likewise, other species that depend on the transition pinyon and juniper/Mojave desert habitat along the North Slope are experiencing habitat losses and fragmentation because of mining activities, residential development, highways, etc.

However, many recent efforts by the SBNF to provide increased protection and restoration to TES habitats have resulted in beneficial effects to those habitats. The SBNF's proposal to restore around 100 miles of unclassified roads to natural habitats would help further reduce impacts to wildlife by providing for more forage, cover, and breeding habitats. The cumulative impacts to wildlife species from various activities along the North Slope are not considered significant.

Once reclaimed long into the future, all of the mined areas would again support vegetative communities and associated wildlife, including some of the rare species. Additionally, the relinquishment of 80 acres of claims within the Bighorn Wilderness would provide for future wildlife habitat undisturbed by mining.

3. Cumulative Impacts to Heritage Resources: Damage to heritage resources has been fairly substantial in the San Bernardino Mountains over the past century. There are numerous historic and archaeological sites that have been lost or damaged due to human use of the general area. Continued private land development and recreational use of National Forest lands have substantially impacted the historic record of this mountain range. Because no heritage resources are expected to be affected by the proposal, the cumulative impacts to heritage resources from

the Proposed Action and other various activities along the North Slope are not considered significant.

4. Cumulative Impacts to Public Access: As a safety precaution about 500 acres would be restricted for hunting and other recreational use to the public. Mining roads would be restricted to company vehicles, and vehicle access on Forest Road 3N87 will be eliminated after restoration. Other recent projects on the Mountaintop Ranger District include restoration of many unclassified roads to natural habitats. This would effectively reduce the number of miles of vehicle access open to the driving public. However, there are still hundreds of miles of vehicle access on the Mountaintop Ranger District and the cumulative effects of road restoration on public access is not considered significant.

The proposed action's restriction of public use within the 500 acres in and around active operations and haul roads would be the only part of the Mountaintop Ranger District currently closed to public recreation. No other complete closures to public access are currently in place or foreseeable.

5. Cumulative Impacts to Visual Quality: The long-term cumulative visual impacts of limestone mining along the North Slope are considerable. The mining areas form a conspicuous landscape along the slope. The limestone mining companies on the North Slope continue to expand their operations periodically on private and federal lands and it is expected that they will do so into the foreseeable future as long as market conditions prevail. Visual impacts would continue to increase with each expansion. Reduction of visual impacts is difficult due to the whiteness of the substrates and due to slowness to revegetate even when the Operator saves the topsoil as growth media. While some efforts have been made to reduce the visual impacts through the use of inert 'desert varnish' to stain white rock exposures or through placement of gray limestone over bright white limestone, some visual modification is an inherent and unavoidable result of the cumulative mining activities in the area.

6. Cumulative Impacts to Soils, Watershed/Hydrological Functioning, and Geology: The large-scale mining efforts on the North Slope have disturbed and disrupted these resources to some extent in the past while at the same time while extracting limestone for public benefit. Mining companies may try to continue mining by underground methods because the demand may justify the higher mining costs way past the near future. There are expected to be adequate limestone resources to meet demand. Societal demands for high purity limestone will be ever present given the ubiquitous uses of the product by modern society.

Soil layers on the North Slope are extremely thin (generally less than 1-3 feet). In many areas, there is no soil layer at all on exposed bedrock or outcrops. All recent and current mining operations require stockpiling of soil for use during reclamation. Thus, very little soil is currently lost during the operating period. Past losses of soil cannot evaluate or rectified. Long-term soil stockpiling may result in losses of seed bank viability and some soil nutrients. However, revegetation requirements help mitigate for the losses of seed banks. Current operating standards, Best Management Practices, regulatory standards, and monitoring help ensure that individual and cumulative effects would not reach a level of significance.

A study made by the United States Geological Survey nearly 20 years ago determined that 90% of the water use in the watershed basin is used for agricultural uses (Schaefer 1979). OMYA records indicate that water uses have decreased by 60% in 20 years. Mitsubishi Cement Corporation has also decreased the use of water since they have converted the cement manufacturing process from a wet to dry process. All mining operations have approved water discharge plans that are approved by the California State Water Resources Control Board. These plans help ensure that cumulative impacts to water quality and quantity will be non-significant.

7. Cumulative Impacts to Air Quality: The most substantial influences on air quality in the San Bernardino Mountains are pollution/emissions associated with urban/industrial developments and smoke from wildfires. Naturally- occurring fugitive dust, especially in desert habitats, also reduces air quality conditions. These influences are expected to continue, and may increase with increasing populations. All mining operations on the North Slope are regulated by various State, County and Federal agencies to ensure minimal impacts to air quality. State and Federal air quality regulation and monitoring will have the most significant effect on maintaining air quality.

#### **IV. Consequences Relative to Environmental Significance**

In 1978, the Council of Environmental Quality promulgated regulations for implementing the National Environmental Policy Act (NEPA). These regulations (40 CDR Parts 1500-1508) include a definition of "significantly" as used in NEPA. The eleven elements of this definition are critical to reducing paperwork through the use of a "Finding of No Significant Impact" when an action would not have a significant effect on the human environment and is therefore exempt from requirements to prepare an Environmental Impact Statement.

1) Context: The context of this proposal is limited to the locale of the Sentinel Quarry. Proposed activities contain measures to reduce direct impacts to T/E species and heritage resources. The SBNF has considered past, current, and reasonably foreseeable actions within the vicinity of the project area to determine that no significant cumulative effects would be expected as a result of this proposal.

2) Intensity: The intensity of this proposal varies by considerations described below:

a) Beneficial and adverse impacts: Through avoidance/minimization and minimization measures, impacts to endangered carbonate plants and their habitats and threatened desert tortoises would be reduced to non-significant levels. Likewise, impacts to sensitive plants and animals in the project area are considered non-significant due to the environmental protection measures incorporated in the project. There are some beneficial effects associated with the acquisition of 80 acres of mining claims in the Bighorn Wilderness: these 80 acres of pinyon/juniper woodland and carbonate plant habitats would be protected from future losses caused by mining activities. This offsets, to some degree, further losses and fragmentation of these habitats in/around the project area. Adverse impacts to visual quality are unavoidable, though considered non-significant due to the limited viewshed and low visual quality objectives for the area.

b) Public Health and Safety: Field surveys did not disclose any indications of present or past release, storage, or disposal of hazardous substances. There have been concerns that

public illegally accessing the haul road and OMYA's operating areas might cause safety hazards to themselves and OMYA personnel, especially when encountering loaded haul trucks that have slow reaction/stopping responses. Gates and signs at the junction of 3N16/Crystal Creek haul road prevent access and inform the public of the potential danger. However, illegal access off of other Forest roads is possible by illegal cross-country driving. Closure of Forest Road 3N87 would help reduce the likelihood of straying into OMYA's active operations. An additional safety risk to public illegally in the area includes falling/driving into open quarries. Large berms along the quarry rims help reduce that risk. Maintenance of gates, signs, berms, and fences along with diligent efforts to close/disguise illegal cross-country access connecting to the haul road would be critical to health and safety.

c) Unique Characteristics of the Geographic Area: The project area does not include and is not near any known historic or cultural resources, prime farmlands, wetlands, floodplains, and wild or scenic rivers. The carbonate rocks and derived soils of the North Slope are unique in the San Bernardino Mountains for several reasons:

- 1) The North Slope's carbonate deposit is among the purest west of the Mississippi River; and,
- 2) The presence of four endemic threatened and endangered plant species that grow on the deposit are found nowhere else in the world. Unique vegetation associations and several sensitive plant species, including several other endemics, characterize the habitat associated with the carbonate geology. The project area also supports a population of Nelson's bighorn sheep that is unique in this portion of the mountain range.

d) Highly Controversial Effects: The ongoing cumulative impacts to endemic carbonate plants and their habitats are, to a degree, controversial. The SBNF's effort to ensure continued viability and recovery for these species is also controversial. The expansion of Sentinel Quarry and the overburden area would not directly impact any habitat with known occurrences of these species. There are indirect effects, however, of the continued operation. Indirect effects include potential degradation of vegetative communities due to dust deposition. Dust impacts are greatest near the crusher and along the haul road. There are additional concerns about impacts to habitat along the haul road during maintenance activities as rocks and sediment roll downslope into plant habitats. Those areas support T/E species as well as sensitive species and vegetation important to wildlife species. The dust study included in the Proposed Action would help Forest Service botanists better understand the effects of carbonate dust on vegetation, allowing future management practices to be developed to mitigate or reduce effects.

e) Uncertain, Unique, or Unknown Risks: There is an unknown risk associated with the impacts of dust on adjacent vegetation, including federally-listed endangered plant species and their habitat. It is anticipated that the impacts/risks would be controlled through monitoring and mitigation. There is also unknown risk associated with the potential losses of individual desert tortoises (from vehicle collisions on access roads) but this is not considered critical to the continued viability of the species. Monitoring incorporated into the Proposed Action would help determine the level of impacts to

desert tortoise, allowing managers to implement mitigation measures if needed to control the risk. There is also an unknown risk to the small population of bighorn sheep that inhabits this part of the North Slope. Due to small population size, possible isolation, disturbance, competition for water, possible habitat fragmentation and losses of movement corridors, the continued existence of this population may be at risk. While bighorn are tolerant of some disturbance, the threshold level at which these factors combine to cause the population to fail is not known.

f) Precedent Setting: Approval of the Proposed Action would not be precedent setting, since limestone mining has been going on in this area for over 40 years.

g) Cumulative Impacts: No significant cumulative effects were identified.

h) Scientific, Cultural, and Historical Resources: An archaeological survey of the area did not discover any significant heritage resources and there were no objects listed or eligible for listing in the National Register of Historic Places.

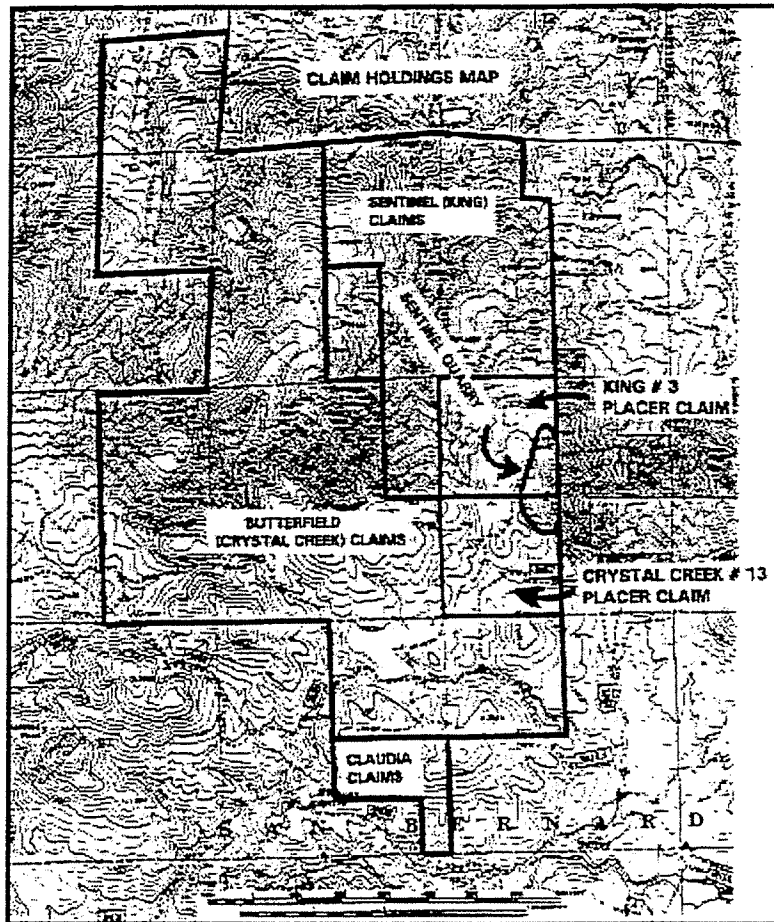
i) Threatened or Endangered Species: The impacts to threatened and endangered species are discussed in detail above. They are not considered significant.

j) Environmental Protection Laws: Approval of the Proposed Action would not violate Federal, State, or local laws or any regulations.

## V. OTHER CONSIDERATIONS FOR MINING

**Minerals**: Approval of the proposed action is subject to determination of Valid Existing Rights. No mining could commence until the SBNF conducts a validity examination on the King #3 and Crystal Creek claims (**Figure 8**).

Figure 8. Claims in the project map



## VI. AGENCIES AND PERSONS CONTACTED

Hisam Baqai, California Regional Water Quality Control Board

Joyce Burk, Sierra Club

Dr. Emily B. Roberson, Ph.D, California Native Plant Society

San Bernardino County Planning Department

Gregory Ouellette

Glenn Steber

Andy Sanders, U.C.-Riverside

Mitsubishi Cement

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Kevin Brennan, California Department of Fish and Game

Mary Meyer, California Department of Fish and Game

Ray Butler, California Native Plant Society

Howard Brown, OMYA (California), Inc.

Tom Walsh, Sierra Club

Jim Davis, California Department of Fish and Game

Doug McPherson, U. S. Fish and Wildlife Service—Carlsbad Field Office

## **VII. CONTACT**

The San Bernardino National Forest invites your comments on this Environmental Assessment for the proposal to allow the expansion of OMYA's Sentinel Quarry limestone operations. The comment period ends 30 days following the publication of notice in the *San Bernardino Sun* newspaper. All comments received during the comment period will be considered in making a decision on the proposed action.

## **VIII. CONTACT PERSON**

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## **IX. LITERATURE INCORPORATED BY REFERENCE**

- Brown, H. J. 1994. Geology, genesis, and mining of high brightness, high purity limestone deposits at Pluess-Staufer (CA) Inc. Lucerne Valley, California Operations.
- Bulot, Inc. 1998. Hydrologic Evaluation of OMYA's Sentinel Quarry. October 1998.
- Butler, R., and D. Volgarino. 1999. Biological assessment for the San Bernardino National Forest carbonate species. San Bernardino National Forest. February 2, 1999.
- Butler, R. 2000. Wildlife biological evaluation for OMYA (California) Inc. proposed Sentinel Quarry expansion. San Bernardino National Forest. December 7, 2000.
- McCarthy, D. 2000. Addendum to the 8/98 Archaeological Reconnaissance Report for Sentinel Quarry expansion proposal. San Bernardino National Forest. 2/4/00
- Mlazovsky, M. 1998. Archaeological Reconnaissance Report for Sentinel Quarry expansion proposal. San Bernardino National Forest. Dated 8/26/98.
- OMYA (California) Inc. 1998. Plan of Operation & Reclamation Plan for Sentinel Quarry Expansion. January 3, 1998.
- OMYA (California), Inc. 1998. Plan of Operation and Reclamation Plan for Sentinel Quarry Expansion. October 1998.
- OMYA (California), Inc. 1998. Plan of Operation and Reclamation Plan for Sentinel Quarry Expansion. Revised June 4, 1998.

- Psomas & Associates. 1997. Biological survey report for the Sentinel Quarry expansion proposal. Dated 8/21/97.
- San Bernardino County Planning Department. 1994. Reclamation Plan 94 M-02: Mining Operations on U.S.D.A. Forest Service Land. Approved June 11, 1994.
- San Bernardino National Forest. 1989. San Bernardino National Forest Land and Resource Management Plan.
- Schaefer, D.H., Ground-water conditions and potential for artificial Recharge in Lucerne Valley, San Bernardino County, CA U.S.G.S. Water-Resources Investigations 78-117 (1979).
- Tierra Madre Consultants, Inc. 1996. Revegetation Plan: Pluess-Stauber (California) Mining Operations on USDA Forest Service Land, SBNF, San Bernardino County, CA. 11/19/96.
- U.S.D.I. Fish and Wildlife Service. 2000. Informal Section 7 consultation for Sentinel quarry expansion, San Bernardino County. Letter dated 9/14//2000.
- Volgarino, D., Butler, R., and S. White. 2000. Biological Assessment for OMYA (California) Inc. proposed Sentinel quarry expansion.
- Volgarino, D. 2001. Botanical biological evaluation for OMYA (California) Inc. proposed Sentinel Quarry expansion. San Bernardino National Forest. January 8, 2001.
- White, S. 1999. Draft biological evaluation: OMYA (California) Inc. Proposed Sentinel quarry expansion. 16 April 1999.
- Jordan, F 1992. Slope stability study of Sentinel Quarry.

## **X. List of Prepares**

Butler, Robin. District Biologist, Mountain Top Ranger District  
 Daniel, Raj. Mine Administrator, Team Leader,  
 Garcia, Gil. Forest Hydrologist  
 King, Allen. Province Geologist  
 McCarthy, Daniel. Forest Archeologist  
 Mlazovsky, Marilyn. Forest Archeologist (Retired)  
 Seyden, Hal. Forester (Retired) Team Leader  
 Sinclair, Lester, Forest Landscape Architect  
 Volgarino, D. District Botanist, Mountain Top Ranger District  
 Williams, Floyd, Ph.D., Volunteer Mining Engineer, SBNF



## APPENDIX I. Applicable Requirements and Direction

Applicable requirements and direction may be found in the Endangered Species Act, National Forest Management Act, Department of Agriculture 9500-4 Regulations, Forest Service Manual, California Surface mining and Reclamation Act of 1975 (SMARA), Forest Service Regulations for Mining (36 CFR 228), General Mining Law of May 10, 1872 (known as the Mining Act), and the San Bernardino National Forest Land and Resource Management Plan (LRMP) of 1989.

The San Bernardino National Forest Land and Resource Management Plan (LRMP) contains direction on management of issues and resources within the Forest boundaries. The project area is within the Back Country Management Area and Custodial Management Emphasis Zone. LRMP direction that applies to this project and associated issues follows.

- Back Country Management Area direction (Page 4-39) includes:
  - Mining: The Forest Service will continue to administer mining operations. Plans of operation and appropriate mitigation and reclamation measures will be required for significant ground disturbing activities. Viable populations of sensitive plants will be identified and protected through special measures.*
  - Wildlife: TES plant and animal habitat will be protected from activities that would adversely affect the species. All management activities will consider and include methods to maintain or enhance plant or wildlife diversity, wherever possible.*
  
- Custodial Management Emphasis Zone (Page 4-17) direction includes:
  - Manage to provide protection of existing facilities and resources. Actively manage to the extent laws, regulations, and legal agreements are met. Conduct projects and vegetation management activities to provide for protection (fuels management) and to maintain or improve habitat conditions for Sensitive, Rare, Threatened, Endangered, and other wildlife species.*
  
- Forest-wide Standards and Guidelines (SG-23 and 24) Management Direction for Locatable Minerals that are applicable to this proposal include:
  - *Allow the production of minerals and energy with the assurance of adequate protection of other surface resources and resource values. Permits, leases, and Plans of Operation are to assure that adverse environmental effects are minimized or mitigated, and that mined lands are reclaimed in a timely manner to regain surface production and use.*
  - *Allow reasonable access to mineral operations.*
  - *Administer mining in conformance with Federal laws and regulations.*
  - *Determine validity of all mining claims which (1) are operating or propose to operate within wilderness, or (2) which operate or propose to operate in areas of sensitive plant or animal habitat.*
  - *Require reasonable conditions including surface reclamation plans and bonds to insure compliance with 36 CFR 228.8 and 36 CFR 228.13.*
  - *Encourage mining claimants to reclaim older operations (pre-1974).*
  
- Forest-wide Standards and Guidelines for Wildlife (SG-57-59) and Threatened, Endangered, and Sensitive Plants (SG-65-67) that are applicable to this proposal include:

- *Coordinate with California Dept. of Fish and Game and U.S. Fish and Wildlife Service during preparation of Eas and Plans having significant effects on fish and/or wildlife habitat.*
- *Manage habitat for TES species to enhance populations and to permit their timely removal from designated lists. Manage for genetic and geographic diversity and long-term viability of the species on the SBNF. Conduct all FS management activities and regulate uses to support the needs of TES species, including maintaining current distribution of all TES speices and re-establishing species in unoccupied suitable habitat.*
- *Fully mitigate for unavoidable impacts to TES species and riparian habitat.*
- *Mitigate for impacts to non-TES species, as appropriate for the emphasis area.*
- *Emphasize sensitive species habitat protection and improvement in all forest management activities.*
- *Avoid introducing barriers to movement of deer, bear, mountain lion, and bighorn sheep. Fully mitigate barriers to movement.*
- *Protect cliffs occupied by TES cliff-nesting raptors during the nesting season. Avoid disturbance of occupied nests, including blasting, operating heavy equipment, and concentrated recreation use.*
- *Manage vegetation to correct habitat deficiencies in important bighorn sheep habitat. Establish seasonal closures as necessary, to minimize diesturbances in lambing areas and at mineral licks.*
- *Manage sensitive plant species to avoid future listing as threatened or endangered.*
- *Integrate management direction for TES plants endemic to limestone into mining operation and reclamation plans.*

