6.3 MINERALS

6.3.1 Introduction and Purpose

Mining and mineral resources are important to the economy of Shasta County and also to the daily lives of all of our citizens. Each person in Shasta County requires about 20 tons of freshly mined non-fuel minerals each year. This amount includes about 8 tons of sand and gravel to make concrete for building homes, schools, offices, factories, bridges, and roads.[1]

One of the primary purposes of the Minerals Element is to provide the necessary geologic information to ensure that there are adequate mineral resources available in Shasta County for at least the next 20 years. According to the Mineral Land Classification study, completed by the California Division of Mines and Geology in 1997, the amount of Portland cement concrete grade alluvial sand and gravel located in mining operations which had approved use permits and reclamation plans at that time would supply the County for approximately 17 years. Clearly, additional resources must be protected to avoid shortages of construction materials which would negatively affect the local economy.

Mining is ultimately a temporary land use, and when the mineral resource is depleted, all mine sites will eventually revert to a different land use. Therefore, plans for reclamation are important and necessary. Reclamation plans should be based on a plan for post-mining land use that is consistent with the General Plan and zoning of the area.

Supporting documentation and additional background information for this Element are found in the *Mineral Element Background Report - 1998*.

6.3.2 Findings

Regulatory Setting

The California Government Code establishes the requirements for General Plan elements. The sections concerning the Conservation Element and Open-Space Elements include requirements for the conservation and production of mineral resources. The Code requires:

> "A conservation element for the conservation, development, and utilization of natural resources, including water and its hydraulic force, forests, soils, rivers and other waters, harbors, fisheries, wildlife, minerals, and other natural resources. ... [T]he conservation element may also cover ... the location, quantity and quality of the rock, sand and gravel resources." California Government Code Section 65302 (d).

The Code further requires an Open-Space Element for those open-space lands:

> "used for the managed production of resources including, but not limited to, forest lands, rangelands, agricultural lands ... and areas containing major mineral deposits, including those in short supply." California Government Code Section 65560.

The other primary State law concerning conservation and development of mineral resources is the California Surface Mining and Reclamation Act (SMARA) of 1975, as amended to date. SMARA is found in the California Public Resources Code, Division 2, Chapter 9, Sections 2710, et seq.

SMARA states that the extraction of minerals is essential to the continued economic well-being of the State and to the needs of society, and the reclamation of mined lands is necessary to prevent or minimize adverse effects on the environment and to protect the public health and safety. The reclamation of mined lands will permit the continued mining of minerals and will provide for the protection and subsequent beneficial use of the mined and reclaimed land. Surface mining takes place in diverse areas where the geologic, topographic, climatic, biological, and social conditions are significantly different, and reclamation operations and the specifications therefore may vary accordingly. California Public Resources Code Section 2711.

The intent of SMARA is to create and maintain an effective and comprehensive surface mining and reclamation policy with regulation of surface mining operations so as to assure that adverse environmental effects are prevented and that mined lands are reclaimed to a usable condition which is readily adaptable to alternative land uses; the production and conservation of minerals are encouraged, while giving consideration to values relating to recreation, watershed, wildlife, range and forage, and aesthetic enjoyment; and residual hazards to the public health and safety are eliminated. California Public Resources Code Section 2712.

The Surface Mining and Reclamation Act also requires that within 12 months of receiving a mineral land classification study, the County must establish mineral resource management policies to be incorporated in its General Plan. These policies would recognize mineral information from the study and emphasize the conservation and development of identified mineral deposits. California Public Resources Code Section 2762(a).

The Minerals Element is developed in a form that meets the County's land use planning needs, while still being consistent with the General Plan Guidelines and the objectives and requirements of SMARA. Through the provision of building materials, revenue, and employment opportunities, mineral resources contribute significantly to the economic and resource bases of Shasta County. The Minerals Element is a fundamental component of the Natural Resources Group.

Historic Mineral Resource Development in Shasta County

Mining has been an important industry in Shasta County since gold was discovered by P.B. Reading on Clear Creek in 1848. Shasta County was one of the two most important centers of mining in California during the 1849 Gold Rush and continuing through the late 19th century. The Washington Mine near French Gulch, established in 1852, is one of the oldest continuously-operated gold mines in the State. Since 1880, when the State began keeping records of production, the County has produced over 2 million ounces of gold.

There are fourteen metallic minerals that have been historically mined in Shasta County: cadmium, chromite, copper, gold, iron, lead, manganese, molybdenite, platinum, pyrite, mercury, silver, tungsten, and zinc. Most of the metallic ores lie in western Shasta County, the French Gulch district being the most important gold producing area of the region. The West and East Shasta Copper-Zinc belts contain the County's principal copper deposits. These belts extend from Iron Mountain northeastward to Backbone Creek, then east to Ingot, a distance of about 30 miles.

During the late 1800's and early 1900's, Shasta County became the most important copper producing area in California, and one of the most important in the United States. The most significant copper mines included the Afterthought Mine in Ingot, the Bully Hill and Rising Star Mines located on what is now the Squaw Creek arm of Shasta Lake, and the Iron Mountain Mines located northwest of Keswick. Over the years, Shasta County has produced more than 700 million pounds of copper, which is more than half of all the copper produced in California.

Between 1874 and 1929, local coal reserves were in demand as an energy source for the County. By 1929, however, due to the extensive development of natural gas resources, coal usage had virtually ceased. The majority of coal deposits are located in the Montgomery Creek Formation east of Redding. The Montgomery Creek coal field has been estimated at approximately 45 square miles and to contain 1,500 tons of coal per acre foot, making a total of over 12 million tons of coal potentially available in the Montgomery Creek Formation.[2]

In addition to coal, there are thirteen other non-metallic minerals that have been mined in Shasta County including: alluvial sand and gravel, asbestos, barite, clay, crushed stone, diatomite, dimension stone, graphite, limestone, olivine, pumice and volcanic cinders, sulfur, and talc.

Production of aggregate for roads and buildings has become the dominant mining industry in Shasta County. Significant development of aggregate resources began with the construction of Shasta Dam in the late 1930's, continuing with the construction of Interstate Highway 5 in the 1960's, and then with the residential and commercial construction boom of the 1970's through the early 1990's.

The recent expansion of urban development and rural residential areas has raised concerns about the potential for land use conflicts with mineral resource development.

Present Mineral Resource Development

At the present time there are six different mineral resources under production in Shasta County. They include the five mineral resources studied in the Mineral Land Classification report: alluvial sand and gravel, crushed stone, volcanic cinders, limestone, and diatomite. The other mineral resource currently being produced is gold, which was not included in the Mineral Land Classification study.

In 2002, the latest year for which production information is available, Shasta County produced the following minerals:

462,000 tons of sand and gravel
852,000 tons of crushed stone (including limestone used for construction)
51,000 tons of volcanic cinders

Note: The total production of other minerals including limestone used to manufacture Portland cement, diatomite, and gold is not listed above. There are fewer than three major producers in each category, so to list total production could reveal proprietary information. Source: Estimates from the Shasta County SMARA Regulatory Program.

Other mineral resources are not currently being produced for a number of reasons, including the quality and quantity of the resource, the cost of extraction, processing and transportation, the potential environmental impacts, and current market conditions. Some mineral deposits are fairly limited and of relatively poor quality and, therefore, may never be developed again. However, other minerals, particularly metallic minerals such as copper, may again be produced when market conditions improve. In addition, gold mining is likely to significantly increase if and when the price of gold increases.

> "Because we have become accustomed to using great quantities of mineral resources, our well-being and standard of living are largely dependent on our ability to find, mine, process, transport, and use mineral resources economically."[3]

Although they are very important, mining and the conservation of mineral resources must compete with other important resources and land uses.

> "Most of the difficulties in securing mining permits stem from the intense competition for land use in California. In fact, land-use conflicts are the most common issues debated at local government public hearings. As a result, land use planning, which is an effort to attain the most suitable use of land in any given area, has become one of the most important functions of local government agencies."[3]

One of the problems in establishing land use policies for mineral resources is the difficulty in obtaining accurate information on the location, quality, and quantity of mineral resources in the County.

> "Most assessments of land for planning purposes can be based on readily observable surface characteristics. Grasslands can be evaluated for grazing potential, timber stands can be appraised for lumber, and soils can be classified for agricultural purposes. However, it is difficult to similarly assess the mineral potential of a particular area with a high degree of certainty. Consequently, in past years mineral potential of land has often not been seriously considered in the land use planning process because of a general lack of readily available scientific information."[3]

The Geology of Shasta County

The geology of Shasta County is very complex, and is arguably the most complex of any county in California. It contains portions of five of the eleven geomorphic provinces in California, including the Coast Range, the Klamath Mountains, the Great Valley, the Cascade Range, and the Modoc Plateau. This complexity has resulted in the large variety of mineral resources that are found in the County. For more information, see the description of the County geology in the Mineral Land Classification study, and the new geologic maps presented in Plates 1A, 1B, and 1C of the study.

Rivers and creeks, both ancient and present day, especially in the Sacramento Valley area, have produced extensive resources of sand and gravel. The movements of continents and undersea areas along earthquake faults has resulted in the location of three significant areas of limestone of different ages in the area between the Klamath Mountains and the Cascade Range. The Cascade Range and Modoc Plateau, which were created by volcanic activity, are the source of volcanic cinders and pumice.

A unique set of geologic conditions, including a long-term ancient lake and adjacent volcanic activity, has resulted in the fresh water diatomite deposits located near present day Lake Britton. The intensive metamorphic processes of the Klamath Mountains have resulted in concentrated and diverse metallic mineralization in the northwestern part of the County.

Portions of Shasta County are underlain by sedimentary rocks that are known to produce valuable, scientifically significant vertebrate and invertebrate fossils. Vertebrate and certain invertebrate fossils are recognized as significant, nonrenewable paleontological resources and are protected under Federal, State, and local environmental laws. Figure M-1 shows the location of paleontologically sensitive areas in the County. Portions of western and north central Shasta County have been rated as highly sensitive.[4]

The Mineral Land Classification Study (MLCS)

The Mineral Land Classification study identifies the location of the significant mineral resources areas in Shasta County. The study is based on the present locations of the existing commercial mining operations and the adjacent similar geologic formations. The study also compiled existing geologic information into a new geologic map of the County. However, no new geologic investigation was done, there was no mining exploration, and no new mineral resource areas or sites were identified. In addition, there is no analysis of the actual commercial viability of the proposed expansion areas of specific existing mine sites.

The study was limited to the five industrial minerals which are presently being commercially extracted in Shasta County. Because of geologic diversity of Shasta County, especially the complexity of the metallic minerals area of the Klamath Mountains, and the large number of minerals that have been historically extracted, it was beyond the resources of the Division of Mines and Geology to include in the MLCS the metallic minerals or other minerals that are not presently being commercially extracted.

It is the legislative intent of the MLCS that it be used to develop mineral resource conservation policies for the County. The primary land use policy document is the General Plan.

It is important to understand that even with the information in the Mineral Land Classification study, it is still not possible to comprehensively identify and protect all potential commercially viable mineral resources in Shasta County. Therefore, the policies of the General Plan must be flexible and allow for new areas to be designated as more information becomes available as mining companies continue to explore and develop the mineral resources.

Specific Mineral Resources

1. Alluvial sand and gravel - Portland cement concrete grade aggregate

Portland cement concrete grade (PCC) alluvial sand and gravel is aggregate that has been naturally sorted, rounded, and polished in rivers and creeks. PCC alluvial sand and gravel is used primarily in finished concrete work. It is valuable for finished concrete work because the rounded material allows for a smooth finish. It requires less cement and water than crushed stone, and is easier to mix, pour, and place. It is less costly than crushed stone and requires less processing.

The supply of PCC sand and gravel is more limited than non-PCC grade material. Based on the projections of supply and demand in the MLCS, the amount of PCC alluvial sand and gravel presently available in-County within permitted mining operations will provide material for Shasta County for approximately the next 17 years.

The primary identified locations for alluvial sand and gravel resources are the Sacramento River, Clear Creek, Cottonwood Creek, and Hat Creek (see the MLCS Plates 1A and 1B). Many other smaller creeks have historically been mined, the most significant being Churn Creek, Stillwater Creek, and Cow Creek. However, these creeks were not included in the MLCS.

In general, the most useful alluvial sand and gravel is found in or immediately adjacent to the active channels of rivers and creeks. This is where the cleanest and hardest material is found. The further away from the active channel the material is found, the more weathered it becomes, so that the outside of the individual stones become weaker and more fractured, and more clay material is found between the stones. Dredger tailings often are not as useful as fresh material found in stream beds because of excessive weathering.

In 1997, there were nine active and three idle alluvial sand and gravel mines. In addition, there is one active and one idle non-alluvial sand pit. Some material from these mines may meet PCC grade requirements while other material may not.

2. Alluvial sand and gravel - road base grade aggregate

Road base grade alluvial sand and gravel is material that may not meet the specifications or qualities for Portland cement concrete grade material, but which is still useful for road base. However, road base must meet Federal and State adopted specifications for road construction applications. It includes material that may be more weathered, softer, and have more clay than PCC grade material. Like PCC alluvial sand and gravel, it is found along river and creek channels and terraces.

In 2002, there were ten active and two idle alluvial sand and gravel mines, as noted in the previous section for Portland cement concrete grade aggregate.

3. Crushed Stone

Crushed stone is rock which is broken into angular fragments. The most common use for crushed stone is for road base and asphalt concrete. It is also sometimes used for Portland cement concrete.

Crushed stone is produced from quarries. Many different kinds of rock may be used for crushed stone, provided they meet required hardness requirements and other specifications. Rock types that are presently being produced for crushed stone include andesite, basalt, granite, limestone, and shale. These rocks are found to some extent throughout Shasta County (see the MLCS Plates 1A and 1B).

In 2002, crushed stone was being produced at six quarry operations, including a limestone quarry in Mountain Gate, a granite quarry located in Keswick, an andesite quarry located in Mountain Gate, a shale quarry in Oak Run, and two basalt quarries in the Lake Britton/Brush Mountain area near Burney.

4. Volcanic Cinders

Volcanic cinders are used primarily for road base and road deicing sand. Cinders are not hard enough to meet Caltrans specifications for use in concrete and asphalt concrete. In the past, cinders have been packaged and sold for decorative rock, in colors including red, orange, yellow, purple, blue, and black.

Volcanic cinders are found in many places throughout the Cascade Range and Modoc Plateau (see the MLCS Plates 1A and 1B). The supply of volcanic cinders is enormous, and has not been calculated. There are numerous small pits throughout eastern Shasta County. The Hat Creek Ranger District of Lassen National Forest has at least 20 pits. Other pits are located on commercial timber land.

In 2002, there were five privately-operated cinder pits regulated by the County. They were located primarily on Black Butte, approximately 6 miles southwest of Shingletown; in the Hat Creek Valley; and in the Burney, Fall River Mills, and Glenburn areas. Volcanic cinders are used primarily in the local area. However, highway deicing sand screened from volcanic cinders is sold as far away as Trinity County.

5. Limestone

Limestone is a sedimentary rock, often formed from ancient coral beds, which consists of a high percentage of calcium carbonate ($CaCO_3$).

Limestone is used for a wide variety of industrial uses including manufacturing plastics, glasses, caulks, putties, paints, paper, many metals, pharmaceuticals, and a wide assortment of industrial chemicals such as dyes, acetylene, lubricants, and agricultural products. It is used in toothpaste, aspirin, PVC pipe, carpet backing, and chewing gum. It is also used to control pollution and treat sewage wastewater. However, the vast bulk of limestone is used in the construction industry for Portland cement concrete.

There are three primary limestone formations in Shasta County. The Devonian Kennett formation is located in three areas. The first is located west of Redding near Placer Road; the second begins north of Whiskeytown Lake and extends northwesterly along the northwest shore of Shasta Lake to the O'Brien Creek Inlet; and the third begins east of Sims and extends northeasterly into Siskiyou County. The Permian McCloud formation begins east of Mountain Gate and extends northward along the McCloud Arm of Shasta Lake and then along the McCloud River up to Siskiyou County. The Triassic Hosselkus formation begins along Highway 299 East about three miles west of Round Mountain and extends in widely-spaced outcrops in a shallow arc trending northwest, then north and finally northeast up to Siskiyou County (see the MLCS Plate 1A.)

Unfortunately, most of these limestone resource areas are located in fairly remote mountainous areas far from major roads or railroads, making it uneconomical to develop at this time. In addition, the quality and quantity of the limestone vary considerably.

Historically there have been a number of small limestone quarries scattered around the County. The most significant of these were associated with the copper smelters near Kennett located near the present location of Shasta Dam. In 2002, there were three active commercial limestone operations, two located on the Permian McCloud formation in the Mountain Gate area and one located in the Triassic Hosselkus formation in Bear Gulch on State Route 299 East between Ingot and Round Mountain.

6. Diatomite

Diatomite is formed from the silica-rich skeletal structures of microscopic single cell water plants. When the plants die, their skeletal structures fall to the bottom of a lake or other water body. Over thousands of years these structures collected on the bottom of an ancient lake bed near present day Lake Britton, until the deposit reached hundreds of feet thick. This deposit is one of the largest deposits of fresh-water diatomite in the world (see the MLCS Plate 1B).

The MLCS notes that because of its unique filtering ability, diatomite is ideal for use in industrial processes and is used extensively in the food, beverage, chemical, and pharmaceutical industries. It is also used in swimming pool filters. In addition to filters, it is used for fillers, insulating materials, mild abrasives, absorbents, reactive silica sources, structural materials, additives for specialty concretes, conditioners or anti-caking agents, and silica admixture for Portland cement. In 2002, there was one active and one idle diatomite mining site near Lake Britton.

7. Gold

Gold is a naturally-occurring metallic element. It is an excellent conductor of electricity and is non-corrosive. Historically it has been used as currency and for jewelry. It remains a very important part of international financial transactions. Today gold is used extensively in technological devices in various applications from medicine to telecommunications. Gold is an essential part of all computer chips. It is used in telephones, videocassette recorders, televisions, lasers, automobile air bags, satellites, and many other applications.

There are two kinds of gold resources: lode and placer. Lode gold is found in the original solid rock in which it was formed. Placer deposits are associated with active or ancient river beds.

The most important lode gold area in Shasta County is the French Gulch district. Other lode districts include Harrison Gulch (near Platina), Iron Mountain, "Old Diggins" (located between 5 and 6 miles north of Redding near and around Walker Mine Road), Shasta, Squaw Creek west of Shasta Dam, and Whiskeytown.

Placer gold has been found in the Sacramento River, Clear Creek, Cottonwood Creek, Rock Creek, and a number of other creeks. Gold dredging began in the river and creeks in 1895, and continued until the 1950's. Large dredger tailings areas are located along many creeks, especially Clear Creek and Cottonwood Creek.

In 2002, there was one idle commercial gold mining operation with a processing mill, the Washington Mine, located west of French Gulch. There were an estimated ten to fifteen active small lode mines and claims and river dredging operations which are operated on an intermittent basis by their owners or claimants.

8. Other Metallic Minerals

In addition to gold, there are thirteen metallic minerals that have been historically mined in Shasta County including cadmium, chromite, copper, iron, lead, manganese, molybdenite, platinum, pyrite, mercury, silver, tungsten, and zinc.

The metallic minerals are located primarily in the East Shasta Copper-Zinc District including the area around Shasta Lake and extending east to Ingot, and the West Shasta Copper Zinc District which begins near lower Clear Creek, includes the area around Whiskeytown Lake and extends north to Shasta Lake.

The value, supply, and demand of these metallic minerals vary considerably. None of them are currently under production, and there is no recent information regarding the potential for economic extraction of these resources. These minerals were not included in the MLCS. In 2002, there were no active metallic mineral mining operations other than gold mining operations.

9. Other Non-metallic Minerals

In addition to the minerals reviewed in the Mineral Land Classification study, there are nine other non-metallic minerals that have been mined in Shasta County including asbestos, barite, clay, coal, dimension stone, graphite, olivine, sulfur, and talc.

Asbestos mines have been located in the extreme northwest corner of the County. Barite is located on the west side of the Squaw Creek Arm of Shasta Lake and east of Castella. Clay sources are located along the Sacramento River near Redding and Anderson and other scattered locations. Coal is found primarily in the Montgomery Creek Formation east of Redding. Dimension stone has been quarried north of lower Clear Creek, and east of Millville. Graphite is found about a mile east of

Mountain Gate. Olivine is found near Castle Crags. Sources of sulfur have been located on Iron Mountain and in Lassen National Park. Talc has been mined north of Whiskeytown Lake.

The value, supply, and demand of these non-metallic minerals also vary considerably. In 2002, there were no non-metallic mineral mines in production, and there is no recent information regarding the potential for economic extraction of these resources.

10. Recycling of concrete, asphalt, and other aggregate materials

Concrete, asphalt, and other aggregate materials may be recycled. Recycled aggregate, such as crushed pavement, is used primarily for road base and for gravel roads but can be reused for asphalt concrete and sometimes for Portland cement concrete. The Shasta County Department of Public Works has used a special machine which grinds up the old asphalt surface of a road and incorporates the grindings in a new asphalt surface. However, this method is only cost effective in remote areas, far removed from existing asphalt plants.[6] Recycled concrete may not meet the hardness specifications for new concrete or asphalt.

In 1997, recycled material accounted for an estimated 3% of the total County annual aggregate production. Recycling may become more common in the future, and can be useful to divert waste material from landfills. Although there is no data available, at the present time it appears that there is not a very large supply of recycled material. It is unusual for road surfaces to be removed. When necessary, the old road surface is usually paved over. Some aggregate material may be available from building demolition, however, there is not very much material from this source either.[6]

At the present time there are no established permanent locations for recycling. As noted above, some recycling has taken place on-site during specific highway or road resurfacing jobs. There are no construction and demolition waste recycling facilities currently in operation in Shasta County.

6.3.3 Objectives

MR-1 To identify, conserve, develop, and utilize Shasta County mineral resources while protecting mineral resource sites and access routes from potential conflicts with incompatible land uses.

MR-2 To encourage the production and conservation of minerals while giving consideration to values relating to recreation, watersheds, wildlife, range, forage, timberlands, and aesthetics.

MR-3 To ensure that mining operations are conducted in such a manner as to protect the public health, safety, and welfare; to minimize adverse impacts on adjacent land uses; and to mitigate other potential adverse environmental impacts.

MR-4 To ensure that mined lands are reclaimed to minimize adverse impacts on the environment, to protect the public health and safety, and to restore mined lands sites to a usable condition which is readily adaptable to alternative land uses.

MR-5 To maintain an adequate long-term supply of mineral resources within the County, in particular, Portland cement concrete grade alluvial sand and gravel.

MR-6 To encourage the use of recycled mineral resources, especially aggregate materials.

MR-7 To recognize the mineral information classified by the State Geologist and transmitted by the State Mining and Geology Board.

MR-8 To ensure the joint participation of residents, industry, and affected agencies in a well-defined and consistent regulatory process.

6.3.4 Policies

MR-a Mineral operations that are long-term (i.e. 30 years or more of expected operation) should be included in the Mineral Resource (MR) land use designation and in the Mineral Resource (MR) zone district. Included in this designation and zoning shall be areas used for extraction, processing, stockpiling, and shipping, and adjacent undeveloped areas within the same ownership as the mining operation site. Development and uses within MR designations and zone districts shall be regulated so that proposed future land uses will avoid or mitigate incompatibilities with mineral extraction operations.

1. Uses permitted in these areas should include mineral exploration and extraction, processing, and accessory uses.

2. Residential uses may be permitted for security and labor housing.

3. The minimum parcel size for lands in the MR designation shall be 20 acres.

MR-b Land within up to one-half mile of MR designated and zoned mining operation sites, but outside the MR designation and zoning, should be included in the Mining Resource Buffer (MRB) land use designation combined with the principal land use designation, and in the Mineral Resource Buffer (MRB) Zone District combined with the principal zone district. Mining operation sites shall include the extraction, processing, stockpiling, and shipping areas of the mining operation, as defined in the reclamation plan. The MRB combining zone district shall be designed to allow for compatible land uses while protecting the potential for mineral resource development.

1. The extent of the buffer designation and zone will depend on the surrounding topography, site distance, and existing development.

2. Notices shall be recorded on the deeds for lots created by new land divisions and/or subject to discretionary land use permits within the MRB combining zone district to advise the property owners of the proximity of existing or potential mining operations and the potential impacts.

3. Principal land use designations considered to be incompatible with the MRB combining designation include Urban Residential (UR), Suburban Residential (SR), and Rural Residential A (RA).

4. The minimum residential parcel size for lands in the MRB combining designation shall be 5 acres, except where a smaller parcel size is permitted by the principal land use designation adopted prior to January 1, 1998. To the extent it is feasible, building sites shall be located on that portion of the property furthest from the mining operation site.

5. The MRB combining designation shall not be applied within the Cottonwood Community Plan area.

MR-c Mining operations which are short-term (i.e. less than 30 years of expected operation) should be included in the Interim Mineral Resource (IMR) land use designation combined with the principal land use designation, and in the Interim Mineral Resource (IMR) Zone District combined with the principal zone district. The IMR combining zone district shall be designed to allow for compatible land uses while protecting the potential for mineral resource development.

1. Notices shall be recorded on the deeds for lots in new land divisions and/or subject to discretionary land use permits within the IMR combining zone district to advise the property owners of the proximity of the existing or potential mining operations and the potential impacts.

2. Principal land use designations considered to be incompatible with the IMR combining designation include Urban Residential (UR), Suburban Residential (SR), and Rural Residential A (RA).

3. Discretionary land use permits within one-half mile of an IMR zone district shall be mitigated, as determined necessary by CEQA review, to prevent conflicts with existing and potential mining operations.

4. The minimum acreage for lands in the IMR combining land use designation shall be 10 acres, except where a smaller parcel size is permitted by the principal land use designation adopted prior to January 1, 1998.

MR-d The County will initiate the redesignation and rezoning for existing mining operations which had reclamation plans approved prior to January 1, 1998, and which are not already so designated and zoned. Applicants shall initiate redesignation and rezoning for new mining operations.

MR-e All Portland cement concrete grade alluvial sand and gravel resource areas (classified as MRZ 2-b as shown on Plate 4 of the Mineral Land Classification study), and all diatomite resource areas (classified as MRZ 2-b as shown on Plate 8 of the same study), which are not presently occupied by existing incompatible land uses, should be designated and zoned Interim Mineral Resource (IMR). The designation and zoning of these specific mineral resource areas shall be initiated by the County.

MR-f The MR General Plan land use designation shall replace the M designation.

MR-g Properties which were designated M and/or zoned MR prior to January 1, 1998, for which there was no approved use permit for mining and/or reclamation plan on said date, should be removed from the M designation and/or MR zone district, unless the property owner requests retention of the M designation and/or MR zone district and submits information to demonstrate that the subject property contains mineral resources which can be commercially developed. The County shall initiate removal of the M designation and MR zoning where appropriate.

MR-h In the future, lands may be placed in the MR, MRB, and IMR designations and zone districts, and lands presently in these designations and zone districts may be removed from them at the initiative of the County, the property owners, or the mine operators, based on the results of mineral resource exploration, and/or completion of extraction and reclamation of the mine site. When the mineral resource is exhausted and reclamation is completed, the property owner shall initiate removal of the MR, MRB, and IMR designations and zone districts from the subject property.

MR-i All new or expanded mining operations shall have a use permit to ensure that they are conducted in a manner to protect the public health, safety, and welfare, and to minimize adverse impacts on adjacent land uses and the environment.

MR-j On-site processing, including crushing, washing, screening, sorting, and stockpiling, should be allowed as much as possible at all mineral resource sites, subject to consideration of potential conflicts with adjacent and nearby land uses, and to mitigation of potential adverse environmental effects. However, concrete plants and asphalt plants should only be permitted in the Mineral Resource (MR) and General Industrial (M) zone districts, subject to approval of a use permit.

MR-k Mining may be permitted in the in-stream or gravel bar areas of a river or creek provided the removal of sand and gravel is:

1. Conducted during a declared civil or hazardous material emergency or natural disaster to relieve or correct potential hazards to the public health, safety, or welfare caused by such emergency or disaster; or

2. For removal of dredger tailings for reclamation purposes only; or

3. To protect a public structure such as a bridge, when it is determined to be necessary by the public entity responsible for said structure; or

4. To remove a buildup of sand and gravel to maintain the channel capacity and prevent flooding.

For sections 2, 3, and 4 of this policy, a use permit and reclamation plan for mining of in-stream and gravel bar areas shall be based on a stream management program, prepared by qualified professionals in appropriate disciplines, which includes data and analysis to show that:

a. The mining or skimming will not lower the streambed below the designed optimum engineered channel profile and cross sections.

b. The mining or skimming will cause a drop in the surrounding water table.

c. There will be no significant adverse impact on in-stream habitat; riparian habitat; wetlands; or rare, threatened, or endangered species of fish, wildlife or plants.

d. Salmon and steelhead trout spawning gravel within critically important streams, as identified in General Plan Policy FW-e, will be strictly protected. All gravel that is the appropriate size for spawning gravel for salmon and steelhead trout shall be left undisturbed, or removed and returned to the river or stream in a manner approved by the Department of Fish and Game.

e. There will be no significant adverse impact on existing structures, including bridges and levees.

f. There will be no significant increase in bank erosion, deposition, or flooding caused by the extraction activity.

MR-l Mining may be permitted in the floodplain area of a river or stream provided that a plan is prepared by a qualified professional including data and analysis to show that the proposed mining in the floodplain will not alter the course of the adjacent river or stream, will not cause river or stream to flow through the mined area, and will not significantly change the boundaries of the floodplain.

MR-m Mining may be permitted in areas of agricultural soils, provided that a plan is submitted by a qualified professional including data and analysis to show that the soil shall be replaced in such a way as to maintain the same or better agricultural qualities and class as existed prior to mining disturbance. Mining in A-cg designated areas is subject to policy AG-g.

MR-n An operating term shall be required for each mining use permit. This would set a defined length of time during which mining may occur. Any extensions beyond the permit expiration would require further environmental review and discretionary approval. The term of mining should be balanced so as to allow sufficient time for the operator to amortize investments, without sacrificing regulatory effectiveness. The maximum length of time for which any mining permit may be approved is 30 years.

MR-o Aggregate recycling facilities should be included as a use permitted subject to a use permit in General Industrial and Mineral Resource zone districts.

MR-p The *Mineral Land Classification of Alluvial Sand and Gravel, Crushed Stone, Volcanic Cinders, Limestone, and Diatomite within Shasta County, California, 1997*, and the associated maps, by the California Department of Conservation, Division of Mines and Geology, is incorporated by reference as a source of geologic and mineral resource technical information for the Shasta County General Plan.

MR-q The County should maintain a Surface Mining and Reclamation Act regulatory program to provide current information on mineral resources and mining operations, to review applications for mining permit and reclamation plans, to review mine reclamation financial assurances, to perform annual mine inspections and file inspection reports, to monitor reclamation of mine sites, and to enforce compliance with State and County mining regulations.

Definition: The term "qualified professional" as used in these policies includes, but is not limited to, California Registered Professional Engineer, California Registered Geologist, Certified Engineering Geologist, Certified Hydrogeologist, professional fisheries biologists, and professionals from other disciplines.

TABLE MR-1
SUMMARY OF MINERALS ELEMENT POLICIES MR-a, MR-b, and MR-c

Regulations	Mineral Resource (MR)	Mineral Resource Buffer (MRB)	Interim Mineral Resource (IMR)
Uses Permitted	Mining and accessory uses	Depends on principal land use designation	Depends on principal land use designation
Acreage minimum	20 acres	5 acres	10 acres
Distance from mine site	n/a	up to ½ mile	n/a
Incompatible land use designations	n/a (MR is principal designation)	UR, SR, and RA	UR, SR, and RA
Notice recording required for discretionary permits	n/a	yes	yes
Mitigations for discretionary permit for development within 1/4 mile	n/a	no	yes
Expected mine life	30+ years	30+ years	less than 30 years

Footnotes:

1. *Significance of California's Mining Industry,* by Don Dupras, *California Geology*, March 1991
2. *Coal Prospects of Northern California*, by Dennison K. Leeds, (prepared for Cooksley Geophysics Inc., Redding, March 26, 1980)
3. *Mineral Land Classification in California,* by Ralph Loyd, Robert Hill and Russell Miller, *California Geology*, January/February 1994.
4. Dr. Hugh M. Wagner, communications with Mark Radabaugh, Shasta County Senior Planner, July, 1991
5. Mineral Land Classification study (Reference 1 below), page 107.
6. Ron Hill, Deputy Director of Public Works, conversation with Bill Walker, Shasta County Associate Planner, January 7, 1998.

References:

1. *Mineral Land Classification of Alluvial Sand and Gravel, Crushed Stone, Volcanic Cinders, Limestone, and Diatomite within Shasta County, 1997* by the California Division of Mines and Geology.
2. *Mines and Mineral Resources of Shasta County, California, County Report 6*, by Philip A. Lydon and J.C. O'Brien, California Division of Mines and Geology, 1974.
3. *Minerals Element Background Report - 1998* Shasta County Department of Resource Management, Planning Division.