

## CHAPTER 2 MINERAL AND ROCK RESOURCES

### UPDATE CHRONOLOGY

NOVEMBER 30, 2005—VERSION 1



SERPENTINE OUTCROP WITH PAINTBRUSH

### PURPOSE

The purpose of this chapter is to provide a comprehensive and current summary of baseline mineral and rock resources in Napa County and to provide a current map inventory of these features. This document and the data assembled provide broad tools for site and regional planning as well as the basis for future planning documents relating to the protection and management of mineral and rock resources.



**NAPA COUNTY BASELINE DATA REPORT  
MINERAL AND ROCK RESOURCES**

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**LIST OF ACRONYMS AND ABBREVIATIONS**

BDR	Baseline Data Report
CEQA	California Environmental Quality Act of 1972
CGS	California Geological Survey
County	Napa County
EIR	environmental impact report
MRZs	mineral resource zones
OMR	California Office of Mine Reclamation
SMARA	Surface Mining and Reclamation Act



## INTRODUCTION

This chapter of the *Napa County Baseline Data Report* (BDR) provides a discussion of the mineral and rock resources in Napa County (County). The chapter provides a baseline discussion of federal, state, and local policies and regulations that involve mineral resources, includes a description of the methodology used to identify and quantify mineral commodities, and provides a discussion of those commodities. In addition, it addresses constraints and opportunities associated with mineral resources in the County.

Historically, mercury and mineral water have been the most valuable mineral resources in Napa. Currently, building stone and aggregate are the most valuable commodities.

## BACKGROUND

Napa County is one of the original 27 counties formed in California in 1850. The County is located in the northern Coast Ranges and borders San Pablo Bay. The City of Napa (County seat) is about 45 miles north of San Francisco on Highway 29. Physiographically, Napa County is characterized by northwest-trending mountain ranges and intermontane valleys.

Historically, Napa County has produced a moderate amount of a wide variety of mineral and rock commodities. This production began in the mid-to-late 1800s with the mining of mercury, and a variety of minerals have been mined since then. In recent decades, the most economically significant production has been the mining and processing of crushed rock for the production of various types of aggregate for construction.

## GEOLOGIC SETTING

The geologic setting of Napa County, like most of the California Coast Ranges, is complex. The County comprises three primary bedrock geologic units: Great Valley complex, Franciscan Complex, and Sonoma Volcanics. The Valley complex comprises the Jurassic Coast Range ophiolite and the Great Valley sequence. The Coast Range ophiolite in the area consists mainly of serpentinite, serpentinite-matrix mélangé, gabbro, diabase, and basalt. Regionally, hard volcanic rock (i.e., basalt and metamorphosed basalt, greenstone) is typically mined for aggregate. The Great Valley Sequence comprises sandstone, conglomerate, and shale of Jurassic and Cretaceous age. Although the sedimentary rocks and ophiolite have been tectonically displaced almost everywhere in the study area, the Great Valley sequence was originally deposited on top of the ophiolite. This depositional relationship is preserved locally in the Chiles Valley and St. Helena quadrangles. These rocks represent old remnants of sea-floor material (ophiolite) and sediments (sands, gravels, muds) deposited on it, which all were then accreted to the crust of the North American continent, and further overlain by more sediments.

The second major geologic unit, the Franciscan Complex, comprises weakly to strongly metamorphosed greywacke, argillite, basalt, serpentinite, chert, limestone, and other rocks. The rocks of the Franciscan Complex in the study area are mostly derived from Jurassic to Cretaceous oceanic crust and pelagic deposits overlain by Late Jurassic to Late Cretaceous turbidites. Although most

Franciscan rocks are little metamorphosed, high-pressure and low-temperature metamorphic minerals are common in rocks that crop out as mélangé blocks (Bailey et al. 1964) and in several fault-bounded lenses within the study area. High-grade metamorphic blocks in sheared but relatively unmetamorphosed argillite matrix (Blake and Jones 1974) reflect the complicated history of the Franciscan Complex. The parts of the complex that crop out in the study area were subducted beneath the Coast Range ophiolite, a process that continued through Late Cretaceous time, after the deposition of Franciscan Complex sandstone that crops out in Marin and Contra Costa counties. On a regional basis, greenstone (geologic map symbol KJgs) and greywacke sandstone (KJss, some times referred to locally as “blue rock”) have been mined from the rocks of the Franciscan Complex and the Great Valley Sequence. For example, Mark West Quarry, located just beyond the western border of Napa County, has been the source for several decades of good quality aggregate mined from greenstone rock of the Franciscan Complex.

Of more importance from a standpoint of recent significant mineral/rock production, are the geologically much younger Sonoma Volcanics that locally overlay the above-described rock complexes. These volcanics occupy the major northwest-trending ridge that borders Napa Valley on the east and that extends continuously to Mount St. Helena to the north and less continuously on the west from Napa to Calistoga. Dark, hard basalt-andesite flow rocks from this volcanic unit are quarried extensively from the hills just southeast of the City of Napa. On a much smaller scale, pumice has also been mined from the Sonoma Volcanics. On geologic maps, these rocks are typically indicated by the symbol Psv (Pliocene Sonoma Volcanics) or Tsv (Tertiary Sonoma Volcanics).

More detailed geologic descriptions (including rock types, ages, and structures) are found in the geology chapter of the *Baseline Data Report*.

## POLICY CONSIDERATIONS

This section provides information regarding the policies, classification, and designation of mineral lands.

The principal regulatory document pertaining directly to mining and mining reclamation in California is the Surface Mining and Reclamation Act (SMARA) of 1975 (Chapter 9, Division 2, of the Public Resource Code). The act requires the State Mining and Geology Board to adopt state policies relative to mineral resource production and conservation.

SMARA was enacted by the California Legislature to address the need for a continuing supply of mineral resources, and to prevent or minimize the negative impacts of surface mining on public health, property, and the environment. The act is described in full detail in Special Publication 51 *California Surface Mining and Reclamation Policies and Procedure: with the Surface Mining and Reclamation Act of 1975, third revision* (California Department of Conservation, California State Mining and Geology Board 2000). The act has been amended several times to keep it up to date and responsive to its original intent.



Serpentine, the California State rock and an abundant mineral in the Coast Ranges (Source: California Geological Survey)

One of the principal provisions of the act is to require mine operators to prepare a Surface Mining and Reclamation Plan prior to mining. Compliance with the California Environmental Quality Act of 1972 (CEQA) is typically also required for mining projects, and a lead agency typically prepares a CEQA-compliance environmental impact report (EIR) on the plan as part of the overall permitting process.

Napa County is the lead agency for implementing the requirements of SMARA. Typically, implementation of the act is founded on a County ordinance that includes SMARA requirements. The California Office of Mine Reclamation (OMR) provides assistance. This includes review and comment on submitted Surface Mining and Reclamation Plans prepared by mine owners/operators. OMR also undertakes periodic inspection of mines.

Special Report 146 (California Department of Conservation, Division of Mines and Geology 1986) was prepared under the authority of SMARA. A principal objective of this chapter was to classify land in the San Francisco-Monterey Bay region into mineral resource zones (MRZs) based on guidelines adopted by the California State Mining and Geology Board. Areas were zoned MRZs if they were identified as being within areas designated in the chapter as subject to urbanization. This classification project assisted the board in adopting and designating lands needed for their mineral content. This designation process, in turn, has been designed to assist and guide local lead agencies, such as Napa County, in preserving essential mineral resources for future use through proper zoning ordinances. Plate 1.2 of Special Report 146 shows the significant aggregate production operations in the San Francisco-Monterey Bay region, including Napa County.

Two of several maps from Special Report 146 that are referenced in this chapter are currently not available in GIS digital format. These maps, identified in the following bullet list, have been reproduced and are included herein as figures. (All figures appear at the end of the chapter.)

- Figure 2-1—Significant Aggregate Production operations in the San Francisco–Monterey Bay Area, CA (California Department of Conservation, Division of Mines and Geology 1986, Special Report 146, Part III, Plate 1.2).
- Figure 2-2—Map of Napa County California Showing Locations of Mines and Minerals Deposits, 1947, Volume 44, Plate 22. Base Map from State Division of Forestry.

Three principal MRZs were identified in Napa County. Of those, the most important with respect to the presence of resources is MRZ-2, which is defined as “areas where adequate information indicates that significant mineral (aggregate) deposits are present or where it is judged that there is a high likelihood for their presence.” This zone is applied to known mineral deposits or where well-developed lines of reasoning, based on economic geologic principles and adequate data, demonstrate that the likelihood for occurrence of significant mineral deposits is high. MRZ-3 zones suggest the potential for aggregate deposits. This zone is less definitive than MRZ-2 and is defined as “areas containing mineral deposits the significance of which cannot be evaluated from available data.” Special Report 146 should be referred to for a complete description of the MRZ zones and their significance.

SMARA applies to anyone, including government agencies, engaged in surface mining operations that encompass more than 1,000 cubic yards and that include the following activities.

- Prospecting and exploratory activities.
- Dredging and quarrying.
- Streambed skimming.
- Borrow pitting.
- Stockpiling of mined materials (and recovery of same).

There are exemptions from SMARA. For a full listing of exemptions, discussion of permitting or enforcement issues and requirements regarding annual mine reporting, and requests for reclamation or general information, contact the Office of Mine Reclamation ([www.consrv.ca.gov/OMR/](http://www.consrv.ca.gov/OMR/)).

## METHODOLOGY

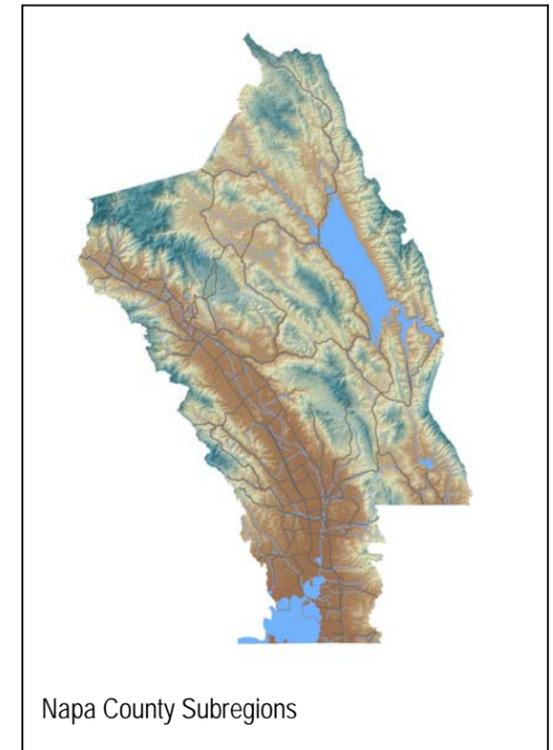
### DEFINITION OF STUDY AREA

The study area for mineral and rock resources includes all of Napa County.

### RESOURCES CONSULTED

To determine the mineral and rock resources existing in Napa County, readily available published maps and reports were reviewed, as described below.

- Special Report 146, Part III “Mineral Land Classification: Aggregate Materials in the San Francisco-Monterey Bay Region” (California Department of Conservation, Division of Mines and Geology 1987).
- Report (Davis 1948) in *California Journal of Mines and Geology* and Countywide map that accompanies the report.
- *Aggregate Availability in California* and accompanying 1:1,000,000 scale map (Figure 2-3; Kohler 2002).
- State of California, Office of Mine Reclamation website ([www.consrv.ca.gov/OMR/](http://www.consrv.ca.gov/OMR/)).



Historically, Napa's two most valuable minerals were mercury, or quicksilver, and mineral water.

Unfortunately, Special Report 146, which contains the most definitive aggregate resource maps for the Bay Area region, only provides MRZ mapping for a portion of southern Napa County: Napa quadrangle (Plate 3.19 in Special Report 146) and parts of the quadrangles of Cuttings Wharf (Plate 3.17), Mount George (Plate 3.18), and Cordelia (Plate 3.16). The remainder of the County remains unmapped for aggregate resource potential. Special Report 146 shows only one MRZ-2 zone within the southern, mapped part of the County. This zone is located in the hills southeast of the City of Napa (Napa and Cordelia quadrangles) and is associated with the active Napa Quarry that is discussed later in this chapter. A few MRZ-3 zones are shown within some of the above-named quadrangles.

Detailed historical information was reviewed on mineral and rock resources of the entire County, as reported by Davis (1948). This information is discussed later in this chapter. The Countywide map that accompanies Davis (1948) shows numerous mineral deposits and past mines. This map can be used as a source of historical mining and mineral resources for the County.

For recent, but very regional, generalized information on aggregate availability, the report and 1:1,000,000 scale map by Kohler (2002) was reviewed (Figure 2-3).

The State of California, Office of Mine Reclamation website was reviewed ([www.consrv.ca.gov/OMR/](http://www.consrv.ca.gov/OMR/)). It contains a large amount of information on regulatory requirements, and lists mines in Napa County that are currently designated as active.

## MINERAL AND ROCK RESOURCES IN NAPA COUNTY

### HISTORY OF MINERAL COMMODITIES AND MINING

Most of the following mineral information is based on "Mines and Mineral Resources of Napa County, California" from *California Journal of Mines and Geology*, Volume 44, No. 1, January (Davis 1948).

The economy of Napa County has traditionally been dominated by agriculture and a few manufacturing industries. Mineral wealth has been best known historically in the northern part of the County. In the heyday of Napa's mining era, mining was dominated by a few minerals. Historically, the two most valuable mineral commodities have been mercury, or quicksilver, and mineral water, and silver accounted for a relatively small portion of mineral resources. The minerals produced in the 1940s—quicksilver, mineral water, pumice, sandstone, and miscellaneous stone—had a total value of \$1,019,786 (1945 dollars). Napa County ranked thirtieth among the 58 counties in the state in value of mineral production in the mid 1940s. The recorded value of mineral production from 1862 to 1947 was \$45,134,431 (1948 dollars).

More recently, building stone and aggregate produced from hard-rock quarries have been the most valuable mineral commodities in the County. In 1972, the most recent year for which the annual dollar

value of mineral production is readily available, the value of mineral production in Napa County was \$3,032,000 (California Division of Mines and Geology 1974). The annual value today, before adjustment for inflation, is roughly estimated to be about ten times the 1972 value. The annual value for the last several years has been derived predominantly from construction materials processed from rock mined from quarries.

Other mineral products that have been mined in Napa County are asbestos, chromite, clay, copper, gold, lead, limestone, magnesite, manganese, onyx, paving blocks, and petroleum.

## DESCRIPTIONS OF MINERAL COMMODITIES

This section provides brief descriptions of most of the mineral commodities mined in Napa County since the late 1800s. The minerals are presented in alphabetical order, not order of importance.

### CHROMITE

Chromite is found in northeastern Napa County associated with serpentinite masses. A total of 2,132 tons of chromite were shipped between 1916 and 1941. Production was greatest during the war years (1941–1945). Chromium is derived from chromite and typically is used for alloying and plating elements on metal and plastic substrates for corrosion resistance.

### CHRYSOTILE (ASBESTOS)

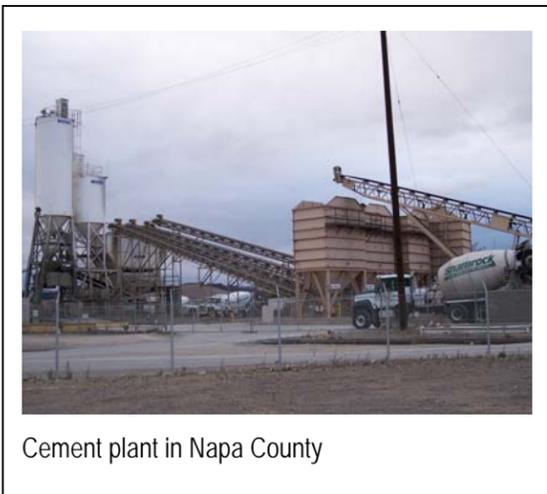
Chrysotile asbestos, which was mined from 1941 to 1945, occurs in a serpentine area 18 miles northeast of Napa. It was milled in a plant at the mine, and the finished product was used as insulating materials, plaster, and stucco for buildings during the war. Chrysotile is recognized as a carcinogen and has not been mined in Napa County.

### CLAYS

Clays from Napa Valley have been used in brick and cement.

### MAGNESITE

Magnesite was produced from 1916 to 1924. Seawater magnesia largely replaced the product of magnesite mines, except in the case of extremely large high-grade magnesite deposits. Magnesite is used in making refractory magnesia. Magnesium oxide (magnesia) is used especially for steel furnace linings, polycrystalline ceramic for aircraft windshields, electrical insulation, pharmaceuticals and cosmetics, and various other purposes.



Cement plant in Napa County

## MANGANESE

Manganese deposits are numerous in northern Napa County. They are interbedded with sediments of the Franciscan Complex. About 300 tons of oxide ore was produced in 1918. Manganese has several uses: steel manufacturing (ferroalloys), nonferrous alloys (improved corrosion resistance and hardness), high-purity salt for chemical uses, purifying and scavenging agent in metal production, and manufacture of aluminum.

## MERCURY (QUICKSILVER)

Historically, quicksilver has contributed more to the value of Napa County production than any other mineral. Production figures are recorded for every year since 1862. The first boom period occurred from 1874 to 1878 and another occurred from 1893 to 1899. Since the latter period, production dropped to a comparatively small figure, which was influenced greatly by fluctuations in price. Past mining operations were chiefly underground, although the only active mine in 1947 was an open-pit operation. Some creek gravels have been worked on a small scale. The unstable price structure discouraged the development of reserves in advance ore extraction. Mercury mining ceased long ago, primarily due to economic and environmental issues.

## MINERAL WATER

Mineral water has made important contributions to the annual value of mineral production in Napa County. Although the present rate of production is comparatively low, it has the potential to be expanded in the near future. The numerous mineral water springs have made Napa County famous as a center of rest and recreation resorts.

## OBSIDIAN

Obsidian is potentially valuable as a source of synthetic pumice for use in lightweight building materials. It occurs as a phase of the Pliocene-aged Sonoma Volcanics in the vicinity of Glass Mountain, where it has been traced about 2 miles to the north as a flow.

## PETROLEUM

Petroleum was produced in the 1940s at the rate of half a barrel per day from the Jurassic sediments of the Knoxville formation in Berryessa Valley.

## PUMICE

Pumice occurs on the east side of the Napa Valley at Glass Mountain as a pumiceous tuff and breccia in the Sonoma Volcanics. It was capped by a lava flow (trachyte), part of which has been removed by subsequent uplift and erosion. Past mining operations occurred 3 to 7 miles east of Napa. The

pumiceous tuff was removed by scrapers, crushed, washed, dried, and used as an aggregate in building bricks and blocks. It is also used as a lightweight fill material.

## GOLD AND SILVER

Silver mineralization associated with gold in quartz veins was discovered on the slopes of Mount St. Helena in about 1870. Robert Louis Stevenson made this discovery famous in his book *Silverado Squatters*. Two productive mines were developed at the Mount St. Helena site and operated intermittently. More than \$1,370,216 in combined silver and gold production between 1847 and 1940 has been reported from Napa County. No production has been reported since 1940.

## QUARRY ROCK

Building stone, chiefly sandstone and tuff, has appeared in the production figures from Napa County since 1913. Much of the tuff was used in local construction within the County. Production of miscellaneous stone, which includes crushed rock, sand, and gravel, was first reported in 1902. This mineral product reached a substantial figure by 1908 and has been a consistent contributor to the value of mineral production since then. One of the largest rock quarries (Basalt Rock Quarry) in the San Francisco Bay Area was located just southeast of the City of Napa. This quarry is currently in operation and is now known as the Napa Quarry. It is the only significant operational mine in the County. There have also been consistent smaller producers, including Pope Creek Quarry, which is currently in operation and will be in operation for about 2 more years.

## ROCK QUARRIES

According to the most recent information available (OMR, AB 3098 List—April 1, 2005), the four mines listed in the following bullet list are the only active mines in Napa County (Map 2-1). (All maps appear at the end of the chapter.) The mines designated as active by OMR are all rock quarries.

- Napa Quarry—Syar Industries, Inc.
- Pope Creek Quarry—Don Wesner, Inc.
- Oat Hill Quarry—Napa Vallejo Waste Management Authority.
- American Canyon Quarry—Syar Industries, Inc.

There are also a number of abandoned quarries within the County (Selleck pers. comm.). Although there are four currently “active” mines in Napa County, only one—Napa Quarry—is a significant mine, according to the OMR (2005) and local mine owners/operators. Napa Quarry (formerly the Basalt Rock Quarry), the sole major operational quarry in Napa County, is located on hill slopes just southeast of the City of Napa. The quarry first opened in the early 1900s. The material mined in the quarry is basalt from flow rocks of the Sonoma Volcanics. The processed basalt rock is suitable for use as concrete



Aggregate and building stone from quarries are the most economically valuable mineral resource currently produced in Napa County.

More than \$1.3 million in silver and gold production came from the slopes of Mount St. Helena between 1847 and 1940. No production has been reported since 1940.

aggregate. Concrete aggregate must meet high specifications and therefore the rock from which it is processed must be of very good quality. About 500,000 tons of basalt rock are mined each year from the Napa Quarry. Due to complexity of the geology at the quarry, reserves are difficult to estimate (Stevenson pers. comm.).

The Pope Creek Quarry is located in Pope Valley (north-central Napa County). It is a small operational quarry that was first opened in the 1940s. The rock type mined is sandstone (Wesner pers. comm.) and is probably from the sediments of the Great Valley Complex. Rock processed from this quarry is used principally for riprap, base rock, and drain rock. About 15 to 20 thousand tons of rock are mined per year, and the quarry has only about 2 years of reserves left before final reclamation and closure.

The Oat Hill Quarry and American Canyon Quarry are both located in southern Napa County. Although listed as active by OMR, these quarries are not currently being mined (Morris and Stevenson pers. comms.). The American Canyon Quarry reportedly ceased operations because of concerns about the possibility of asbestos associated with serpentinite that was exposed during mining. Because mined materials are stored or stockpiled at both of these mines, both mines are considered "active" by OMR and remain under its jurisdiction.

Construction materials were the only materials reported produced at all the above-described mines. Thus, there has been a shift from the production of mercury and other metals to the production of construction materials such as aggregate and fill materials. This reflects the growing need over recent decades for construction materials as the population of the region has grown. It also reflects a more thorough understanding of the environmental consequences of mining some of the other, historically important commodities and the decrease in demand as markets change.

## SAND AND GRAVEL EXTRACTION

The Pope Creek Quarry has a current permit to extract up to 2,000 tons of gravel per year. The extraction process involves a gravel-skimming operation. It is not done every year; extraction occurs only when the winter rains have been sufficiently heavy to introduce sufficient excess gravel to streambed surfaces.

## OPEN-PIT MINES

In 1985, gold mining commenced at the McLaughlin Mine located at the border of Napa, Lake, and Yolo Counties. (The majority of the mine was located in Lake County.) The mine consisted of a large open-pit operation situated in Franciscan Complex host rock of the Knoxville Mining District. This district had been mined for mercury over a hundred years earlier. The hydrothermal system that was the source of the mercury ore was also responsible for the deposition of the finely disseminated gold at the McLaughlin Mine. The McLaughlin Mine lies at the center of the historic Knoxville Mining District, where dozens of mines produced mercury for more than a century. McLaughlin now inhabits the site of the former Manhattan mercury mine, which dates from 1862. As the McLaughlin site gave up its 3 million ounces of gold, the concurrent environmental efforts at the mine earned more than a dozen

awards and commendations from such groups as the Sierra Club and the Soil Conservation Service of America.

## GEOHERMAL RESOURCES

Geothermal waters are a mineral and energy resource. A description of geothermal resources in Napa County is not included within the scope of this chapter. Geothermal resources within the County should be evaluated in future updates of this chapter of the BDR.

## CONSTRAINTS AND OPPORTUNITIES OF FUTURE MINERAL EXTRACTION

### CONSTRAINTS

The principal constraints to future mining operations in Napa County relate to economics, the environment, permitting, and politics.

Principal economic constraints include the substantiation of resources of sufficient quality and quantity, market demand for the products mined, and cost of transporting the products. Generally, the cost to the consumer of quarry rock roughly doubles for every 20 to 35 miles of distance the product must be hauled. Thus, the best rock quarry sites can be economically infeasible if the distance from the quarry to the market is too great.

Quarry development and operation have environmental impacts. Some of the more obvious impacts are visual disturbance, dust pollution, surface/groundwater extraction, noise, and traffic safety. The proper assessment of these and other impacts and the development/ implementation of adequate mitigation measures are necessary under CEQA; this process can be costly and time consuming.

In addition to meeting environmental requirements under CEQA, there are numerous agencies that have specific conditions that must be met as part of the permitting process.

Finally, the political implications of successfully opening a new quarry or extending the operational life of an existing quarry can be difficult to overcome because of the complex issues involved and the actual or perceived impact of mining operations on adjacent lands and roadways.

### OPPORTUNITIES

The geologic opportunities for future mineral extraction in Napa County are not clearly known. As discussed above, MRZ zone maps do not exist for the bulk of the County. Such maps would provide good insight into the potential for mineral extraction (aggregate only) within the County. The California



Historic Manhattan mercury mine, 1862  
(Source: Bancroftiana 2000.)

Geological Survey (CGS) has recently initiated the North San Francisco Bay Region classification study. Unlike the former study mentioned above (Special Report 146, part III) that only classified urbanizing areas of the North Bay Region, this pending report will classify all of Napa, Marin, and Sonoma counties. The estimated completion date is October 2006.

The general geology of the County suggests that the potential for favorable aggregate rock does exist. For example, the Sonoma Volcanics include the dark basalt flow rock that produces high-quality aggregate. These volcanics extend as a wide swath (up to about 8 miles) for a length of over 40 miles, all the way from State Highway 12 northwestward to Mount St. Helena at the northern border of the County.

Additionally, there are broad areas throughout much of the eastern part of the County that are underlain by various rock types of the Franciscan Complex and Great Valley sequence. These rocks are sporadically mined at other locations for aggregate production, which suggests that there is some potential for similar rock quality within the County. Also, the active Pope Creek Quarry in east-central Napa County is located in rocks of this type.

## CONCLUSIONS AND REPORT UPDATE RECOMMENDATIONS

Historically, various mineral resources have been mined in Napa County. However, markets for many of these resources no longer exist. Some resources, such as mercury and asbestos, are known to cause serious health problems and for economic and environmental reasons, these resources will not likely be mined in the future in Napa County.

As time passes, there will be an increasing shortage of aggregate resources in the greater San Francisco Bay Area. Kohler (2002) states that the North San Francisco Bay Region (including Napa, Marin, Sonoma, and southwestern Solano County) currently has only 27% of the aggregate reserves it will need in the next 50 years. This is a shortfall of 470 million tons. The degree to which this will affect Napa County is beyond the scope of this chapter. However, the impact will probably not be as great in the County as in the more rapidly urbanizing areas of the region. To the extent that there is a shortfall in Napa County, it will likely include a commensurate increase in aggregate cost and in truck traffic for importing the needed materials into the County.

Further study (probably by the private sector) may reveal the presence of additional, economically viable sources of mineral resources in the County. Any search for mineral resources would likely focus on quality quarry rock (Sonoma Volcanics), such as basalt, which is suitable for high-end uses such as concrete aggregate, class 2 aggregate base, and aggregate subbase. The potential impacts related to extracting mineral resources from new areas would be evaluated as part of the required permitting process.

Assessment of baseline conditions of mineral resources in Napa County reflects two general considerations.

- The natural extent and distribution of mineral resources and the economic feasibility of exploiting them, as well as broader economic conditions that may change the demand for certain resources.
- The regulatory environment that may mandate environmental, hazard, or other engineering considerations related to the exploitation of mineral resources.

The data and conclusions presented in this mineral resources chapter of the BDR should be updated as needed to effectively represent the County's mineral baseline condition. As significant changes occur to the general considerations described above, a review and update of the BDR for mineral resources should occur. At a minimum this information should be reviewed and updated at least every 5 years.

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