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Lyon County - general

Item 13

.42 Minerals

Inventory and Analysis

of the

Walker Planning Unit

Carson City District
Nevada and California

by

J. R. Gilbert
1976

see individual mining districts for detailed descriptions.

CONTENTS

ATTACHMENTS

INTRODUCTION

The following report and accompanying overlays attempt to delineate those areas within the Walker Planning Unit which have potential for mineral discovery and development. These lands should therefore be considered firstly for the mineral resources they possess.

It must be said at the outset that this analysis is not exhaustive but is based upon the best information which could be obtained in the limited time available. This information was derived from library research, personal discussion with personnel experienced in the mining history and recent developments in the planning unit, and from cursory field examination during which not even all known mineralized areas were visited.

The format of the narrative and overlays follows guidelines established in BLM Manual 1605 as supplemented by amendments and instruction memoranda. The instructions in the manual suggest mineral information should be derived largely from the Mineral Resource Inventory (MRI). The MRI was completed in 1965, however, and present priorities have not allowed sufficient time for update. Therefore, an attempt was made, through coordination with the Carson City District Geologist, to update and refine mineral areas in the MRI in so far as they pertain to the Walker Planning Unit. These redefined mineral areas then form the basis for the Unit Resource Analysis (URA).

Manual guidelines prescribe that the narrative portion of the URA be divided into two parts, the Present Situation which depicts the present state of knowledge about mineralized areas in the planning unit and the Management Opportunities which attempts to determine what opportunities exist for minerals production and management.

The following narrative, then consists of 1) a section on the present situation which summarizes the mining history, production, and mineral resources of the planning unit; 2) a section summarizing the types and basis of selection of management opportunities, problems inherent in defining management opportunities, and a summary of mineral commodities; and 3) a description of the potentially valuable mineral areas in the planning unit.

Each description follows the format outlined in BLM Manual 1605 and includes past mining history, geology and mineralization, current activities, and potential for development. Mineral management opportunities are combined with the present situation in the discussion of each mineral area.

Three sets of overlays accompany the narrative and attempt to graphically present some of the information discussed in the text. The overlays are referenced both to the existing MRI and to the narrative and are described as follows:

1. Mineral Status Overlay - depicts the ownership of the mineral estate, disregarding surface ownership.

2. Mineral Inventory Overlay - depicts area potentially valuable for minerals including leasables. These mineral areas are subdivided into operating mines, identified resources, and undiscovered resources. A simplified breakdown of these subdivisions follows:

   A. Operating Mine

   B. Identified Resource - known deposit not now being mined.

      1. Economic Reserve - currently mineable.

         a) measured
         b) indicated
         c) inferred

         (↑ increasing knowledge of tonnage and value of ore)

      2. Subeconomic - not currently mineable.

         a) Submarginal - requires a price at least 1.5 times higher than current price or new technology which cuts operating costs.

         b) Paramarginal - unavailable for legal or political reasons.

C. Undiscovered Resource - an area likely to contain deposits.

1. Hypothetical - mineralized areas and mining districts in which deposits are probable.

2. Speculative - large areas with favorable geology and/or in which there are numerous active mining claims.

3. Management Opportunities Overlay - depicts technologically feasible opportunities for mineral production and/or management. The opportunity categories for minerals are:

A. Opportunities to identify and inventory presently undiscovered mineral resources.

B. Opportunities to protect and allow further identification and delineation of known mineral resources.

C. Opportunities to permit development of known mineral resources.

The designated classes on the Mineral Inventory Overlay are based primarily upon limited published data and unpublished information known to the District Geologist. These areas, called undiscovered speculative resource areas, contain geologic conditions favorable for mineral occurrence. For locatable minerals, areas which contain metamorphic sediments and volcanics in the presence of igneous granitic intrusive rocks generally are favorable for mineralization. Also designated as speculative for locatable minerals are concentrations of active claims. Most often the two criteria coincide, but two areas exhibiting favorable geology contain at present no active claims. Many areas not included as speculative resources contain an abundance of claims, but most of the claims are old and inactive.

In the case of leasable minerals, lands designated by the U.S. Geological Survey as prospectively valuable for particular minerals or for geothermal resources are classed as undiscovered speculative resources.

Subeconomic and economic resources are based on published and unpublished information derived from recent industry exploration programs in the planning unit. Specific data as to types, sizes, and grades of ore bodies is, of course, the confidential information of the companies involved and is not generally known.

A great temptation exists when reviewing outlined mineral areas on an overlay to believe that only the area inside the borders is mineralized and that outside of the area there are no minerals. Nothing could be further from the truth. The reviewer must always bear in mind two essential facts:

1) Mineral resources are not readily identified and defineable. Many are buried under younger rocks.. Those exposed are seen in only two dimensions at the outcrop-length and width. The depth to which valuable minerals extend cannot be positively determined until the deposit is virtually mined out. Neither can the value or character of the deposit be positively determined just from outcrop sampling and observation. Unlike most surface resources which can be precisely measured and defined, mineral resources are largely hidden and their definition and value can only be estimated.

2) Our constantly changing technology results in corresponding changes in our defined mineral areas by: a) enabling previously uneconomic deposits to become economic, b) enabling previously unknown mineral deposits to be discovered, and c) by promoting new raw material needs whereby new uses for minerals within a previously worthless deposit now make that deposit a valuable mineral resource.

The present study attempts to define likely areas which may contain valuable minerals. If the facts above are kept in mind the reviewer can readily see that any attempt to assess the mineral potential of an area is risky at best. If such an evaluation must be done in a limited time frame the results can only be a rough estimate.

Therefore this report does not purport to be a total evaluation of the mineral potential of the planning unit. The actual presence of mineral value can only be determined by extensive geologic mapping and exploration by those in search of mineral deposits. The reader is reminded to bear these facts in mind when using this report and to remember that the mineral areas herein depicted are not finite but ever changing.

A. PRESENT SITUATION - MINERALS (URA-Step 3)

The Walker Planning Unit comprises about 883,537 acres in eastern and southeastern Douglas County, central and southern Lyon County, and western Mineral County in western Nevada. The regional physiography and geology of the planning unit are described in Step 2 of the Walker Planning Unit URA.

The general history of mining in the area of the planning unit is summarized in Moore (1969):

> "The history of mining in Nevada began in May of 1850, when placer gold was first discovered near the present site of Dayton, in northwestern Lyon County. This placer gold was worked for several years, and eventually led to the discovery of its source in 1859 at the Comstock Lode....during the early, excitement of the Comstock in the 1860's and 1870's the surroudning countryside was heavily prospected and several small mining districts were formed. These include the Yerington, Talapoosa, Como, Wilson, and Washington districts in Lyon County; the Genoa, Red Canyon, and Mountain House districts in Douglas County; and the Voltaire and Carson districts in Ormsby County...."

> "Prior to 1907, production from the Yerington district was small and intermittent and was devoted primarily to the production of copper sulfate for use in reduction of the silver of the Comstock Lode. Since then four main periods of activity have elevated the Yerington district to the second most important copper producer in the state. These periods were: 1912-1913, with a production of approximately $3,500,000; 1917-1919,

with $7,000,000; 1927-1928 with $3,000,000; and 1953-1965, with over $250,000,000 (and every indication of continuing). This latest large production is from Anaconda's open pit operation at Weed Heights".

"In the early 1950's two significant mining events occurred in the mapped area. The Minnesota mine began sizeable production of iron ore for export (60,000 tons in 1952-1953) and the Anaconda Company began large scale open-pit mining at its Yerington porphyry copper deposit in 1953. From that time through 1965, both these mines have had large production. The Minnesota mine has produced more than 3 million tons of ore and the Yerington mine more than 800 million pounds of copper".

Ross (1961) relates the history of Mineral County as follows:

"Mining activity in Mineral County began with the discovery of the Aurora gold deposits in 1860. The exploitation of these rich deposits was followed by the location of the silver veins of Candelaria by a Spanish party in 1863. Together these two districts in the period 1861-1891 accounted for more than half of the total mineral production of the county to 1956. In addition these two districts furnished a mining population to the county and served as a great impetus to prospecting".

Moore (1969) reports production from Lyon and Douglas Counties as:

Period	Lyon	Douglas
Pre-1941	$ 32,005,359	$ 292,388
1941-1950	2,160,688	3,968
1951-1960	138,099,567	8,278,300
1961-1965	125,999,171	8,469,633
TOTAL	$298,264,785	$17,044,289

Cammarota in preprints of U.S. Bureau of Mines Minerals Yearbooks for 1972 and 1973 reports 1971-1973 mineral production in Lyon and Mineral Counties as:

County	1971	1972	1973	Minerals Produc Order of Value
Lyon	$52,407,000	$52,963,000	$51,643,000	Copper, Cement, Stone, Sand and Gravel, Gypsum,
Mineral	23,000	W 1/	W	Tungsten, Sand and Gravel, Sto

Any discussion of mining history and production as related in the literature invariably involves the use of mining districts. It should be emphasized that the term "mining district" evolved as a way by which mines and prospects in a general area were recorded before county records were established. The now obsolete term was never meant to define mineral occurrences or geologic or structural conditions in an area and should not even be used in mining description. Since the literature is replete with the term, however, its use cannot be totally avoided even in the following text. Those areas in the Walker Planning Unit in which metallic mineral

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1/ "W" Means withheld to avoid disclosing company confidential data.

mining was concentrated and which were later recorded as mining districts are summarized below:

Name	Year Developed	Period of Greatest Activity	Chief Minerals Extracted	Recorded Production	Mineral Inventory Overlay Reference	Published References
Aurora	1860	1861-1869 1914-1918	Gold, Silver	$31,350,000	SW-1-1	Ross
Buckskin	Late 1800's	1943-1971	Iron, Copper, Gold	$16,817,035 through 1966	NW-31-7	Moore
Mountain House	Late 1800's	Early 1900's	Gold, Silver	$6,754 to 1940	NW-40-1	Moore
Mountain View	Early 1900's	Early 1900's	Gold, Silver, Copper	Few tens of thousands of dollars	NW-31-9	Ross
Mount Grant	Late 1800's	1870's	Gold, Silver	Unknown	-	Ross
Red Canyon	1862	Early 1900's	Gold, Lead, Copper	To 1940 $102,818	NW-40-1	Moore
Washington	1861	Early 1900's	Silver, Gold, Chloride, Copper	None recorded	SW-1-2	Moore
Wellington	Late 1800's	Early 1900's	Gold, Silver, Copper, Tungsten, Antimony	To 1940 $6,099	NW-40-1	Moore
Wilson	Late 1800's	Early 1900's	Gold, Silver, Lead, Iron, Tungsten	Through 1940 $778,734	NW-39-7	Moore
Yerington	1865	1912-1920 1953-present	Copper, Gold, Silver, Iron	Through 1965 $272,208,763	NW-31-7	Moore

Metallic minerals of economic value commonly occur in the Walker Planning Unit in two types of rocks; igneous intrusive rocks of Cretaceous age and older metamorphosed sedimentary and volcanic rocks included with the igneous intrusives. In-place mineralization in these rocks is found generally in three types of deposits:
1) quartz veins in the intrusive rocks,
2) contact metamorphic replacement deposits in the metamorphosed sediments and volcanics, and
3) disseminated particles in both the intrusive and the metamorphic rocks.

Some heavier metallics such as gold are also found concentrated in alluvial sand and gravel. These deposits, called placers, form when the metallic minerals weather from their source rocks and are then washed away by streams. As the stream constantly shifts its alluvium, the heavier metallic minerals work their way down and become concentrated in pockets along the base of the stream deposits.

Nonmetallic rocks and minerals generally occur in Tertiary volcanic and sedimentary rocks. Inventory of these rocks and minerals is extremely difficult because characteristics not readily discernible in field examination often determine if the material is valuable or not. In addition, due to the industrial process of blending high quality with lower quality material to obtain a material which meets use specifications, a deposit, which by itself is uneconomic, may, in association with a higher quality deposit, become economic. Because nonmetallic minerals are therefore so user-specific, the determination of what is and what is not valuable is a problem of some magnitude. Nevertheless, nonmetallic minerals are gaining ever increasing importance as raw materials and the need to allow for discovery and development of potential deposits of these materials is vital.

BLM is operating two community pits in the Walker Planning Unit both for sand and gravel. Only one of the two has an active contract in effect at present. The other has been inactive for at least five years.

Only limited potential appears to exist for leasable minerals. Prospective areas for coal and sodium and potassium minerals as defined by U.S. Geological Survey mineral classification data are shown on the Mineral Inventory Overlay and discussed in a later section of the narrative.

At present, however, the only activity associated with leasable minerals is exploration for alunite in the East Walker River Valley in which potassium is considered as a possible secondary product.

Little potential appears to exist for oil and gas discovery in the planning unit. The generally igneous and volcanic geology of the area is not favorable for the accumulation of oil and gas. Only the deep basin sediments of Smith and Mason Valleys appear to hold any potential for petroleum products. Only two oil and gas leases are presently in effect in the planning unit and no activity has been observed with either of them.

Potential for geothermal resources is somewhat greater in the planning unit. A large portion of the Walker Planning Unit has been designated in U.S. Geological Survey data as an area prospectively valuable for geothermal resources. Two Known Geothermal Resource Areas (KGRA) are in the prospectively valuable area. Both the prospectively valuable area and the KGRA's are shown on the Mineral Inventory Overlay and are further discussed later in the narrative.

SELECTED REFERENCES

Cammarota, V.A. Jr., 1972, The mineral industry of Nevada: U.S. Bur. Mines, preprint of 1972 Minerals Yearbook.

————1973, The mineral industry of Nevada: U.S. Bur. Mines, preprint of 1973 Minerals Yearbook.

Moore, J.G., 1969, Geology and mineral deposits of Lyon, Douglas, and Ormsby Counties, Nevada: Nevada Bur. Mines Bull. 75.

Ross, D.C., 1961, Geology and mineral deposits of Mineral County, Nevada: Nevada Bur. Mines Bull. 58.

B. MANAGEMENT OPPORTUNITIES - MINERALS (URA-Step 4)

This narrative, including the section on commodity outlooks, attempts to depict the future mineral potential of the Walker Planning Unit. It should be stated, however, that any such long or short range predictions are fraught with uncertainty and possible error. Although this evaluation is attempted with the best information available, many factors, largely unforeseen, may well have profound effect on the future minerals potential of the planning unit.

As each mineral area is discussed in the following mineral area descriptions a section is devoted to a determination of what management options are available to insure the maximum utilization of the mineral resources. The discussion is keyed to the Management Opportunities Overlay and defines those areas in which the opportunity exists for 1) development of existing mineral resources, 2) further delineation and definition of known resources, and 3) discovery and inventory of unknown mineral resources.

Areas cited for development of known mineral resources are ranked in order of importance. These areas shown on the overlay include additional land for auxilliary facilities such as tailing, mill, and plant sites, and other installations necessary for a successful mining operation.

In general, those areas designated as economic reserves on the Mineral Inventory Overlay have been completely identified through extensive exploration. There then exist opportunities for protection of needed lands and eventual development.

Those areas in the planning unit containing subeconomic resources are all submarginal and require an increase of commodity price or significant technological advances before they can be developed.

Since most exploration was directed to defining the economic reserves, the opportunity exists to further identify and protect the subeconomic areas.

The ranking of the economic and subeconomic areas as to importance for development is based on very sparse evidence as to commodities involved, general market, and proximity to existing facilities. No specific data is available whereby amount, value, and limiting geologic conditions of the deposits in the respective areas can be computed and compared. Without this information a meaningful ranking of the areas as to importance of development cannot be made.

Areas classed as undiscovered resources on the Mineral Inventory Overlay are almost entirely speculative. The opportunity exists, therefore, to firstly protect the lands within the area and keep them open to discovery of minerals and secondly to identify any new mineralized areas which may be discovered.

The opportunities shown on the overlay are not intended to limit the mineral management opportunities in the Walker Planning Unit only to those delineated areas. For reasons already stated, almost certainly not all the potential mineral areas have been identified and inventoried in this study. Future exploration utilizing detailed geologic field work and new techniques and equipment will undoubtedly result in discovery of valuable minerals in an area not considered in the present report. It is imperative, then, that natural resource lands remain open to exploration and location under the multiple use concept. Any withdrawal of lands from the mineral inventory should be done only after the most careful investigation and consideration of potential loss of mineral resources.

COMMODITY OUTLOOK

The following section contains brief summaries for individual mineral commodities present or anticipated to be discovered at some later date in the Walker Planning Unit. The main objective of this coverage is an attempt to survey current uses, prices, and to analyze present and future supply and demand relationships for each commodity. It should be noted, however, that the outlook for each mineral commodity represents only a brief digest compiled from various published sources (See Selected References, p. 15) and by no means is construed to be comprehensive.

Market quotations for the various commodities have been compiled from several sources, Engineering and Mining Journal (E. &M.J.), a monthly publication devoted to the mining industry, is an excellent source of current market (price) information. Prices--especially price increases--must be interpreted with caution inasmuch as most increases simply reflect inflationary gains of several percentage points per year. Price decreases may simply represent minor short-term fluctuations and not a major trend. Individuals wishing further background material should consult Mineral Facts and Problems, U.S. Bureau of Mines Bulletin 650 and preprints of Bulletin 667. Latest market quotations may be obtained from any current periodical devoted to news and developments in the mining industry such as E. & M.J. (above).

Included with each commodity is a section listing areas containing or having a potential for the specified resource. This list should in no way be interpreted to limit the potential of other areas not designated to contain said commodity.

The "future addition and comments" section in the following summaries contain space for future notations concerning each commodity.

SELECTED REFERENCES

Engineering and Mining Journal, monthly publication of McGraw-Hill Pub. Co., New York, N.Y.

U.S. Bureau of Mines, 1970 and 1975, Mineral Facts and Problems: U.S. Dept. Interior, Bur. Mines Bull. 650 and Preprints of Bull. 667.

________________ 1974, preprints from 1974 Minerals Yearbook.

________________ 1975, Commodity Data Summaries.

COMMODITY OUTLOOK

ANTIMONY

USES AND TRENDS

Antimony is used in the manufacture of batteries, fire-retardant chemicals, rubber and plastic products, and in various alloys. Antimony is produced from its primary ore, stibnite, and as a byproduct of the refining of silver and base-metal ores. Approximately 85 percent of the United States antimony output is derived from foreign ores. Over one-half of our domestic production comes from recycling. Scrap battery plates constitute the single most important secondary source of antimony.

Consumption of antimony will generally continue to increase, especially in the fields of battery and flame retardant/repellant manufacturing. However, because of the important military applications of antimony, wide demand fluctuations have occurred in the past as the result of the difference between wartime requirements and those of peacetime.

PRICES

Prices are in dollars per pound for antimony metal and in dollars per short ton of ore.

	Apr. 1974	Apr. 1975	Apr. 1976
Foreign Metal	\$1.90-\$2.20	\$1.65-\$1.80	\$1.70-\$1.80
Domestic Metal	\$1.40-\$1.66	\$1.97-\$2.35	\$1.58-\$1.90
Foreign Ore (60% Sb)	\$23.50-\$24.50	\$21.00-\$22.00	\$21.50-\$23.00

OCCURRENCE IN PLANNING UNIT

Southern Pine Nut - Wellington Hills Area NW-40-1

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FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

CLAY

USES AND TRENDS

As a group, clays are used primarily in ceramic products, cement, and lightweight aggregate. These uses account for about 90 percent of the clay consumption in the United States. The other 10 percent, consisting of high quality clays suitable for use as fillers, catalysts, and chemicals, accounts for more than 75 percent of the total clay value.

Most clays are a low price commodity and cannot stand high transportation costs. Only high quality clays can be shipped any great distance. Because of this transportation factor, clays are typically mined close to marketing areas.

Mixtures of clays have fundamentally different characteristics and because of this factor, many deposits are suitable only to limited end-uses. Therefore, local shortages may occur due to the lack of material suitable for specific end-uses.

The clay market is expected to increase in the future and major technological advances (such as the production of aluminum from common clay) could materially increase the demand for clay.

PRICES

Prices are in dollars per short ton for raw material. The following prices were reported for the respective clays in 1972 and 1973.

	1972 Average	1973 Average
Kaolin (all grades)	$25.75	$27.26
Ball Clay	$15.99	$16.88

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	1972 Average	1973 Average
Fire Clay (Domestic)	$8.15	$8.89
Bentonite (Domestic)	$10.60	$11.34
Fullers Earth	$23.08	$24.07
Common Clay	$1.60	$1.61

OCCURRENCE IN PLANNING UNIT

East Walker Area SW-1-2

Any area that has been hydrothermally altered has a potential for clay.

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

COPPER

USES AND TRENDS

The primary use of copper is in electrical equipment and related supplies. Electrical uses accounted for 61 percent of the 1974 copper demand in the United States. Other important uses and their respective consumption percentages in 1974 are tabulated below:

Construction (roofing, tubing, plumbing, etc.)	14%
Transportation	8%
Industrial Machinery	10%
Munitions	2%
Miscellaneous Uses (chemicals, coins, jewelry, etc.)	5%

Total copper demand for the United States in 1974 amounted to 1.59 million short tons. Projected total demand in the year 2000 could range from 4.90 million to 7.86 million short tons. These figures represent a cumulative demand for 96.4 million to 128.2 million short tons of copper during 1968-2000. Known total domestic reserves are available to meet the bulk of the lower cumulative demand at prices close to present levels. However, increased importation or exploitation of marginal domestic properties at higher prices will be required to satisfy the higher cumulative demand figure.

The increasing demand for copper will certainly spur the discovery and development of new domestic reserves, especially considering the volatile position of foreign copper properties still owned by United States companies.

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Additionally, future development of new beneficiation techniques or substantial price increases will result in renewed exploration and re-evaluation of presently submarginal resources.

Although copper is the metal of choice in many applications, alternate metals are sometimes available. This substitution factor will of course be influenced by future price levels and supply of copper.

PRICES

Prices are in cents per pound.

	Apr. 1974	Apr. 1975	Apr. 1976
Domestic	67.950¢	63.555¢	68.616¢
Imported	134.882¢	57.667¢	65.818¢

OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area	NW-31-7
East Mason Valley - Northern Wassuk Area	NW-31-9
Pine Grove Area	NW-39-2
Southern Pine Nut - Wellington Hills Area	NW-40-1
Lucky Boy Area	SW-1-3

FUTURE ADDITIONS AND COMMENTS

COMMODITY OUTLOOK

CORUNDUM

USES AND TRENDS

Corundum is totally imported and in recent years the whole domestic supply has consisted of material imported by one firm in Massachusetts. Corundum is used primarily in fabricated metal products and in grinding and polishing optical components.

United States resources of the mineral are poorly known and if new deposits of corundum are found which can be mined at prices competitive with the imported product a ready market is available.

PRICES

Prices expressed as average value of imports are given below. Units are dollars per short ton.

1972 Average	1973 Average	1974 Average
$55.00	$65.00	$69.00

OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area NW-31-7

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

DIATOMITE

USES AND TRENDS

Diatomite is composed of the silicious skeletons of microscopic, one-celled organisms (plants) called diatoms. These skeletons accumulate at the bottom of lakes as the plants die and sink. The inert character of the skeletons, porosity, and large surface area of the diatom accumulations make an ideal filtration medium. Diatomite is also used as a mild abrasive, filler, and insulation material. The following list gives the 1974 consumption percentages for various uses of diatomite:

Filtration	60%
Fillers	W 1/
Insulation	5%
Miscellaneous (Abrasives, aggregate, catalyst carriers)	35%

The United States is self-sufficient in diatomite and in 1974 about 30 percent of our domestic production was exported. Projected domestic reserves are sufficient to meet the estimated consumption through the year 2000.

Present usage of diatomite requires selective mining of horizons that have the proper characteristics for each application. Exploration for and evaluation of diatomite is difficult as no suitable method is available to determine the product grade that can be produced without testing finished products for each individual deposit.

1/ Withheld to avoid disclosing company confidential data; percentage included with "Miscellaneous".

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Additionally, there are many alternate materials that may be substituted for diatomite. However, it is anticipated that advanced ultilization and marketing techniques will offset losses due to substitute materials. Nevada's diatomite deposits should be of increased interest in the future. Because diatomite is relatively a low price, high bulk product, transportation costs will limit the exploitation of deposits not in close proximity to shipping facilities. Diatomite output could be limited if fuel supplies are inadequate to operate processing plants.

PRICES

Prices are in dollars per short ton. Estimated average value for all uses in 1974 was $76.31 per ton.

Use	1972 Average	1973 Average	1974 Average
Filtration	$73.08	$65.18	$87.40
Insulation	$47.02	$50.39	$55.39
Abrasives	$125.27	$125.46	$129.51
Fillers	$69.37	$62.01	$77.12
Lightweight Aggregate	$43.07	$45.02	$47.31
Miscellaneous	$39.01	$36.99	$46.25

OCCURRENCE IN PLANNING UNIT

Pine Grove Area NW-39-2

FUTURE ADDITIONS AND COMMENTS

COMMODITY OUTLOOK

FLUORSPAR

USES AND TRENDS

Fluorspar is the commercial term for the mineral fluorite the only naturally occurring and abundant source of fluorine. Fluorspar has many applications including flux for separating slag from molten steel; flourcarbon compounds used in refrigerants, aerosols, solvents, and plastics; the production of synthetic cryolite for reduction of aluminum from bauxite; additive to glass, ceramics, and enamels; and manufacture of abrasives and coated welding rods.

The United States production in 1974 was only about 4 percent of the total world ouput. Ninety- four ~~five~~ percent of the fluorspar consumed in the United States was imported, so this country is highly dependent on foreign sources.

The U.S. Bureau of Mines estimates that at present consumption the earth's present resources of fluorspar will be gone in about twenty years. This means any new domestic deposits of fluorspar which are economically competitive with present foreign sources are assured a ready market.

A modest increase in Nevada fluorspar production is expected in the next few years because the apparent worldwide shortage will raise prices high enough to encourage development of low grade deposits. An even greater long term increase is expected as the need increases for developing low grade deposits to replace dwindling high grade supplies. The production of byproduct fluorine produced from phosphate ore in the phosphate fertilizer industry, however, will undoubtedly increase as the supply of fluorite decreases. This potentially abundant source of fluorine will tend to offset the urgent need for new fluorspar mines.

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PRICES

Prices are in dollars per net ton except where indicated.

Domestic	Apr. 1974	Apr. 1975	Apr. 1976
Metallurgical Pellets	$65.50	$83.00	$83-$91
Ceramics	$77-$96	$90-$115	$90-$115
Dry Acid Basis 97% C.F.	$76.50-$96	$95-$115	$95-$115
Dry Acid Concentrate	$97.50	$102.50-$125	$102.50-$125
Foreign Metallurgical ($/ Short Ton)	$48.50-$62	$61-$76.50	$65.52-$79.38

OCCURRENCE IN PLANNING UNIT

Southern Pine Nut - Wellington Hills Area NW-40-1

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

GEOTHERMAL RESOURCES

USES AND TRENDS

Because of impending shortages of fossil fuels, and essentially complete development of hydrological sources, geothermal resources will become increasingly important for power generation in the future. The industry is still in a very early stage of development, but it is expected that exploration and development of geothermal resources will increase dramatically in the future.

Two types of geothermal systems are considered to have present commerical application:

(1) Vapor-dominated systems (dry steam) are believed to contain both saturated steam and water in the reservoir. When a well is drilled, the decrease in pressure superheats and dries the steam. The steam may be used to drive a turbine directly.

(2) Hot water systems are believed to result from a thermally driven convection system which moves the heated water upward. When a well is drilled, a portion of the water flashes into steam and both water and steam come to the surface. The steam is separated from the water and used to drive a turbine. To date, only hot water geothermal systems are known in Nevada. Many of Nevada's known geothermal resources contain abundant, and often toxic impurities. Exploitation of these thermal areas will have to await the development of a binary generating system whereby toxic impurities are not released in the environment. Several pilot plants utilizing a closed system

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are in various stages of testing and development at the present time, but it is not known when they will become functional on a large scale.

In summation, Nevada's potential geothermal resources constitute a very important energy source of the future. Geothermal exploration and development can be expected to increase greatly in the next decade.

PRICES

Private leases for geothermal exploration currently range from 50 cents to 15 dollars per acre, depending upon how favorable the locality is for geothermal resources, and other factors. Federal Government non-competitive leases cost 1 dollar per acre. Recent Federal competitive lease sales indicate valuation in the hundreds of dollars per acre.

OCCURRENCE IN PLANNING UNIT

Prospectively valuable in Smith and Mason Valleys and Singatse Range but may occur unit wide.

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

GOLD

USES AND TRENDS

The traditional use of gold as jewelry is declining and only 50 percent of the commerical gold production is used for this purpose. Industrial uses of gold are increasing and in 1970 about 40 percent of the total gold demand was consumed by industry. Electronic components accounted for the large increase in industrial gold needs. Dental gold requirements represent the final 10 percent of commerical gold use.

The inescapable conclusion is that the commerical requirements for gold are increasing in a market where demand has historically exceeded supply. As a result, increased gold prices will be the rule rather than the exception.

The U.S. Bureau of Mines cites Nevada as having the third highest gold reserves in the nation. Most of these reserves are not economically recoverable at the old ceiling of $35 per ounce. Since the ceiling has now been lifted it is anticipated that there will be increased exploration for new gold deposits and re-evaluation of properties considered uneconomic in the past.

PRICES

Prices are in dollars per troy ounce on the open market.

Apr. 1974	Apr. 1975	Apr. 1976
$169.25	$165.60	$139.25

OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area NW-31-7

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COMMODITY OUTLOOK

GYPSUM

USES AND TRENDS

Included under this heading is hydrous calcium sulfate--gypsum--and anhydrite, the anhydrous calcium sulfate mineral. Gypsite, a mixture of gypsum and soil, clay, or other earthy materials is also considered.

Virtually 70 percent of the gypsm produced is channeled into the construction market where it is used in plasters, wallboard, and other related materials. The Portland cement industry uses about 22 percent of the gypsum produced. With such close ties to the construction industry, production and prices for gypsum will closely follow expansion and contraction in this field.

Gypsum and gypsite are also used in agriculture as soil conditioners. Gypsum requires prior crushing whereas gypsite is suitable for direct application to the soil.

Domestic demand for gypsum is expected to increase at an annual rate of 2 percent during the period 1973-2000. Foreign demand in construction products will parallel the United States. Therefore, demand for gypsum should increase at the same annual rate. Domestic supply of gypsum is however, more than adequate to supply demand as is true also of the foreign market. It is not expected that gypsum will become important in the planning unit in the near future as larger deposits closer to users exist in other parts of the Carson District.

PRICES

There are no market prices quoted on crude gypsum as most sales are by negotiated contracts.

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What meager price data is available, though, is shown below. Prices are in dollars per short ton and vary depending upon preparation of the material.

1973 Average	1974 Average	1975 Average
$4.18	$4.41	$4.80

OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area NW-31-7

East Mason Valley - Northern Wassuk Area NW-31-9

FUTURE ADDITIONS AND COMMENTS

COMMODITY OUTLOOK

IRON

USES AND TRENDS

The United States consumes approximately 25 percent of the world's iron supply, but only produces about 13 percent of that supply.

Iron is used chiefly in the production of steel. The transportation and construction industries are major users of steel and account for about 50 percent of the total domestic consumption. Machinery and equipment for industrial uses account for another 17 percent of the total steel demand. Other important steel users are container, petroleum, and home appliance manufacturers.

The world demand for iron will steadily increase in the future. Iron and steel consumption in the United States essentially parallels economic growth. United States iron consumption will also expand, but problems associated with domestic production will moderate these increases. The most pressing problems in the domestic market are the decline of steel production during automobile strikes and "hedge" buying of steel against a possible steel strike. These two factors cause major fluctuations in the pattern of raw steel production.

Shipping costs and the high expense of mining small deposits has, in the past, effectively prevented Nevada's iron ore from competing in domestic markets. However, prior shortage of iron ore in Japan has allowed the State's deposits to compete in that market. Future production will depend upon premium overseas or favorable long-term domestic contracts.

Especially encouraging to the development of Nevada's iron deposits is the possibility of the expansion of iron and steel-making facilities on the Pacific Coast.

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Should this occur, it will be a tremendous boost to Nevada's iron ore production.

PRICES

Prices are in dollars per long ton for domestic iron ore and cents per long ton for taconite pellets.

	Apr. 1974	Apr. 1975	Apr. 1976
Lake Superior Ore	$11.91-$12.31	$17.28-$17.53	$18.50-$19.50
Taconite Pellets	30.019¢	44.559¢	50.45¢

OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area NW-31-7

East Mason Valley - Northern Wassuk Area NW-31-9

Cambridge Hills Area NW-39-7

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

LEAD

USES AND TRENDS

Lead-acid storage battery manufacturing accounts for about 35 percent of the total United States lead use. The second largest use of lead (about 18 percent in 1973) is for gasoline additives. Miscellaneous uses, such as in munitions, solders, corrosion-resistant paints, and electronics, account for most of the remainder of domestic lead production.

It is estimated that the domestic lead demand, through the year 2000, can be met by domestic production with little or no increase in price. In fact, supply presently exceeds demand and some major producers have curtailed production. Additionally, with the anticipated phasing out of leaded gasoline due to environmental considerations, a considerable surplus will be created unless present markets are expanded. A further depressant on the market is the existence of a considerable lead surplus in government stockpiles. Producers hope that increased battery production and the use of lead shielding in the expanding nuclear power industry and as a sound depressant in structures will offset losses in the tetraethyl lead market.

Indications are that a status quo will continue to exist in the lead industry; prices will remain low and demand will be met by domestic production.

PRICES

Prices are in cents per pound.

Apr. 1974	Apr. 1975	Apr. 1976
21.487¢	24.5¢	21.933¢

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OCCURRENCE IN PLANNING UNIT

Pine Grove Area	NW-39-2
Southern Pine Nut - Wellington Hills Area	NW-40-1
Lucky Boy Area	SW-1-3

FUTURE ADDITONS AND COMMENTS

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COMMODITY OUTLOOK

LEASABLE MINERALS

USES AND TRENDS

Leasable minerals, other than oil and gas (and geothermal resources) include coal, borates, potassium, sodium, phosphate, sulfur, and asphalt. These minerals and their various end-products are widely used in the commercial and industrial segments of our economy, and it is anticipated that the demand for leasable minerals will increase in the future.

Of the leasable minerals only bituminous coal, sodium, and potassium have an apparent potential for future development in the Walker Planning Unit.

Bituminous coal is,of course, the great potential energy source in the years to come. Great emphasis is being placed on research into conversion of coal to petroleum products and to the production of clean burning fuels. Sodium and potassium are used chiefly in the manufacture of fertilizer, water softeners, soaps and chemicals.

Coal, sodium, and potassium minerals are not expected to be produced from the Walker Planning Unit in the near future. At present a moritorium exists on further leases of coal until some of the present leases are put into production. This will prohibit new development until such time as the moritorium is lifted. Even with all bans lifted, the voluminous deposits of coal in the northern Great Plains states will provide adequate coal to supply the market for many years. Sodium and potassium are also not expected to be produced in any important quantities in the planning unit owing to the presence of higher quality deposits in other parts of the Carson City district.

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PRICES

Prices for potassium (potash) are in cents per short ton unit (1 percent, or 20 pounds K_2O per ton). Prices vary according to grade and degree of processing.

	Apr. 1974	Apr. 1975	Apr. 1976
Domestic Potassium (potash)	47¢-59¢	74¢-81¢	80¢-81¢

Prices for sodium products are in dollars per short ton unless otherwise indicated:

	1972 Range $/lb	1973 Average	1974 Average
Soda Ash (Sodium Bi-carbonate)	$1.77 1/2-$2.47 1/2	$25.36	$33.01
Sodium Sulfate	23 1/2¢-96¢	$17.26	$23.99

Prices for bituminous coal are in dollars per ton.

1972 Average	1973 Average	1974 Average
$7.66	$8.53	$15.00

OCCURRENCE IN PLANNING UNIT

Coal is prospectively valuable in the East Walker Area SW-1-3. Sodium and potassium are prospectively valuable in Smith and Mason Valleys.

FUTURE ADDITIONS AND COMMENTS

COMMODITY OUTLOOK

MOLYBDENUM

USES AND TRENDS

Production of molybdenum first started in Norway in 1880; since then molybdenum has become one of the most important ferroalloy metals. The western mountains of North and South America constitute the world's largest molybdenum province.

The chief use of molybdenum is as a ferroalloy to impart strength to cast iron and steel. Over 80 percent of the world production of molybdenum goes into iron and steel. Other uses include ceramics, pigments, chemical products, catalysts in petroleum cracking, electrical and electronic applications, and dry lubricants.

The chief ore of molybdenum is molybdenite but other associated minerals such as ferrimolybdite, wulfenite, and powellite also provide some metal. No mine in Nevada yet extracts molybdenum as a principal product, but most production has been as a byproduct to other ores.

Domestic consumption of molybdenum has steadily increased in the last 10 years and is continuing to increase as the demand for steel increases. Due to the discovery of a major ore body north of Tonopah[1], Nevada will probably become a major producer of molybdenum in the next 50 years. Until then minor amounts of byproduct molybdenum will continue to be the only production.

PRICES

Prices in dollars per pound.

	Apr. 1974	Apr. 1975	Apr. 1976
Metal	$1.92	$2.69	$3.21
Concentrates	$1.60-$1.87	$2.00-$2.43	$2.38-$2.90

1/ Arthur Baker III, N. L. Archbold, and W. J. Stell, "Forecasts for the Future-Minerals", Nev. Bur. Mines and Geology Bull. 82, 1972, p. 92-93.

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OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area	NW-31-7
Pine Grove Area	NW-39-2
Risue Canyon Area	NW-40-7

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

PERLITE

USES AND TRENDS

Perlite is a glassy volcanic rock that contains up to 5 percent combined water. Upon heating, the rock expands, liberates its combined water, and produces a mass of low-density material.

At the present time, the United States is the world's largest producer and consumer of perlite. The following list tabulates the 1974 usage consumption of expanded perlite:

Aggregate (concrete, plaster)	17%
Filter Aid	17%
Agriculture (horticulture aggregate)	6%
Low Temperature Insulation	5%
Filler	1%
Formed Products	8%
Miscellaneous (includes insulation board)	46%

Since about 70 percent of United States perlite consumption is related to construction, the material closely follows trends in the building industry. The demand for perlite is expected to increase, but problems inherent to the industry will inhibit the development of new mines. These limiting factors include readily available substitutes for all current usages, rigid specifications for the finished product, and cost disadvantages due to the distance of many deposits from commercial markets. If in the future these and other factors can be resolved, Nevada's perlite deposits will be of increased importance in the domestic market.

PRICES

Prices are in dollars per short ton.

	1972 Average	1973 Average	1974 Average
Crude Perlite	$11.34	$11.64	$12.89
Expanded Perlite	$60.17	$67.02	$73.39

OCCURRENCE IN PLANNING UNIT

Southern Pine Nut - Wellington Hills Area NW-40-1

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COMMODITY OUTLOOK

PUMICE

USES AND TRENDS

Pumice is the general name for a lightweight, porous rock of igneous origin. Included in the general pumice category are volcanic cinders, scoria, and pumiceous rhyolite. Pozzolan, a fine-grained silicious material that imparts advantageous properties to cement (superior strength, acid resistance) is included here also. Pumice is used extensively in the construction industry as a lightweight aggregate. The only other major use of pumice is as an abrasive.

Pumice is a low-cost, high-volume product that is very sensitive to transportation costs. Substitutes are available for essentially all uses of pumice, and the degree of substitution is determined with respect to location, mining costs, and transportation distances associated with a particular deposit. Haul distances exceeding even a few tens of miles may be enough to make a deposit uneconomical.

Domestic reserves are expected to meet United States pumice demands through the year 2000. The market will be confined to the western United States inasmuch as these states contain all of the reserves and costs of transportation to eastern markets are prohibitive.

Pumice consumption will increase in the future as the economy expands. Highgrade deposits, in close proximity to marketing areas or shipping facilities, will be exploited first. As these deposits are depleted, and assuming the substitution factor is not substantial, attention will be focused on more distant deposits.

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PRICES

Prices are for the average value for crude pumice, pumicite and volcanic cinder sold and used. Units are in cents per short ton.

1972 Average	1973 Average	1974 Average
98¢	93¢	$1.10

OCCURRENCE IN PLANNING UNIT

Aurora Area SW-1-1

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

SAND AND GRAVEL

USES AND TRENDS

Sand and gravel are important materials used in the construction industry. In 1974 about 95 percent of the total consumption of sand and gravel was in construction with 56 percent for highway construction and 39 percent for general buildings and other heavy construction. The remaining 5 percent was used for abrasives, glass sand, molding sand, railroad ballast and other uses. Generally these materials are of value only if they are located reasonably close to population centers. Because of high transportation costs, their value diminishes rapidly with increased distances from consumption points.

As the economy grows and the construction industry expands, it is anticipated that the demand for these products will increase. Demand is expected to increase at an annual rate of 4 percent through 1980. As deposits in close proximity to population centers are exhausted, producers will be required to relocate operations at further distances from market areas. Environmental problems will become increasingly critical in the future as urban expansion overruns sand and gravel operations. Due largely to this factor and the requirement to move even farther from markets, crushed stone is seeing increased use as a substitute for sand and gravel. Due to the need to obtain gravel from less favorable sources and compliance with more stringent anti-pollution and rehabilitiation regulations, prices are expected to rise from 1975-2000.

PRICES

Commerical prices for sand and gravel are in dollars

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per short ton and are listed below:

1972 Average	1973 Average	1974 Average
$1.31	$1.38	$1.48

The price as of July 1973 for sand and gravel sold from BLM Community Pits in the planning unit was 18¢ to 23¢ per cubic yard.

OCCURRENCE IN PLANNING UNIT

BLM Community Pits:

Upper Smith Valley

Wassuk

Alluvial fan deposits and river and stream channels throughout the planning unit.

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

SILICA

USES AND TRENDS

Silica is used primarily as a commerical source of the element silicon and in the manufacture of glass. Silicon, when alloyed with other metals, is used extensively in the iron and steel industries. Elemental silicon is used primarily in the production of aluminum castings.

Because silicon is the second most abundant element in the earth's crust, the supply is essentially dependent on the demand. The United States has abundant silica resources and it is not expected that foreign imports will have any future impact on the market.

Since the principal use of silicon is in the iron and steel industry, future demands are expected to parallel growth in that industry. The use of silicon in the aluminum industry is expected to increase and by the year 2000 consumption should exceed that of the iron and steel industry. The future potential for silicon is therefore very good.

PRICES

Prices for silica are variable and depend primarily on grade and degree of preparation of the final product. Representative prices listed below are in dollars per short ton.

	Apr. 1974	Apr. 1975	Apr. 1976
90%-99% Silica, nominal crushing (through 200 mesh screen)	$27-$28	$28-$29	$31-$32
90%-99.5% Silica, finely crushed (through 325 mesh screen)	$29-$46.50	$30-$48.50	$33-$51.50

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	Apr. 1974	Apr. 1975	Apr. 1976
99% Silica, extremely well crushed (through 400 mesh screen)	$68-$95	$71-$100	$75-$105

OCCURRENCE IN PLANNING UNIT

Hawthorne Silica Company Mine west of Lucky Boy
Area SW-1-3

All igneous intrusives with a high silica content.

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

SILVER

USES AND TRENDS

The photographic industry is the major user of silver in the United States. Other important consumers are the electronics and jewelry industries.

At the present time, silver consumption exceeds new production and the deficiency is being met primarily by the release of government stockpiles, private silver hoards, and recycling. With the exception of recycling, these sources are likely to be soon exhausted, and it is anticipated that prices will move upward in response to increased demands over available supply. Speculative interests will probably cause minor price fluctuations for short periods of time, but the overall trend will be for increasing prices. Unless major users fall by the wayside, these factors should ultimately spur the exploration for new deposits and the exploitation of presently submarginal ones.

Approximately two-thirds of the United States domestic silver production is recovered as a byproduct of the beneficiation of copper and lead-zinc ores. Therefore, future silver production will be related to the price of these metals as well as the price of silver. Recycling of silver scrap has played only a minor role in the recovery of silver. This potential source of silver will probably receive more attention in the future.

PRICES

Prices for silver are in cents per troy ounce.

Apr. 1974	Apr. 1975	Apr. 1976
503.595¢	420.918¢	435.552¢

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OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area	NW-31-7
East Mason Valley - Northern Wassuk Area	NW-31-9
Pine Grove Area	NW-39-2
Cambridge Hills Area	NW-39-7
Southern Pine Nut - Wellington Hills Area	NW-40-1
Topaz Area	NW-40-6
Risue Canyon Area	NW-40-7
Aurora Area	SW-1-1
Lucky Boy Area	SW-1-3
Stanmore Mine	

FUTURE ADDITONS AND COMMENTS

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COMMODITY OUTLOOK

TALC AND RELATED MINERALS

USES AND TRENDS

Talc-group minerals are used in ceramics, paints, paper, refractories, building materials, insecticides, toilet preparations, and rubber products. The United States is self-sufficient in most grades of talc and related minerals and U.S. mine production has exceeded or kept pace with demand. Exports, as a matter of fact, have grown considerably in the past few years.

Although the domestic demand for talc and related minerals is expected to increase at an average of about 4 percent through 1980, reserves are abundant enough that production should keep pace with demand.

PRICES

The following prices expressed in dollars per short ton are largely dependent on fineness of material. Selected monthly prices for three successive years are given below:

	Apr. 1974	Apr. 1975	Apr. 1976
Mineral Pulp	$10.50-$12.50	$10.50-$12.50	$10.50-$12.50
Finely Ground (98% passes 325 mesh screen)	$20-$90	$27-$100	$27-$105
Intermediate Ground (96% passes 200 mesh screen)	$14-$28	$20-$34	$20-$38
California Standard	$37-$55	$60.50	$69.50
Micronized	$62-$104	$62-$104	$62-$104

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OCCURRENCE IN PLANNING UNIT

East Mason Valley - Northern Wassuk Area NW-31-9

FUTURE ADDITONS AND COMMENTS

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COMMODITY OUTLOOK

TITANIUM

USES AND TRENDS

Titanium gained prominence as a metal as late as 1948 when it was found superior to other metals for both structural and rotating parts in turbine engines of high performance aircraft. Since that time the metal has seen increasing need in the aircraft and aerospace industry. In 1974 87 percent of titanium metal production went into jet engines, air frames, and space missile applications.

Titanium occurs in only two commercially important minerals, ilmenite and rutile. Present technology dictates distinct end uses for the two minerals. Ilmenite is used mostly for titanium pigment for use in paints, varnishes, and lacquers. Rutile is also used for pigments, but it has several other important uses, including being the chief source of titanium metal.

Ilmenite is in abundant supply domestically, but only one mine produces rutile in the United States. About 95% of the rutile used in this country is imported.

In order to satisfy the demand for titanium products of all types, either more economic rutile deposits will have to be found or some way must be found to extract the titanium from ilmenite at a cost competitive with foreign rutile import prices.

The need for domestic supplies of rutile, then, assures a ready market for many years to come. However, as economic deposits are sparse and extraction involves costly mining and milling methods, the trend to develop new and cheaper means of utilizing ilmenite as a source of titanium metal and other titanium products will continue and intensify.

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PRICES

The price for titanium metal is in dollars per pound. Titanium ore is cited in dollars per short ton.

	Apr. 1974	Apr. 1975	Apr. 1976
Metal	$1.70-$1.78	$2.45-$2.85	$2.45-$2.70
Ore			
Ilmenite	$38	$55	$55
Rutile	$330	$710	$510

OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area NW-31-7

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

TUNGSTEN

USES AND TRENDS

Tungsten is used extensively in metallurgical applications, imparting hardness and high heat-resistant characteristics to the metal it is alloyed with. Perhaps its most important use is in the manufacture of high-speed cutting tools. Other applications are in the electric industry; the most important of which is its use as filaments in light bulbs.

Domestic tungsten, primarily recovered as a by-product of molybdenum mining, equals about 75 percent of the United States demand. Unless government price incentives are established--as they have been in the past--the future rate of domestic production will remain relatively constant while the demand increases markedly. Hence, the United States will probably become increasingly dependent on foreign ore imports.

The tungsten market closely follows trends in the steel industry. Any factor adversely effecting steel production will tend to depress the tungsten market. However, in the long run, world consumption of tungsten will out-grow world production and the future for the metal is bright indeed.

PRICES

Prices are in dollars per pound for tungsten metal and in dollars per short ton unit (20 pounds of WO_3) for ore.

	Apr. 1974	Apr. 1975	Apr. 1976
Tungsten Metal (98.8% W)	$4.50-$6.74	$10.21-$12.01	$10.21-$12.01
Tungsten Ore	$57.523	Nominal	$86.097

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OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area	NW-31-7
Pine Grove Area	NW-39-2
Cambridge Hills Area	NW-39-7
Southern Pine Nut - Wellington Hills Area	NW-40-1
Topaz Area	NW-40-6
Risue Canyon Area	NW-40-7
Lucky Boy Area	SW-1-3

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

URANIUM

USES AND TRENDS

The principal current use for commerical uranium is for the generation of electrical power. With the growing shortages in fossil fuels, uranium usage is expected to increase dramatically in the coming years.

A recent study by the Energy Research and Development Administration (ERDA) projected a U.S. nuclear generating capacity comprising 29 percent of the total electrical generating capacity by 1985 and 54 percent of the total U.S. generating capacity by the year 2000. The resultant demand for uranium should therefore continue until perhaps the 1990's, when breeder reactors are expected to assume much of the burden of supplying nuclear energy.

U.S. and world low-cost uranium resources are expected to be sufficient in the short term but their adequacy in the long term is uncertain. Present known domestic reserves are inadequate to meet estimated consumption in the 1980's. The annual growth rate for probable demand to the year 2000 is nearly 9 percent. Foreign imports will partially fulfill future domestic needs starting in 1977, but it can be expected that the increasing need for uranium will encourage major exploration in the next few years.

Another problem confronting the uranium industry at present is the opposition of environmental groups to the establishment of nuclear power generating plants at various locations in the United States.

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PRICES

Prices are in dollars per pound of uranium oxide.

Average 1973	Average 1974	Jan. 1975	Aug. 1975
$6.50	$10.50	$15	$25

OCCURRENCE IN PLANNING UNIT

Singatse Range - Buckskin Mountains Area	NW-31-7
Cambridge Hills Area	NW-39-7
Southern Pine Nut - Wellington Hills Area	NW-40-1
Aurora Area	SW-1-1
East Walker Area	SW-1-2

FUTURE ADDITIONS AND COMMENTS

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COMMODITY OUTLOOK

ZINC

USES AND TRENDS

Zinc is used primarily as a protective coating for steel, in metallurgical applications (as in zinc alloys for diecasting), and as a chemical additive in paints and rubber.

The supply of zinc presently exceeds demand and for the next several decades domestic production could easily satisfy domestic demand. However, the overall picture is not bright as cheap and readily available imports will make substantial inroads on domestic production. These imports have already resulted in lower zinc prices, and marginal domestic mines and smelters will eventually be closed if prices remain at or below today's levels.

The government has recently declared over 500,000 tons of zinc surplus in the United States stockpile. This, coupled with increasing substitution of other materials for zinc will further depress the market. The ultimate effect will be the increasing dependence of the United States on foreign sources of zinc.

It is apparent that until the uncertainties of United States stockpile disposal and importation policies are resolved, the domestic zinc market will remain on a downhill slide, and there is little likelihood that any new mining ventures will be initiated in the near future.

PRICES

Prices are in cents per pound for zinc metal and in dollars per long ton for ore.

Apr. 1974	Apr. 1975	Apr. 1976
34.816¢	38.929¢	37.000¢

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OCCURRENCE IN PLANNING UNIT

Pine Grove Area NW-39-2

FUTURE ADDITIONS AND COMMENTS

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MINERAL AREA DESCRIPTIONS

The following section describes the present situation including history, current activity, and potential development, and the management opportunities for those areas considered with the present state of knowledge to be potentially valuable for minerals. A large scale map of the area showing mines and prospects identified in the narrative follows each area description. For those areas too large to show on one page, a series of pages is used which depict different sections of the area. These pages are keyed to a preceding small scale index map. Each mineral area is keyed to the Mineral Inventory Overlay and the Minerals Management Opportunities Overlay.

See individual districts for these write-ups

ABBREVIATED GEOLOGIC TIME TABLE

ERA	PERIOD	TIME FROM BEGINNING OF PERIOD TO PRESENT IN MILLIONS OF YEARS	TIME SPAN IN MILLIONS OF YEARS
Cenozoic	Quaternary	2.5	2.5
	Tertiary	65	62.5
Mesozoic	Cretaceous	136	71
	Jurassic	190	54
	Triassic	225	35
Paleozoic	Permian	280	55
	Pennsylvanian	320	40
	Mississippian	345	25
	Devonian	395	50
	Silurian	435	40
	Ordovician	500	65
	Cambrian	570	70
Precambrian	Z	800	230
	Y	1700	900
	X	2600	900
	W	4500 plus	1900 plus

Attachment No. 1

GLOSSARY

In this report an attempt has been made to minimize the use of technical terms so that the non-technical reader may better understand the text. However, in order to clearly and completely describe geologic and mining conditions certain language of the profession must be used. The following technical terms used in this report are defined, therefore, for the benefit of those readers unfamiliar with geologic and mining terminology.

ADIT: A nearly horizontal passage which leads from the surface underground.

AEROMAGNETIC SURVEY: The measurement of Earth's magnetic field at different locations from aircraft. Such measurement is used to map either broad patterns of the Earth's main field or variations in the main field due to differing rock magnetization.

AGGLOMERATE: A chaotic assemblage of material which has been explosively ejected from a volcano or volcanic vent.

AGGREGATE: A term used in two senses as follows: 1) geologically to mean a mass or body of mineral or rock particles separable by mechanical means; 2) materially to mean any of several hard, inert, construction materials (such as sand, gravel, crushed stone, shells, etc.) used to make concrete, mortar, etc., or used alone as railroad ballast, fill rock, etc.

ALLOY: A substance composed of two or more metals or a metal and a nonmetal intimately mixed by fusion, electrodeposition, etc.

ALLUVIUM: The general term for material such as sand, gravel, silt, and clay which has been transported by running water and deposited in comparatively recent time in stream channels, on flood plains, or as a cone or fan along mountain fronts.

ALTERED ROCK: A rock which has undergone change in its chemical and mineralogic composition since it was formed.

AMALGAMATION: The process whereby mercury is introduced into gold-bearing concentrate to recover the free gold. The gold adheres to the mercury and forms a mercury-gold alloy called amalgam.

ANASTOMOSING: A net-like pattern of veins, fractures, etc.

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ANDESITE: A dark-colored, fine-grained volcanic rock rich in plagioclase feldspar; the extrusive equivalent of diorite.

ANOMALY: A deviation from normal. As used in this report a geophysical or geologic condition appreciably different from surrounding conditions.

APLITE: A light-colored igneous rock formed at intermediate depth which has a fine-grained, granular texture composed of crystals without their own crystal faces. The form is impressed upon the crystals by pre-existing adjacent mineral crystals.

ARGILLIZATION: The alteration of feldspar to clay minerals especially in wall rocks adjacent to mineral veins.

BASE METAL: Any of the more common and more chemically active metals such as copper, lead, etc.

BLEACHING: The process whereby light-colored rock is formed by chemical alteration.

BRECCIA: A coarse-grained rock consisting of large, angular, and broken rock fragments cemented in a fine grained matrix; the consolidated equivalent of rubble.

CONCENTRATION: As used in this report the various processes of eliminating extraneous or worthless rocks and minerals and leaving mainly valuable minerals such as gold, copper, etc.

CONTACT METAMORPHISM: The local process of alteration of rocks by the intrusion or extrusion of magma and occurring at or near the contact with the igneous body. The alteration is due to heat and chemical solutions emanating from the magma and by physical deformation associated with the emplacement of the igneous body.

COPPER PITCH: A brown or brownish-red substance of pitchy luster consisting primarily of chrysocolla and limonite and occurring in copper oxide zones.

CROSS CUT: An underground passage usually at right angles to a vein or structure which is driven from a shaft or adit to intersect the vein or structure.

DACITE: A fine-grained, volcanic rock of the same general composition as andesite but containing less calcium plagioclase.

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DIORITE: An intrusive igneous rock composed of dark-colored amphibole (especially hornblende), acidic plagioclase, pyroxene, and sometimes a small amount of quartz; the approximate intrusive equivalent of andesite.

DRAGLINE: The process of excavation whereby a large bucket is placed on a cable with one or both ends anchored and is dragged through the broken ore thus scooping it up.

FAULT: A fracture in the Earths surface along which the ground on one side of the fracture has moved relative to the ground on the opposite side of the fracture.

FAULT GOUGE: Soft, uncemented, pulverized, clayey or clay-like material found between the walls of a fault or in a fault zone.

FAULT ZONE: A fault expressed as numerous small fractures, fault breccia, or fault gouge.

FINENESS: The proportion of pure gold or silver in bullion expressed in parts per thousand. Thus, a fineness of 925 indicates 925 parts out of 1000, or 92.5% pure gold or silver.

FLOATATION: A common metallurgical process for separating two valuable minerals from one another or valuable minerals from the worthless fraction of ore by causing the valuable constituents to float in a solution while the valueless constituents sink to the bottom of the solution.

FLUX: A substance used to refine metals by combining with impurities to form a molten mixture that can be readily separated from the desired metal.

GANGUE: The valueless rock or mineral aggregates in ore; that part of ore which is not economically desirable.

GOSSAN: An iron-bearing, weathered product overlying a sulfide deposit; formed by the oxidation of sulfide and leaching out of sulfur and most metals leaving hydrated iron oxide.

GRANITE: Broadly applied, a crystalline, coarse-grained igneous rock rich in quartz, potassium feldspar, and muscovite and biotite micas.

GRANODIORITE: A coarse-grained, crystalline igneous rock intermediate in composition between granite and quartz diorite; contains a higher percentage of sodium and calcium feldspar.

HYDROTHERMAL: Heated waters or gases. Fluids which produce mineralization, ore deposits, rock alteration, and hot springs.

HYPABYSSAL: Pertaining to an igneous intrusion or to so intruded rocks whose depth of formation is intermediate between abyssal and surface.

IGNEOUS: Pertaining to formation from a molten or partially molten state.

INTERMEDIATE COMPOSITION: Usually refers to igneous rock which lies somewhere between basic and silicic rocks; a general subdivision based upon silica content.

INTERSTITIAL: Type of mineral deposition where the minerals fill the spaces between fragments or crystals of the host rock.

INTRUSIVE: Emplacement of molten rock in pre-existing rock and the rock mass so formed within the host rock.

JOINTS: Fractures in the Earth's surface along which no displacement has taken place.

LACUSTRINE: Formed in or adjacent to a lake.

LATITE: A porphyritic volcanic rock having large plagioclase and potassium feldspar crystals in nearly equal amounts, little or no quartz, and a very fine-grained to glassy texture; the volcanic equivalent of monzonite.

LODE: Fissures in rock which usually contain valuable minerals and have definite boundaries; a group of veins.

MAGMA: Molten rock.

MANTLED: Said of deposits such as volcanic fragmental deposits that cover and conform to the underlying topography.

METAMORPHISM: The general process by which pre-existing rocks are changed through the addition of heat, pressure, and solutions at depth below the zone of weathering and cementation.

METASEDIMENTARY: Sedimentary constituents which have been altered through metamorphism.

PORPHYRY: An igneous rock of any composition which contains large crystals--- in a fine-grained ground mass.

PYROMETASOMATIC ALTERATION: The formation of contact-metamorphic mineral deposits at high temperature by emanations from the intrusive and involving replacement of the enclosing rock with different minerals.

QUARTZ MONZONITE: A crystalline, coarse-grained igneous rock which is intermediate in composition between granite and quartz diorite.

REDUCTION: The process by which oxygen is removed from oxide ores in the refining and extraction of valuable metals from ore.

REPLACEMENT: The simultaneous solution of one mineral and deposition of a new mineral in the place of the old mineral.

RESERVES: A general term for the volume of economically mineable ore in a mineral deposit.

RHYOLITE: A volcanic igneous rock generally porphyritic with larger crystals composed of quartz and potassium feldspar in a very fine-grained to glassy ground mass; the extrusive equivalent of granite.

SERICITIZED: Altered by hydrothermal or metamorphic means in which sericite; a white, fine-grained potassium mica very close to muscovite in composition is either introduced into or replaces pre-existing rocks.

SHEAR ZONE: A tabular area of rock that has been crushed and brecciated by many parallel fractures due to forces which slide the two sides of the fractures against each other.

SILICIFICATION: The introduction of or replacement by silica in pre-existing rocks to form fine-grained quartz, chalcedony, or opal.

SKARN: Lime-bearing silicates derived from limestones and dolomites upon the introduction of large amounts of silica, aluminum, iron, and magnesium such as occurs in contact metamorphism of limestones and dolomites.

SOLFATERIC ALTERATION: A type of alteration in pre-existing rocks through the introduction of sulfurous gases.

STOPE: The underground excavation caused by extraction of ore in a series of levels or steps usually in a vertical or steeply inclined ore body.

__TACONITE:__ An unaltered iron formation containing magnetite, hematite, siderite, and hydrous iron silicates.

__TACTITE:__ A complex rock formed by contact metamorphism and metasomatism of carbonate rocks.

__TAILINGS:__ The material left over after the recoverable valuable minerals have been extracted.

__TENOR:__ The percentage or average metallic content of an ore. As commonly used, it is an approximate or general value rather than a precisely known value.

__TUFF:__ A compacted deposit of volcanic ash and detritis which may contain up to 50 percent sediments such as sand or clay.

__VEIN:__ A fissure, fault, or crack in a rock filled by minerals that have travelled upwards from a deep source in the Earth's crust.

__WINZE:__ A downward excavation from an adit or underground level.

Source: Glossary of Geology, 1972 and other standard authorities. The definitions have in some cases been edited or abridged for conciseness.

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