U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Map of Industrial Mineral Occurrences in the National Forests of Arizona

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MAP OF INDUSTRIAL MINERAL OCCURRENCES IN THE NATIONAL FORESTS OF ARIZONA

This map shows the locations of quarries, mines, prospects, occurrences, rock exposures, and (or) outcrop areas for twenty-two industrial mineral commodities (exclusive of sand and gravel) within the boundaries of the National Forests in Arizona. The map was prepared as part of a mineral resource appraisal of the Mexican spotted owl habitat in National Forest lands. The accompanying pamphlet includes brief descriptions of the commodities and a listing (table 1) of location and production data for each occurrence of a particular commodity. The data used to compile the map and pamphlet are chiefly from Phillips' (1987) tabulation of industrial mineral occurrences in Arizona and from Bates (1969). Geologic contacts are from Wilson and others (1969) and Reynolds (1988). The information shown on the map is similar to the nonmetallic mineral occurrences map of McCrory and O'Haire (1965) except that it was compiled from the updated data of Phillips (1987). No claim is made for completeness of this compilation and the user should bear in mind that some published and unpublished sources likely have been missed and that the data are no more accurate than the data sources.

The commodity location data in Phillips (1987) are given in terms of township, range, and the nearest section; thus locations shown on the map are accurate only to within 1 mi. A more accurately located industrial minerals data base, using coordinates of latitude and longitude, is in preparation by the U.S. Geological Survey (USGS) in cooperation with the Arizona Geological Survey (Greta Orris, USGS, oral commun., 1992). This data base will be available in the Mineral Resource Data System (MRDS), possibly by the end of 1993.

COMMODITY DESCRIPTIONS AND NOTES

Asbestos (Chrysotile)

Chrysotile asbestos, a hydrous magnesium silicate mineral ($Mg_3[Si_2O_5](OH)_4$), commonly occurs as veins of silky fibers. In Arizona, chrysotile was formed as a result of alteration of the Mescal Limestone in the Proterozoic Apache Group by intrusion of diabase sills about 1,100 Ma (Shride, 1967). The area designated on the map by wide-spaced horizontal ruling corresponds chiefly to the outcrop area of the Apache Group and diabase sills. Although zones of asbestos alteration are locally common at the contact between the Mescal Limestone and diabase sills, they are of limited extent and are not necessarily present throughout this area. The close-spaced horizontal ruling indicates areas of numerous chrysotile occurrences. Individual asbestos mines, prospects, and occurrences listed in table 1 were not plotted on the map because there are too many of them. Table 1 lists 57 asbestos locations, some of which include several mines or occurrences.

Because of its fibrous habit, with some fibers as long as 15 cm, chrysotile can be woven into heat-resistant textiles in addition to use in packings and gaskets. It is also used in asbestos cement, floor tiles, brake shoes, and as a strengthener in plastics and paper.

Chrysotile asbestos has not been mined in Arizona since 1982 because of U.S. Environmental Protection Agency (EPA) restrictions on the use of all types of asbestos. Chrysotile asbestos, however, is considered by many scientists to be

considerably less carcinogenic than the crocidolite variety of asbestos (Stone, 1991). Thus, the possibility exists that chrysotile asbestos may receive future EPA approval for use in some applications, and production of this mineral in Arizona may resume.

Barite

Barite ($BaSO_4$), a very heavy mineral with a specific gravity of 4.5, is used chiefly for weighting oil well drilling fluids. Other uses include the production of barium chemicals and paint. In Arizona the main occurrences of barite are in veins associated with faults, breccias, and fracture zones. A total of 26 locations, some including several mines and occurrences, are listed in table 1 and are plotted on the map.

Basalt, cinders, and scoria

Basalt is a volcanic rock that contains less than 52 percent silica. It occurs as dense, black lava flows and as highly vesicular flows and pyroclastic deposits (scoria and cinders). The areas marked by diagonal ruling and small hand-drawn asterisks (indicating cinder cones) on the map are underlain by young Quaternary and Tertiary (less than 4 Ma) volcanic rocks, predominantly basaltic in composition. Quarries are abundant in this area. The total area of basalt outcrop is actually more extensive, but includes older upper Tertiary (4 to 8 Ma) basalt and cinder cones (Wilson and others, 1969; Reynolds, 1988). Individual quarries in basalt and in cinders and scoria are shown in the area of older rock. The younger rock is considered superior because it is not as indurated or weathered as the older rock (Bryan, 1987). One location for basalt is listed in table 1 and 21 locations for cinders and scoria. All sites are plotted on the map.

Uses of basalt, cinders, and scoria include concrete aggregate, railroad ballast, riprap, and manufacture of rockwool insulation. Scoria and cinders are commonly substituted for sand and gravel in construction aggregate.

Clay

Clays are chiefly hydrous aluminum silicate minerals that have a particle size of generally less than 2 micrometers, and are more or less plastic when moist. These minerals occur as beds of clay or shale interbedded with other sedimentary rocks in sedimentary basins, as matrix and cement in sandstone, as alteration products in the diagenesis or weathering of volcanic ash, and as products of hydrothermal alteration.

Phillips (1987) did not include common clays (generally illitic clay used in the manufacture of brick and tile) in his tabulation of industrial minerals. Thus, the 16 clay occurrences shown on the map and listed in table 1 are chiefly bentonite (montmorillonite), kaolin, or unidentified clay minerals. These clays occur in a variety of depositional environments and in association with several host rocks.

Bentonites are dominantly either high-swelling sodium type and low-swelling calcium type. Low-swelling bentonite is used in refining and decolorizing oil, and in desiccants. High-swelling bentonite is used in oil well drilling mud, pharmaceuticals, canal and reservoir linings, and heap leach pad sealants. Kaolin is used in paper-coating material, and in the manufacture of stoneware, refractory brick, and ceramic products.

Diatomite

Diatomite is a sedimentary rock composed of a large percentage of microscopic aquatic plants called diatoms that have shells made of opaline silica. Diatomite deposits are common in lacustrine facies of basin-fill rocks in southern and western Arizona, but the deposits currently are considered to be too thin and too impure to be exploited using present technology in existing economic conditions. A total of four diatomite locations are listed in table 1 and plotted on the map.

It is the microscopic size of the diatom shells that give diatomite its desirable properties. Nearly half of the diatomite produced is used as a filter aid. Other uses are as fillers and in thermal insulation.

Feldspar

The feldspar group of minerals are anhydrous aluminum silicates of potassium, sodium, and calcium. Taken as a whole, feldspars are the most abundant constituents of igneous rocks. The members of the group that find common use as industrial minerals are the potassium feldspars (orthoclase and microcline) and the sodium end member of the plagioclase feldspar series (albite). The chief uses of feldspar are in the ceramics and glass industry. The potassium and sodium content of ground feldspar acts as a flux when the powder is added to ceramic mixes, lowering the melting point. Feldspar powder is added to glass mixes for its alumina content. Additional alumina increases the resistance of glass to impact, bending, and thermal shock.

Although feldspar is common and widespread in nearly all igneous rocks and is present in many metamorphic and sedimentary rocks, pegmatites are the only source exploited for feldspar in Arizona. Productive and potentially productive pegmatites occur in older crystalline rocks in a belt that runs from Lake Mead in Mohave County southeastward to Cochise County. Five locations are listed in table 1 and plotted on the map for feldspar.

Fluorspar

Fluorspar or fluorite (CaF_2) is translucent to clear, and varies from colorless or white through green, yellow, brown, blue, and purple. It occurs as veins, aggregates of cubic crystals, and as granular masses, and commonly crystallizes with calcite, quartz, and pyrite. Fluorspar occurs in Arizona chiefly as veins in fissures and breccia zones associated with faults. A total of 29 fluorspar locations are listed in table 1 and are plotted on the map.

Uses of flourspar are in the manufacture of hydrofluoric acid, as flux in steel making, and in the production of ceramic materials.

Gypsum

Gypsum, $CaSO_4.2H_2O$, is soft (can be scratched with a fingernail); commonly white, but can be colorless, gray, pink, or brown; and can be granular or finely to coarsely crystalline. Curved fibrous crystals are common. Gypsum is an evaporite mineral that precipitates from hypersaline lacustrine or marine water, either as interbeds with salt and claystone or disseminated in clayey sedimentary rocks. Gypsum deposits must occur in fairly pure thick beds to be economically important. The gypsum deposits in the National Forests in Arizona are found in Tertiary lacustrine rocks. Fourteen locations for gypsum are listed in table 1 and plotted on the map.

Gypsum is used either "as is" or it is calcined. Uncalcined gypsum is used as an additive to portland cement and as an agricultural soil conditioner. Gypsum that has been calcined at 250° to 400°F produces plaster of paris. Calcining at 900° to 1000°F produces anhydrous gypsum (anhydrite) that is used as a desiccant and in specialty cement.

Limestone, dolomite, and marble

Limestone and dolomite are lacustrine and marine sedimentary rocks. Pure limestone is composed of calcium carbonate ($CaCO_3$); dolomite is calcium-magnesium carbonate ($CaMg(CO_3)_2$). Marble is either limestone or dolomite that has been metamorphosed, which commonly has to effect of making the resulting rock whiter and more coarsely crystalline. Limestone and dolomite do not usually occur as pure end members, but tend to contain varying amounts of magnesium. In addition, because they are sedimentary rocks, they may contain interbedded shale, sandstone, or chert. Twenty-nine limestone, dolomite, and marble locations are listed in table 1 and plotted on the map.

The uses of limestone, dolomite, and marble depend on either their physical properties or their chemical composition. Uses that are not composition dependent are as smelter flux and as crushed rock for aggregate, ballast, poultry grit, whiteners and fillers. Limestone or limestone marble is required for the manufacture of portland cement and is also used in the treatment of stack gases.

Mica

Members of the mica group of minerals are complex hydrous potassium aluminum silicate minerals characterized by platy morphology and perfect basal cleavage. Of the mica minerals, muscovite, phlogopite, and lepidolite are the most important economically. The eight muscovite occurrences within the National Forests (table 1) are nearly all in pegmatites.

Mica is marketed as sheet mica and scrap mica. Sheet mica must be flat and in pieces larger than 1 in. across. Its chief use is as an insulator in the electrical and electronics industry. Scrap mica is ground and used mainly in the manufacture of joint cement and paint.

Perlite

Perlite is a glassy volcanic rock with the composition of rhyolite (greater than 69 percent SiO_2) and high water content (2 to 5 percent). When perlite is crushed and heated to between 1,400° and 2,000°F, the contained water is converted to steam and the perlite granules expand 4 to 20 times to pruduce light, cellular particles. Twelve perlite locations are listed in table 1 and plotted on the map.

Perlite is important in the construction industry for insulation, light weight aggregate, and acoustical tile. Other uses are as fillers, extenders, and carriers.

Pumice

Pumice is a light-colored highly vesicular glassy volcanic rock that generally contains more than 69 percent SiO_2. Because of its light weight and the fact that many vesicles are closed off from one another, some blocks of pumice will float on water. Twenty locations for pumice are listed in table 1 and shown on the map.

Principal uses of pumice are for concrete aggregate, landscaping, abrasives, roofing granules, and in creating stone-washed garments.

Salt

Salt, or sodium chloride (NaCL), is an evaporite mineral that precipitates from hypersaline lakes in closed basins. It is commonly interbedded with gypsum and clay. Salt crystallizes in the form of cubes and is transparent and colorless when pure. Only one location for salt is listed in table 1 and plotted on the map.

Salt is used chiefly in the chemical industry for the production of chlorine and caustic soda. Other uses include the de-icing of roads, the food processing industry, livestock feed, and petroleum refining.

Silica, quartz, and quartzite

Quartz or silica (silicon dioxide, SiO_2) is a component of many igneous rocks, and is abundant as veins in mineralized areas. It is commonly colorless or white, but a wide variety of colors is possible depending on the content of trace element impurities. Because of its resistance to corrosion, fracture, and abrasion, quartz persists through weathering and erosion and is one of the most abundant detrital minerals. Quartzite is a sedimentary or metamorphic rock that consists of detrital quartz grains held together with silica cement.

Most of the quartz and quartzite produced in Arizona is used as metallurgical flux in copper smelters. There may be occurrences of quartz with properties that would be useful for other purposes, but the quartz occurrences of the state have not been evaluated adequately. Twenty-six locations for silica, quartz, and quartzite in the National Forests are listed in table 1 and shown on the map.

Sandstone

Sandstone beds of the Coconino Sandstone and Moenkopi Formation are quarried for dimension stone in northern Arizona. The middle Permian Coconino Sandstone consists of white, pink, and red, well-bedded, fairly well consolidated sandstone. It is used chiefly as flagstone and is shipped throughout the U.S. and to Japan. Thick-bedded, maroon and chocolate-colored sandstone near the base of the Triassic Moenkopi Formation was quarried extensively prior to the 1930's. The sandstone of the Moenkopi is calcite-cemented and is thus softer than the silica cemented Coconino Sandstone. Its principal use was as large blocks for building stone (Kieth, 1969).

The outcrop belts of the Coconino and Moenkopi are shown on the map, but individual quarries are not indicated on the map or listed in table 1. Quarry activity for the Coconino Sandstone is presently centered north of Ashfork.

Sillimanite group

These are aluminous silicate minerals and include sillimanite, kyanite, andalusite, dumortierite, and topaz. The chief utility of these minerals is that, upon firing at high temperature, they convert to mullite, a refractory mineral able to withstand thermal shock. Their uses, among others, include the manufacture of glass furnaces, molten metal handling equipment, and spark plug insulators.

In Arizona, the sillimanite group of minerals are known to occur in Precambrian metamorphic rocks, although the size and quality of the occurrences have not been explored adequately. Three locations for silimanite group minerals are shown on the map and listed in table 1.

Sodium sulfate

The main sodium sulfate minerals are thenardite (Na_2SO_4), mirabilite ($Na_2SO_4.10H_2O$), and glauberite ($Na_2SO_4.CaSO_4$). These are evaporite minerals and are found in brines and interbedded with other evaporite minerals such as gypsum and salt. Only one location for sodium sulfate is listed in table 1 and plotted on the map.

Sodium sulfate is used for the digestion of wood pulp, the manufacture of sodium based chamicals, and in ceramics, dyes, ink, and animal feed supplements.

Strontium

In Arizona, strontium occurs in the form of the mineral celestite ($SrSO_4$). Celestite is found in cavities in dolomite and dolomitic limestone, in evaporite deposits, and in hydrothermal veins. Celestite is important as a source of strontium, which is used in pyrotechnics. One celestite location is listed in table 1 and shown on the map.

Vermiculite

Vermiculite is a sheet silicate formed mainly from the low temperature alteration of biotite. Vermiculite commonly occurs in small amounts in many igneous and metamorphic rocks. Larger deposits of vermiculite are inferred to have formed by the alteration of mafic rocks by silica-poor or volatile-rich intrusives, followed by supergene alteration.

Heating in the range of 800° to 2,000°F drives off the water of hydration, which in turn forces the cleavage plates of the mineral apart in an accordion-like fashion. This results in a lightweight material that is incombustible and has good thermal insulating properties. Principal uses of vermiculite are as lightweight aggregate, thermal insulation, agricultural soil supplement, and as carriers, fillers, and extenders.

Only one location for vermiculite is listed in table 1 and plotted on the map.

Wollastonite

Wollastonite ($CaSiO_3$) is a brilliant white contact metamorphic mineral that occurs in the aureole between impure limestones and granitic intrusive rocks. It is commonly associated with garnet, diopside, epidote, calcite, and quartz. Two wollastonite locations are listed in table 1 and shown on the map

Wollastonite is used in making tile and as a filler, extender, and whiting agent in paints and plastics.

Zeolite group

The zeolite group of minerals comprises more than twenty-five minerals defined as hydrated aluminosilicates of the alkali and alkaline earth metals, with an infinitely extended three-dimensional anion network. The porous character of the zeolites allows them to act as molecular sieves for separating mixtures based on the size and shape of the molecules or for the selective adsorption of gases.

In Arizona, natural zeolite deposits have been formed by the diagenetic alteration of volcanic ash. The following zeolite minerals have been reported in these deposits: clinoptilolite, chabazite, mordenite, phillipsite, analcime, and erionite. A total of seven locations for zeolite group minerals is shown on the map and listed in table 1.

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Table 1. Listing of industrial mineral location and production data for commodities occurring in the National Forests of Arizona (from Phillips, 1987).
[Permissive and favorable areas for the occurrence of asbestos are shown on the map by patterns. Thus, leaders (---) indicate there are no map numbers corresponding to the individual asbestos localities listed. Otherwise, leaders indicate no data was given in Phillips (1987).]

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
ASBESTOS				
COCHISE COUNTY				
Sec. 34 17S, 23E	---	Pearce 15'	Abril Zinc Mine	Chrysotile asbestos in Permian limestone; a noteworthy mineral occurrence in a zinc-copper deposit.
GILA COUNTY				
Secs. 34 & 35 8N, 14E	---	McFadden Peak 15'	Cherry Creek, Buckhorn	Past production; chrysotile veins in Mescal Limestone
Sec. 35 8N, 14E	---	McFadden Peak 15'	Melrose Group	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 19 8N, 15E	---	Young 15'	Number Two-Vosberg Claims	Past producer; chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 20 8N, 15E	---	Young 15'	Home Property, Wilson Claims	Past production of short fiber asbestos; one of the earliest worked deposits; chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Secs. 19, 20, 29 & 30 8N, 15E	---	Young 15'	Walnut Creek, Wilson Creek, Arizona Asbestos Group, Tony, Wolf Spring Group	Past production, chrysotile asbestos veins in Mescal Limestone in Precambrian formation intruded by diabase sills
Secs. 27 & 35 8N, 15E	---	McFadden Peak 15' Young 15'	Sloan Creek Group, Kyle Asbestos	Past production
Sec. 30 8N, 15E	---	Young 15'	Buckhorn, Triangle Asbestos, American Asbestos Cement Co.	Past production of up to 3 in. soft fiber; chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
Sec. 35 8N, 15E	---	McFadden Peak 15'	Cato Claims	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 35 8N, 15E	---	McFadden Peak 15'	Aileen & Cowboy Claims	Past producer; chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 35 8N, 15E	---	McFadden Peak 15'	Last Chance	Chrysotile asbestos in serpentinized zone in Mescal Limestone
Sec. 20 7N, 12E	---	Picture Mtn. 7.5'	Independent	Chrysotile asbestos with serpentine in limestone intruded by diabase
Sec. 2 7M, 14E	---	McFadden Peak 15'	Challenge 1-3 Property	Soft to semi-harsh asbestos in serpentine zones in Mescal Limestone intruded by diabase dikes and sills
Secs. 4 & 5 7N, 14E (proj.)	---	McFadden Peak 15'	Bore Tree Saddle, Ash Creek	Past production
Sec. 10 7N, 15E	---	McFadden Peak 15'	Pierce Mine	Past production
Secs. 10, 11 14 & 15 7N, 15E	---	McFadden Peak 15'	American Fiber Group, Rock House, King, Many, Montezuma	Past production; chrysotile asbestos
Sec. 14 7N, 15E	---	McFadden Peak 15'	Tank House Creek	-----
Sec. 15 7N, 15E	---	McFadden Peak 15'	May Mine	Past production
Sec. 22 7N, 15E	---	McFadden Peak 15'	Delong Asbestos Claims	-----
Secs. 7, 8, 17 & 18 6N, 14E	---	McFadden Peak 15'	Rosa Group	-----
Sec. 15 6N, 14E	---	McFadden Peak 15'	Lucky Strike, Metate Mine	Past production
Sec. 21 6N, 14E	---	McFadden Peak 15'	Reynolds Creek, Reynolds Fall	-----
Sec. 22 6N, 14E	---	McFadden Peak 15'	Pueblo	Past production

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
Secs. 19 & 20 5N, 14E	---	McFadden Peak 15'	American Ores, Asbestos Peak Property	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 32 5N, 14E	---	Rockinstraw Mtn. 15'	Friday Claim, Globe and Miami Group	Small past production; short, good quality chrysotile fiber with serpentine in limestone intruded by diabase; also contains magnetite zone
Sec. 32 5N, 14E	---	Rockinstraw Mtn. 15'	Black Diamond	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 12 5N, 16E	---	Blue House Mtn. 15'	Fiber King, Salt Bank, Riverside	Past production; asbestos zone in massive bedded limestone in Mescal Limestone
Sec. 14 5N, 16E	---	Blue House Mtn. 15'	Victory Group, Bacon Group	Part of the Johns-Mansville Co. group of properties in the area; at one time the largest asbestos mine in the U.S.; chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 24 5N, 16E	---	Blue House Mtn. 15'	Cliffbestos	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 24 5N, 16E (proj.)	---	Blue House Mtn. 15'	Regal Group, Corral Creek	Past production, asbestos-bearing zones within Mescal Limestone
Sec. 26 5N, 16E	---	Blue House Mtn. 15'	Fourth of July Blue Eyes Group	Past production, asbestos veins in algal limestone
Sec. 35 5N, 16E	---	Blue House Mtn. 15'	Wonder Group	Asbestos bearing serpentine zone under base of algal limestone near diabase sill
Sec. 7 5N, 17E	---	Blue House Mtn. 15'	Apache Extension	Asbestos-bearing serpentine in limestone

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
Secs. 7 & 8 5N, 17E	---	Blue House Mtn. 15'	Apache Mine, Seven Star, McIntyre Mine	Past production; chrysotile asbestos veins in limestone near diabase sill
Sec. 8 5N, 17E (proj.)	---	Blue House Mtn. 15'	Loey & Lena	Asbestos bearing zone, algal limestone
Sec. 16 5N, 17E	---	Blue House Mtn. 15'	Salt River Group	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 17 5N, 17E	---	Blue House Mtn. 15'	Punto Negro Group	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills; possible small production
Sec. 20 5N, 17E	---	Blue House Mtn. 15'	River Group	Narrow veinlets of asbestos in Mescal Limestone between concordant diabase sills
Sec. 28 5N, 17E	---	Blue House Mtn. 15'	Oso Claim	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 28 5N, 17E	---	Blue House Mtn. 15'	Canadian, Ladder	Past production; chrysotile asbestos in Mescal limestone intruded by diabase dikes and sills
Sec. 30 5N, 17E	---	Blue House Mtn. 15'	Bluff Mine	Asbestos bearing zones in Mescal Limestone beneath diabase sill
Sec. 33 5N, 17E	---	Blue House Mtn. 15'	Phillips Mine, Grandview Mine	Past production of chrysotile asbestos in Mescal Limestone intruded by diabase dikes or sills
Sec. 4 4N, 17E	---	Chrysotile 7.5'	Triple Star Mining Co. Property, Donato	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 1 2N, 14E	---	Rockinstraw Mtn. 15'	G & H Prospect	Asbestos serpentine zone within limestone

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
Sec. 30 2N, 14E	---	Inspiration 7.5'	Shackelford Prospect	Somewhat harsh fiber; chrysotile asbestos associated with pale colored serpentine in limestone immediately above a diabase sill
Sec. 34 2N, 14E	---	Inspiration 7.5'	Chuckwalla	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 2 1N, 14E	---	Inspiration 7.5'	Asbestos Prospects	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 12 1N, 14E	---	Inspiration 7.5'	Dixon Group	Short fiber
Sec. 13 2S, 15E	---	Pinal Peak 7.5'	Asbestos Claims	Chrysotile asbestos in Mescal Limestone intruded or cut by diabase dikes and sills
Sec. 5 2S, 16E	---	Cutter 15'	Indian Springs Deposit	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 5 2S, 16E	---	Cutter 7.5'	Lone Pine Prospects	Chrysotile asbestos in Mescal Limestone intruded by diabase dikes and sills
Sec. 9 2S, 17E	---	Cutter 7.5'	Chiricahua Prospect	Asbestos serpentine zone parallel to Mescal Limestone bedding
PINAL COUNTY				
Sec. 14 1N, 12E	---	Haunted Canyon 7.5'	Kennedy Ranch	-----
Secs. 18 & 19 1N, 12E	---	Iron Mtns. 7.5'	---	-----
Sec. 13 1S, 11E	---	Picketpost Mtn. 7.5'	El Marmol Claims	Mescal Limestone cut by diabase; asbestos reported
Sec. 22 1S, 11E	---	Picketpost Mtn. 7.5'	Hewitt Canyon, Martinez Sand Wash	Reported asbestos occurrence; also dimension stone marble and serpentine

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
Sec. 13 2S, 12E	---	Superior 7.5'	Vesta	-----

BARITE

COCHISE COUNTY

Secs. 23 & 24 18S, 23E	1,2	Pearce 15'	Standard Tungsten Mine, Johnnie Boy No. 1, Head Center	Barite pods and scheelite in limestone

GILA COUNTY

Sec. 31 10N, 10E	3	North Peak 7.5'	Belch Group	Barite stringers in precious metal vein
Sec. 15 10N, 11E	4	McDonald Mtn. 7.5'	Baronite Group	"Bedded" barite deposit between coarse-grained granite hanging wall and fine grained siliceous breccia footwall
Sec. 15 10N, 15E	5	Young 15'	Baronite Group	Iron-stained barite stringers in granite
Sec. 1 9N, 9E	6	North Peak 7.5'	Zulu	Parallel barite veins in quartz-diorite in Precambrian formation
Sec. 4 9N, 10E	7	Payson South 7.5'	Gilmore Spring Prospect	Minor barite veinlets in quartz diorite
Sec. 5 9N, 10E	8	Payson South 7.5'	Pat Walsh Group	Barite veinlets
Sec. 6 9N, 10E	9	Payson South 7.5'	Grey Fox Group	Barite stringers in diorite in Precambrian formation
Sec. 7 9N, 11E	10	Payson South 7.5'	Gisela (Spook) Deposit	Barite vein in fractured granite
Sec. 20 9N, 13E	11	Buzzard Roost Mesa 7.5'	Jones Barite-Fluorite	Barite and fluorite in vein with manganese oxides between Dripping Spring Quartzite and diabase.
Sec. 31 8N, 12E	12	Picture Mtn. 7.5'	Top Hat Mine, A & B Group	Barite vein in faulted quartzitic schist in Precambrian formation. Produced high grade barite for paint industry
Sec. 35 7N, 9E	13	Reno Pass 7.5'	Lone Pine Claim, Mt Ord Barium	Barite vein in pyroxenite
Secs. 7 & 8 2N, 16E (proj.)	14,15	Rockinstraw Mtn. 15'	Richmond Basin	Barite veins

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
BARITE (continued)				
Secs. 20 & 29 1N, 14E	16,17	Inspiration 7.5'	Castle Dome Mine, Pinto Valley Copper Mine	Barite-fluorite mineralization, copper ores within quartz monzonite
MARICOPA COUNTY				
Sec. 4 2N, 7E	18	Granite Reef Dam 7.5'	Granite Reef Mine, Macco, Arizona Barite, Christman	Past production for drilling mud, barium chemicals, barite veins in faulted conglomerate
PIMA COUNTY				
Sec. 26 19S, 15E	19	Sahuarita 15'	Quebec Mine	Barite gangue in lead-silver ores adjacent to quartz latite stock
PINAL COUNTY				
Sec. 9 2S, 11E	20	Picketpost Mtn. 7.5'	Gonzales Pass Deposit	Barite vein in Pinal schist; Precambrian
SANTA CRUZ COUNTY				
Sec. 17 23S, 16E	21	Harshaw 7.5'	Morning Glory	Minor barite in base metal replacement deposit
Sec. 33 22S, 16E	22	Lochiel 15'	-----	Barite veinlets
Sec. 8 21S, 15E	23	Mt. Wrightson 15'	Dixie, Dixie Queen	Bladed masses of barite in veins of massive quartz
YAVAPAI COUNTY				
Sec. 2 12N, 3W	24	Wilhoit 7.5'	White Spar Claim	Barite veins in diorite
Sec. 1 10N, 1E	25	Bumble Bee 7.5'	Irle Claims, Excalibur, Cactus Wren, Porter Claims	Barite reported with base and precious metal mineralization
Sec. 11 10N, 5E	26	Tule Mesa 7.5'	Santa Claus, Christmas Tree Claims	Barite and fluorspar in vein deposit in a red coarse-grained granite
BASALT (Tertiary)				
YAVAPAI COUNTY				
NE 1/4 of 20N, 2W	1	Ashfork 15'	Meath	Olivine basalt

CINDERS AND SCORIA (Tertiary)

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
COCONINO COUNTY				
Sec. 35 22N, 4E	1	Garland Prairie 7.5'	Garland Prairie No. 1 Cinder Pit	Cinder deposit; quarry
Sec. 35 21N, 5E	2	Garland Prairie 7.5'	Garland Prairie No. 2 Cinder Pit	Cinder deposit; quarry
Sec. 25 20N, 5E	3	Dutton Hill 7.5'	Dutton Hill No. 1 Cinder Pit	Cinder deposit; quarry
Sec. 21 19N, 1E	4	Matterhorn 7.5'	Matterhorn No. 1 Cinder Pit	Cinder deposit; quarry
Sec. 27 18N, 8E	5	Mormon Mountain 7.5'	Mormon Mtn. No. 1 Cinder Pit	Cinder deposit; quarry
Sec. 34 18N, 9E	6	Mormon Lake 7.5'	Sedge Spring Cinder Pit	Cinder deposit; quarry
Sec. 20 18N, 10E	7	Kinnikinick Lake 7.5'	Kinnikinick Lake	Cinder deposit; quarry
Sec. 29 16N, 9E	8	Happy Jack 7.5'	Happy Jack No. 1, 2 & 3 Cinder Pits	Cinder deposit; quarries
YAVAPAI COUNTY				
Sec. 12 21N, 2W	9	Ashfork 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 21 & 22 21N, 2W	10	Ashfork 15'	Cruice Pit	Past production of basalt scoria for cinder blocks and aggregate
Sec. 23 21N, 2W	11	Ashfork 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 25 21N, 2W	12	Ashfork 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 36 21N, 2W	13	Ashfork 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 11 20N, 2W	14	Ashfork 7.5'	Olivine Basalt Pits	Cinder (scoria) deposit, quarry
Sec. 24 20N, 2W	15	Meath Spring 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 30 20N, 1W	16	Meath Spring 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 17 19N, 1W	17	Meath Spring 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
Sec. 13 18N, 2W	18	Paulden 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 34 16N, 6E	19	Casner Butte 7.5'	Adot Materials Pit #5780	Cinder (scoria) deposit, quarry
Sec. 32 16N, 7E	20	Casner Butte 7.5'	Cinder Pit	Cinder (scoria) deposit, quarry
Sec. 25 12.5N, 1W	21	Poland Junction 7.5'	Christmas Gift	Cinder deposit
			CLAY	
COCONINO COUNTY				
Secs. 31 & 32 21N, 6E	1,2	Bellemont 15'	Rogers Lake	High-silica clay derived from decomposed volcanic rock
GILA COUNTY				
Secs. 27 & 28 12N, 9E	3,4	Buckhead Mesa 7.5'	Florence Ceramics, Red Giant	Past production of kaolinitic clay with limestone particles
Sec. 36 11N, 13.5E	5	Woods Canyon 15'	Chris Clay Deposit	Sandy reddish-orange clay interbedded with sandstone
Secs. 20 & 29 8N, 10E	6,7	Gisela 7.5'	Quintonite	Tufa deposit; production has been a ground and bagged product for soil supplement and oil absorbent
Sec. 14 6N, 10E	8	Tonto Basin 7.5'	Clay Deposit	Fine bedded and variable colored clay beds in lake deposits
MARICOPA COUNTY				
Sec. 14 7N, 6E	9	Horseshoe Dam 7.5'	Horseshoe Dam Clay, Verde Vista Group	Low swelling bentonite - mostly montmorillonite
NAVAJO COUNTY				
Sec. 33 11N, 16E	10	Heber 15'	Turkey Springs	Gray refractory clay associated with shaly coal seams
Sec. 19 11N, 19E	11	Clay Springs 15'	Saul Quarry, Rim Clay	Refractory aluminous shales; kaolinitic shales used in clay mixtures as the stabilizing constituent in the manufacture of vitrified pipe

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		CLAY (continued)		
Sec. 9 10N, 17E	12	Heber 15'	North Fork, Phoenix Wash	White refractory clay in sandstone overlying coal seams
YAVAPAI COUNTY				
Sec. 1 15N, 3E	13	Cottonwood 7.5'	McCarthy Clay	Bedded deposits of red and white structural clay
Sec. 1 13N, 4E	14	Camp Verde 7.5'	Camp Verde Salt Mine, Graham Wingfield Sulphate	Past production from flat bedded deposit of thenardite, mirabilite, gypsum, glauberite, halite, and clay in Cenozoic Verde Formation
Sec. 11 13N, 5E	15	Camp Verde 7.5'	Larson Quarry	Past production bentonitic clay associated with gypsum, used for iron ore pelletizing and canal-reservoir sealer
Sec. 21 8N, 6E	16	Chalk Mtn. 7.5'	Chalk Mtn.	Kaolin (?) reported
		DIATOMITE		
GREENLEE COUNTY				
Sec. 19 1N, 32E	1	Alma Mesa 7.5'	-----	Four-foot thick bed of diatomite in lower Miocene conglomerate
SANTA CRUZ COUNTY				
Sec. 35 21S, 18E	2	Preatt Ranch 7.5'	Lyle Creek	Impure diatomite outcrops
Sec. 1 22S, 18E	3	Preatt Ranch 7.5'	Eagle	Diatomite occurrences
YAVAPAI COUNTY				
Sec. 16 13N, 5E	4	Camp Verde 7.5'	Verde River	Diatomite beds interbedded with gypsum, clay and calcium carbonate

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		FELDSPAR		
GILA COUNTY				
Sec. 24 9N, 12E	1	Buzzard Roost Mesa 7.5'	Jones Beryllium Prospect	Veins of feldspar and quartz in altered Precambrian schist
Sec. 32 1S, 15E	2	Pinal Peak 7.5'	Signal Peak Area	Feldspar and sillimanite in schist
YAVAPAI COUNTY				
Sec. 4 10N, 1E	3	Crown King 7.5'	Silver Christmas	Reported feldspar occurrence
Sec. 6 10N, 1E	4	Crown King 7.5'	Muscovite Mine, B.A.R.R. 4 Mica, Vasser Mica	Feldspar in poorly zoned pegmatite dike
Sec. 16 19N, 1E	5	Crown King 7.5'	Silver Christmas Mine	Orthoclase feldspar
		FLUORSPAR		
COCHISE COUNTY				
Sec. 17 16S, 30E	1	Cochise Head 15'	Indian Creek, Pague Prospect	Fluorspar vein in faulted limestone
Sec. 12 17S, 30E	2	Portal 15'	Paradise Area	Past production; fluorspar in quartz veins in faulted granite
Secs. 26 & 35 18S, 19E	3,4	Benson 15'	Lone Star Mine	Past production for metallurgical uses; banded fluorspar and quartz veins in Precambrian schist; intruded by aplite dikes and an alaskite stock
GILA COUNTY				
Sec. 32 10N, 10E	5	Payson South 7.5'	Ox Box Mine	Fluorspar veinlets with edidote, gold, silver in hornblende diorite
Sec. 20 9N, 13E	6	Buzzard Roost Mesa 7.5'	Jones Barite-Fluorite	Fluorite and barite in vein with iron and manganese oxides between Dripping Spring Quartzite and diabase

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		FLUORSPAR (continued)		
Sec. 20 7N, 11E	7	Picture Mtn. 7.5'	Quartz Ledge Prospect, White Cow	Past production for acid grade concentrates, fluorspar-quartz lenses and veins in granite in Precambrian formation
Sec. 19 7N, 12E	8	Picture Mountain 7.5'	Red Rock	Vein in quartzite
Sec. 35 7N, 13E	9	McFadden Peak 15'	McFadden Peak Fluorspar, Mack Claims, Western Fluorspar Property	Fluorite in vein in quartzite and hornfels with interbedded quartzite; past producer of both acid and metallurgical grade fluorspar
Sec. 36 7N, 14E	10	McFadden Peak 15'	Jerky Group	Vein in Dripping Spring Quartzite
Sec. 9 6N, 11E	11	Greenback Creek 7.5'	Tonto Basin, Packard Claims, Walnut, Bluebird Claims	Past production for acid grade concentrates, fluorspar-quartz lenses and veins in granite in Precambrian formation
Sec. 2 6N, 14E	12	McFadden Peak 15'	Quartzite Claims, Cherry Creek	Brecciated white fluorite; copper mineral bornite in Mescal Limestone
Sec. 36 5N, 16E	13	Blue House Mtn. 15'	Hillside Deposit	A little fluorite with pyrite, calcite, gypsum and uranium minerals in Dripping Spring Quartzite underlain by diabase sill
Sec. 20 1N, 14E	14	Inspiration 7.5'	Castle Dome Copper Mine, Pinto Valley Mine	Fluorspar, barite, copper sulfides in fractured quartz monzonite
GRAHAM COUNTY				
Sec. 20 5S, 20E	15	Cobre Grande 7.5'	Orejana	Siliceous flow breccia containing a little fluorite
Sec. 29 5S, 20E	16	Klondyke 15'	Landsman Group	Purple fluorite stringers, lead-silver values in faulted limestone
MARICOPA COUNTY				
Sec. 31 7N, 6E	17	Humboldt Mtn. 7.5'	Amethyst, Lookout Pat. Claim #1196	Irregular fluorite-quartz veins in granite

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		FLUORSPAR (continued)		
Sec. 12 6N, 5E	18	Humboldt Mtn. 7.5'	Manley Bickle Group	Mineralized zone in Precam-brian granite containing acid feldspar, horn-blende, fluorite, calcite and uranium minerals
Sec. 14 6N, 5E	19	Wildcat Hill 7.5'	May Be Claims	Fluorspar in vein deposit
Sec. 20 6N, 9E	20	Boulder Mtn. 7.5'	Kandarian Fluorspar Prospect	Purple and white fluorite in vein deposit in Precambrian granite
Sec. 18 5N, 8E	21	Maverick Mtn. 7.5'	Muskhog Claims	Fluorspar vein in granite in Precambrian formation
PINAL COUNTY				
Sec. 12 1S, 13E	22	Pinal Ranch 7.5'	Rainbow Group, Clark Claims, Clark Prospect	Fluorite occurring sparsely as minute grains in the greisen and in vugs in the quartz in a stockwork of subparallel veinlets of quartz in a deposit containing tungsten, molybdenum and copper mineralization
Sec. 16 2S, 11E	23	Picketpost Mtn. 7.5'	Gonzales Pass Deposit	Minor fluorspar in barite veins
SANTA CRUZ COUNTY				
Sec. 8 23S, 11E	24	Ruby 15'	Annie Laurie Claims	Purple fluorspar stringers, quartz, calcite, galena and sphalerite in granite
Sec. 3 23S, 16E	25	Harshaw 7.5'	Alta Mine	Reddish fluorite gangue, quartz, silver-lead values in quartz diorite cut by rhyolite dike
Sec. 4 23S, 16E	26	Harshaw 7.5'	Alta	Reddish fluorite and quartz gangue in a base metal replacement deposit in rhyolite
YAVAPAI COUNTY				
Sec. 24 12N, 2W	27	Mt. Union 15'	Venezia	Purple fluorite gangue, copper ores

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		FLUORSPAR (continued)		
Sec. 16 10N, 1W	28	Crown King 7.5'	Springfield Group	Purple fluorite stringers associated with copper oxides, pyrite, in granodiorite intruded by quartz dikes
Sec. 11 10N, 5E	29	Tule Mesa 7.5'	Santa Claus, Christmas Tree Claims	Fluorspar and barite in vein deposit in a red coarse grained granite
		GYPSUM		
COCHISE COUNTY				
Sec. 30 & 32 18S, 19E	1,2	Benson 15'	Whetstone Mtns. Gypsum Deposits	Gypsum beds in Permian Epitah dolomite
Secs. 2, 11, 12, 13, 14 & 15 24S, 19E	3,4,5, 6,7,8	College Peaks 15'	D Hill Area, Gypsite Quarries	Past production for gypsum blocks and plaster; gypsite and gypsum overlying clay and shale
PIMA COUNTY				
Secs. 13 & 14 18S, 15E	9	Sahuarita 15'	Helvetia	Gypsum beds in Permian Epitah dolomite
YAVAPAI COUNTY				
Sec. 18 14N, 6E	10	Camp Verde 7.5'	Clear Creek Gypsum	Gypsum beds in Cenozoic Verde Formation
Sec. 1 13N, 4E	11	Camp Verde 7.5'	Camp Verde Salt Mine, Graham Wing-Field Sulphate	Past production from flat bedded deposit of thenardite, mirabilite, gypsum, glauberite, halite, and clay in Cenozoic Verde Formation
Sec. 11 13N, 5E	12	Camp Verde 7.5'	Larson Quarry, Verde Gypsum	Past production of gypsum from beds in mudstone facies of the Cenozoic Verde Formation; used for cement retarder and agricultural applications
Sec. 22 13N, 5E	13	Camp Verde 7.5'	Wingfield Gypsum Deposit, Wingfield-McLeod Gypsum	Gypsum associated with other salines in mudstone in Cenozoic Verde Formation
Sec. 21 8N, 6E	14	Chalk Mtn. 7.5'	Gypsum and Kaolin Deposit	Gypsum beds in lake sediments with interbedded clays (reportedly kaolin?)

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS

LIMESTONE, DOLOMITE, AND MARBLE

COCHISE COUNTY				
Secs. 28 & 29 16S, 30E	1	Cochise Head 15'	Cochise Marble	Dolomitic marble in Escabrosa Limestone
Sec. 36 23S, 20E	2	Sunnyside 15'	Stump Canyon	Escabrosa Limestone and marble
COCONINO COUNTY				
Secs. 2 & 3 20N,7E (approx)	3,4	Flagstaff West 7.5'		Permian Kaibab Limestone
MARICOPA COUNTY				
Sec. 19 6N, 5E	5	Cave Creek 7.5'	Lone Mtn. Group, White Eacle Mine	Past production, stucco filler, from Tertiary dolomitic limestone
PINAL COUNTY				
Sec. 22 1S, 11E	6	Picketpost Mtn. 7.5'	El Marmol Claims, Superstition Secret Stone Co.	Thick section of lower Merscal Limestone cut by diabase
Sec. 36 1S, 12E	7	Superior 7.5'	Superior	Dolomite in Devonian Martin Formation
Secs. 1 & 6 3S, 12E	8,9	Teapot Mtn. 7.5'	Star of Arizona	Naco Limestone. Large deposit of possible economic interest for production of cement
Secs. 28, 33 & 34 10S, 16E	10,11,12	Campo Bonito 7.5'	Santa Catalina Mtns.	Mississippian Escabrosa Limestone
SANTA CRUZ COUNTY				
Secs. 18 & 19 20S, 14E	13	Mt. Wrightson 15'	Concha	Permian Concha Limestone
Secs. 24 & 25 22S, 17E	14	Canelo Pass 7.5'	Canelo Hills	Paleozoic limestone blocks interbedded in welded tuff
Secs. 29, 30 & 33 22S, 18E	15,16,17			
Sec. 15 23S, 16E	18	Harshaw 7.5'	Mowry Area	Mississippian Escabrosa Limestone

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS

LIMESTONE, DOLOMITE, AND MARBLE (continued)

YAVAPAI COUNTY

Secs. 5 & 6 19N, 1W Sec. 1 19N, 2W	19,20 21	Paulden 7.5'	Limestone Canyon	Mississippian Redwall Limestone
Sec. 32 19N, 1W Sec. 5 18N, 1W	22 23	Paulden 15'	Drake	Active quarry in fresh water Tertiary limestone, used for smokestack scrubbing
Sec. 31 18N, 2E	24	Perkinsville 7.5'	Storey Quarry	Past production of limestone from quarry in the Mississippian Redwall limestone. Production was used for lime manufacture and for metallurgical flux
Secs. 31 & 32 18N, 2E	25	Clarkdale 15'	Perkinsville	Past production, Mississippian Redwall Limestone and dolomitic limestone
Sec. 3 16N, 2E	26	Clarkdale 7.5'	Phoenix Cement Co. Claims	Limestone deposit held for future reserves for cement manufacture
Sec. 11 16N, 2E	27	Munds Draw 7.5'	Clarkdale Quarry	Quarry, Mississippian Redwall Limestone processed for cement and sugar refining
Sec. 16 16N, 2E	28	Munds Draw 7.5'	Limestone Quarries, Divide	Limestone quarry
Sec. 22 10N, 5E	29	Bloody Basin 7.5'	Marble Mine, White Castle	Past producer of marble or onyx. White marble crushed for decorative uses and filler

MICA

GRAHAM COUNTY

Sec. 25 8S, 22E	1	Blue Jay Peak 7.5'	Snowrock Claims	Muscovite in pegmatite with quartz and feldspar
Sec. 10 9S, 23E	2	Webb Peak 7.5'	Twilight and Grey Groups	Mica and scattered beryl in pegmatite in granite

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		MICA (continued)		
MARICOPA COUNTY				
Sec. 8 7N, 9E	3	Reno Pass 7.5'	Oneida, Ward Group	Sericite mica schists, locally impregnated with cinnabar
YAVAPAI COUNTY				
Sec. 24 17N, 6W	4	Camp Wood 15'	Camp Wood	Pegmatite containing mica
Sec. 28 11N, 1E	5	Battle Flat 7.5'	Last Found	Muscovite mica in small, irregular unzoned simple pegmatites
Sec. 26 10N, 1W	6	Crown King 7.5'	Kale Group Luke Hoist Area	Simple poorly zoned pegmatites containing muscovite mica
Sec. 6 10N, 1E	7	Crown King 7.5'	Muscovite Mine, B.A.R.R. 4 Mica, Vasser Mica	Past production of muscovite mica from poorly zoned pegmatite dike
Sec. 19 10N, 1E	8	Crown King 7.5'	Black Magic Mine	Past production, muscovite books in pegmatite
		PERLITE		
GREENLEE COUNTY				
South half of 1N, 30E	1	Dutch Blue Creek 7.5'	Rousensock Creek	Perlite, pumice in quartz latite and rhyolite
Sec. 10 3S, 29E	2	Clifton 15'	Granville Area	Gray to black perlite and agglomerate
PINAL COUNTY				
Secs. 19, 20, 29, 30 1S, 12E	3	Picketpost Mtn. 7.5'	Snow White	Gray, relatively massive perlite with little or no "onion" perlite
Sec. 2 2S, 11E	4	Picketpost Mtn. 7.5'	Driftwood, Driftwood Ext.	"Onion" perlite deposit; past production for filter aid
Secs. 7, 8 & 17 2S, 12E	5,6,7	Picketpost Mtn. 7.5'	Arnett and Telegraph Canyons	Perlite outcrops

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		PERLITE (continued)		
Sec. 8 2S, 12E	6	Picketpost Mtn. 7.5'	Apache Tears Deposit	Perlite deposit containing "Apache Tears: gemstones; a variety of marekanite
Secs. 8 & 9 2S, 12E	6,8	Picketpost Mtn. 7.5'	Mary Ann Mine, Chemi-cote Mine	Past producer; glassy perlitic flows underlying rhyolite; used for soil conditioners, light-weight aggregate, plaster mix and expanded for use as insulation material
Sec. 9 2S, 12E	8	Superior 7.5'	Adams Mine, Iberri Mine	Past production for plaster mix, soil conditioner and light weight aggregate
Sec. 9 2S, 12E	8	Picketpost Mtn. 7.5'	Superior Obsidian, Boyer Claims	Perlite and obsidian occurrence
Secs. 9 & 16 2S, 12E	8,9	Picketpost Mtn. 7.5'	Chicago Pit, Old Cliff	Past producer; perlite produced for filter aid; same occurrence as Mary Ann Mine
Sec. 12 2S, 12E	10	Picketpost Mtn. 7.5'	Talley-Barnett Claims	"Onion" perlite deposit
Sec. 15 2S, 12E	11	Superior 7.5'	Antone Claims	"Dark" perlite
Sec. 16 2S, 12E	9	Picketpost Mtn. 7.5'	Cottonwood, Self Protection	Continuation of perlite deposits
Sec. 18 2S, 12E	12	Picketpost Mtn. 7.5'	Picketpost Mtn.	Glassy perlitic flows, underlies glassy rhyolite and overlies tuff and breccia
		PUMICE GROUP		
COCONINO COUNTY				
Secs. 2, 3, 11 & 12 24N, 8E	1,2,3,4	O'Leary Peak 7.5'	Deadman Wash Area	Pumice and cinders
Sec. 13,14 23 & 24 23N, 7E	5,6,7,8	Sunset Crater West 7.5'	More Sand and Moon Sand, Sugarloaf Mtn. Area	Production of white pumiceous rhyolite ash used for pozzolan
Sec. 10 23N, 8E	9	O'Leary Peak 7.5'	O'Leary Peak	Rhyolitic pumice

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
		PUMICE GROUP (continued)		
Sec. 19 23N, 8E	10	Sunset Crater West 7.5'	Sunset Crater Pumice, Bonner Pozzolan	Production and past production of white pumiceous rhyolite ash used for pozzolan
Sec. 31 23N, 8E	11	Sunset Crater West 7.5'	Bosley Deposit	Decomposed rhyolitic pumice
Sec. 3 22N, 2E	12	Williams 15'	Pouquette	Pumice deposit
Secs. 3 & 4 21N, 2E	13,14	Bill Williams Mtn. 15'	Arizona Mine, Old Williams, Bill Williams Pumice & Pumice No. 1	Past production of rhyolitic pumice for building blocks, and red volcanic cinders
GREENLEE COUNTY				
Sec. 25 4S, 31E	15	Big Lue Mtns. 15'	Big Lue Mtns. No. 1 Quarry	Pumice outcrops
Sec. 20 4S, 32E	16	Big Lue Mtns. 15'	Big Lue Mtns. No. 1 Gravel Pit	Pumice outcrops
Sec. 29 4S, 32E	17	Big Lue Mtns. 15'	Big Lue Mtns. No. 2 Gravel Pit	Pumice outcrops
MARICOPA COUNTY				
Sec. 8 2N, 9E	18	Mormon Flat 7.5'	Tuff Mine, Concrete Industries	Past production. Volcanic tuff in extensive beds; used as lightweight aggregate
SANTA CRUZ COUNTY				
Sec. 24 23S, 12E	19	Ruby 15'	Pumice Group	Pumicite outcrops
YAVAPAI COUNTY				
Sec. 35 11N, 2W	20	Walnut Grove 7.5'	Remington Non-Metallic Prop.	Fine grained white pumice
			SALT	
YAVAPAI COUNTY				
Sec. 1 13N, 4E	1	Camp Verde 7.5'	Camp Verde Salt Mine	Past production of halite for cattle feed, with mirabilite and thenardite in old lake bed

SILICA, QUARTZ, AND QUARTZITE

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
COCHISE COUNTY				
Secs. 17 & 20 16S, 30E	1,2	Cochise Head 15'	Indian Creek	Quartz masses
Sec. 24 18S, 19E	3	McGrew Spring 7.5'	Ricketts Quarry	Past production; bull quartz masses in alaskite and quartz monzonite
Sec. 14 23S, 20E	4	Sunnyside 15'	Tungsten Reef Mine	Quartz veins with gold and silver
Sec. 12 24S, 20E	5	Montezuma Pass 7.5'	Tracey Mine	Quartz vein in granite; possible use as copper smelter flux
GILA COUNTY				
Sec. 20 10N, 11E	6	McDonald Mtn. 7.5'	Beauty 1-7	Quartz dike 300-500 ft wide containing massive quartz, quartz crystals, amethyst and agate
GREENLEE COUNTY				
Sec. 28 3S, 28E	7	Clifton 15'	Willis Mine, Harmony No. 1	Past producer. Coronado Quartzite in Cambrian formation used for smelter flux
Sec. 8 3S, 30E	8	Clifton 15'	Independence, Big Medicine, White Property, Henry Ford, Greenlee Gold	Siliceous base and precious metal vein
MARICOPA COUNTY				
Secs. 14 & 15 6N, 9E	9,10	Boulder Mtn. 15'	Harrison Deposit, Dixie Claims	Quartz veins
PIMA COUNTY				
Sec. 24 19S, 18E	11	Apache Peak 7.5'	Copper Plate Mine	Past producer of copper-silver bearing silica flux for copper smelter
PINAL COUNTY				
Sec. 22 2S, 11E	12	Mineral Mtn. 7.5'	Reymert, Alaska Shaft, Australia, Denoon Property, Devoux Property	Epithermal silver manganese vein system; high silica-silver zones currently being mined for copper smelter flux

SILICA, QUARTZ, AND QUARTZITE (continued)

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
Secs. 19 & 20 10S, 16E	13,14	Campo Bonito 7.5'	Southern Belle, Careless, Cross Town, Apache Girl, Dolphin, Apache Peak Cons. Mng. Co., Jim Douglas, Fortuna, Aravaipa Metals	Auriferous silica fluxing ores mined for copper smelter flux; past production from quartz veins
SANTA CRUZ COUNTY				
Sec. 36 22S, 15E	15	Nogales 15'	Old Timer, George Morris Gold Claim, Homestake	Siliceous gold ore; possibly source of flux for copper smelters
Sec. 2 24S, 16E	16	Lochiel 15'	Bonanza	Small pockets of quartz crystals in base-precious metal replacement deposit
YAVAPAI COUNTY				
Sec. 28 18N, 1E	17	Hell Point 7.5'	United States, Supai Claims	Copper carbonates in paleozoic sandstones; past production of siliceous copper ores for copper smelter flux
Sec. 26 16N, 7W	18	Camp Wood 15'	Black Magic, Mary D, Joy, Black Diamond	Coarsely crystalline grayish-white quartz as vein fillings 3 in. to 10 ft in width
Sec. 5 14N, 2E	19	Humboldt 7.5'	Shylock	Siliceous base and precious metal mineralization along fault in Precambrian schist series
Sec. 10 14N, 3E	20	Cherry 7.5'	Etta	Lenses of coarsely crystalline white quartz
Sec. 13 13N, 1.5E	21	Humboldt 7.5'	Atlas Copper, Cheryl Prop., Bauman Prop., Humboldt Copper	Siliceous copper-gold-silver mineralization; past production of fluxing ores
Sec. 36 12.5N, 2W	22	Groom Creek 7.5'	Cash, Senator Cash	Reported occurrence of quartz crystals at base and precious metal vein deposit
Sec. 13 12N, 2W	23	Mt. Union 15'	Cash Mine	Quartz crystals, adularia, calcite in fractured granite

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
SILICA, QUARTZ, AND QUARTZITE (continued)				
Sec. 32 12N, 2E	24	Mayer 7.5'	Iowa Group, Roese Mining Co. Property	Past production of siliceous copper ores for copper smelter flux; copper mineralization in ferruginous chert unit
Sec. 28 11N, 1E	25	Battle Flat 7.5'	Last Found	Massive quartz in unzoned pegmatite
Sec. 33 10N, 1W	26	Crown King 7.5'	Wansfell	Quartz vein containing gold-copper mineralization; possible source of siliceous ores for copper smelter flux
SILLIMANITE GROUP				
YAVAPAI COUNTY				
Sec. 6 11N, 1E	1	Mt. Union 15'	Mule Canyon	Andalusite occurrence
Sec. 20 11N, 1E	2	Battle Flat 7.5'	Middleton Andalusite	Andalusite and kyanite occur in widely separated small pockets and pods at contacts between small, discontinuous quartz dikes and schist
North half of 10N, 1E	3	Mayer 7.5'	-----	Andalusite occurrence
SODIUM SULFATE				
YAVAPAI COUNTY				
Sec. 19 13N, 5E	1	Horner Mtn. 7.5'		Past production; thenardite in Cenozoic Verde Formation
STRONTIUM				
MARICOPA COUNTY				
Sec. 29 2N, 8E	1	Goldfield 7.5'	Coyote Claim	Shear zone in andesite containing lead, zinc, silver, manganese and strontium
VERMICULITE				
PINAL COUNTY				
Sec. 10 10S, 15E	1	Oracle 15'	Irene Wash, Little Matty Claims	Vermiculite occurrence

LOCATION	MAP NO.	QUADRANGLE MAP	KNOWN NAMES	DESCRIPTION-COMMENTS
WOLLASTONITE				
PIMA COUNTY				
Secs. 25 & 36 18S, 15E	1,2	Sahuarita 7.5'	Santa Rita Mtns.	Wollastonite and garnet in metamorphosed limestome
ZEOLITES				
GILA COUNTY				
Sec. 12 6N, 10E	1	Tonto Basin 7.5'	Tonto Basin Chabazite Deposit	Chabazite in six distinct lithologies - all altered ashy tuffs; also contains traces of clinoptilolite
Sec. 35 6N, 11E	2	Greenback Creek 7.5'	Tonto Basin East Deposit	Chabazite in pinkish-white altered vitric tuff
Sec. 34 5N, 12E	3	Windy Hill 7.5'	Roosevelt Lake Phillipsite	Phillipsite in altered vitric ash
Sec. 31 5N, 13E	4	Windy Hill 7.5'	Dager Ranch Chabazite Deposit	Chabazite bed in brownish-white altered vitric tuff
Sec. 4 4N, 13E	5	Windy Hill 7.5'	Roosevelt Lake Chabazite Deposit	Chabazite in three distinct lithologies: 1) altered vitric tuff, 2) altered ashy mudstone, and 3) altered ashy tuff
GREENLEE COUNTY				
Sec. 16 3S, 29E	6	Clifton 15'	Morenci Mordenite	Clinoptilolite and mordenite in lapilli and tuff in Tertiary formation
MARICOPA COUNTY				
Sec. 12 7N, 6E	7	Horseshoe Dam 7.5'	Horseshoe Dam, Clinoptilolite	Clinoptilolite in tuff of Verde Formation or a Cretaceous unit