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CHRYSOTILE-ASBESTOS DEPOSITS OF ARIZONA

(SUPPLEMENT TO INFORMATION CIRCULAR 7706)

BY L. A. STEWART

United States Department of the Interior—May 1956

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UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF MINES
Thos. H. Miller, Acting Director

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L. A. Stewart[1/]

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1/ Mining engineer, Bureau of Mines, Tucson, Ariz.

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INTRODUCTION

This paper is one of a series covering the mineral resources of the Nation. It supplements Bureau of Mines Information Circular 7706, Chrysotile-Asbestos Deposits of Arizona, by the same author. The 18 additional properties that were examined after release of the former circular are described in this report, virtually completing the list of known asbestos properties in Arizona. The general location map (fig. 1) shows the statewide distribution and indicates the concentration of deposits around Globe.

With few exceptions the properties described are on unsurveyed land, but the stated approximate locations have been determined by appropriate projections. The township and range numbers refer to the Gila and Salt River base and meridian. All the deposits discussed are on unpatented mining claims.

The history of production of asbestos in Arizona, origin, varieties, mode of occurrence, uses, and mining methods are covered in some detail in the earlier publication.2/

ACKNOWLEDGMENTS

The writer acknowledges the willing cooperation of the various owners and operators in collecting information concerning their various properties and granting permission to publish this material. Special acknowledgment is due A. F. Shride, Federal Geological Survey, for his interpretation of stratigraphy.

ASBESTOS MINING DISTRICTS

There are no organized asbestos-mining districts in the Central Arizona region. For the purpose of these reports the writer has assigned limits to the Salt River, Sierra Ancha, and Globe districts (fig. 2). Two deposits so situated as not to be logically included within the above districts are placed under a Miscellaneous heading.

The locations of most of the deposits discussed in this report and in Information Circular 7706 are shown on figure 3.

GENERAL GEOLOGY

Central Arizona Region

The Central Arizona region is a broad term that embraces the areas containing all the chrysotile-asbestos occurrences except those in the Grand Canyon to the north and two deposits to the southeast.

2/ Stewart, L. A., Chrysotile-Asbestos Deposits of Arizona: Bureau of Mines Inf. Circ. 7706, 1955, 124 pp.

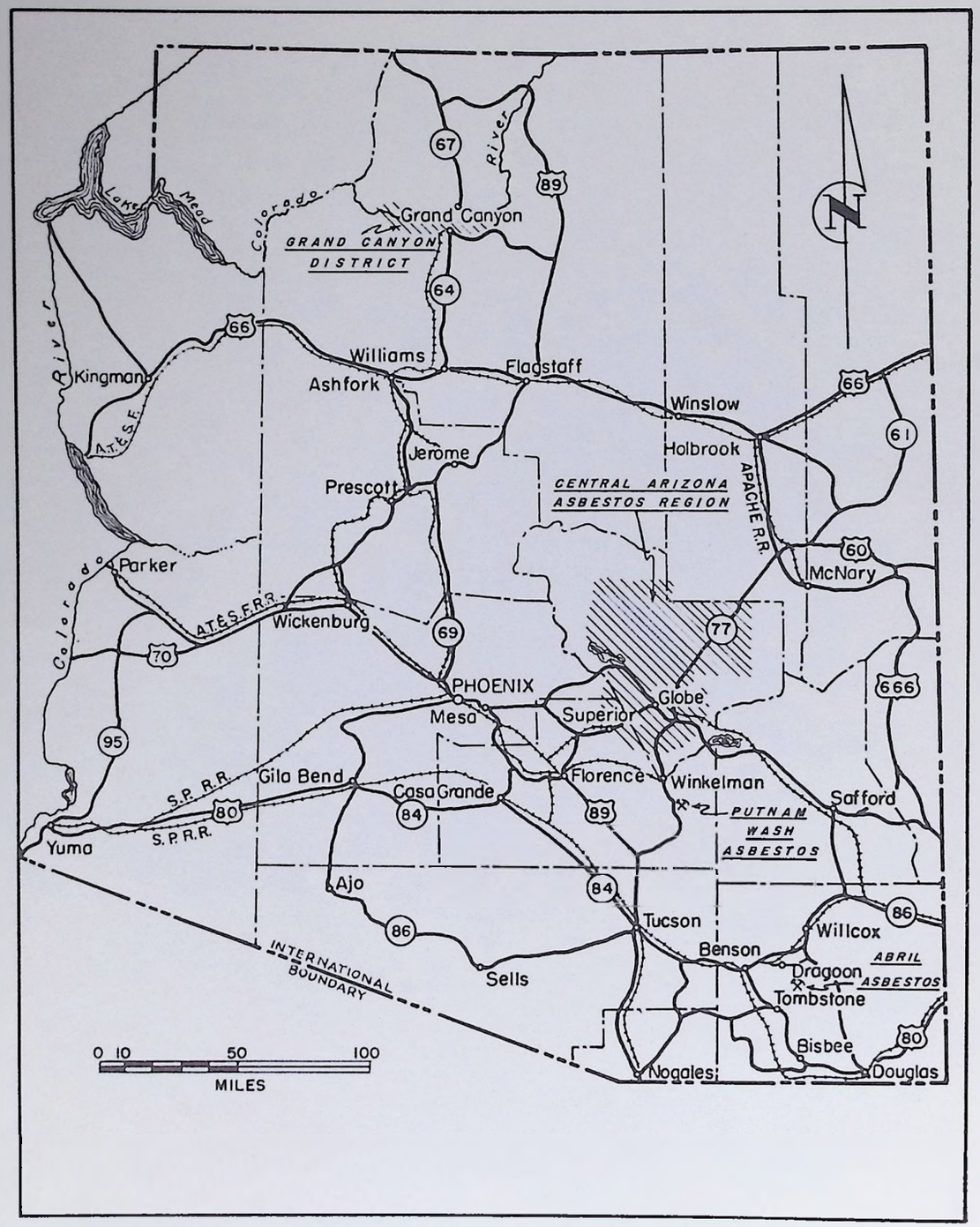


Figure 1. - General location map of Arizona chrysotile occurrences.

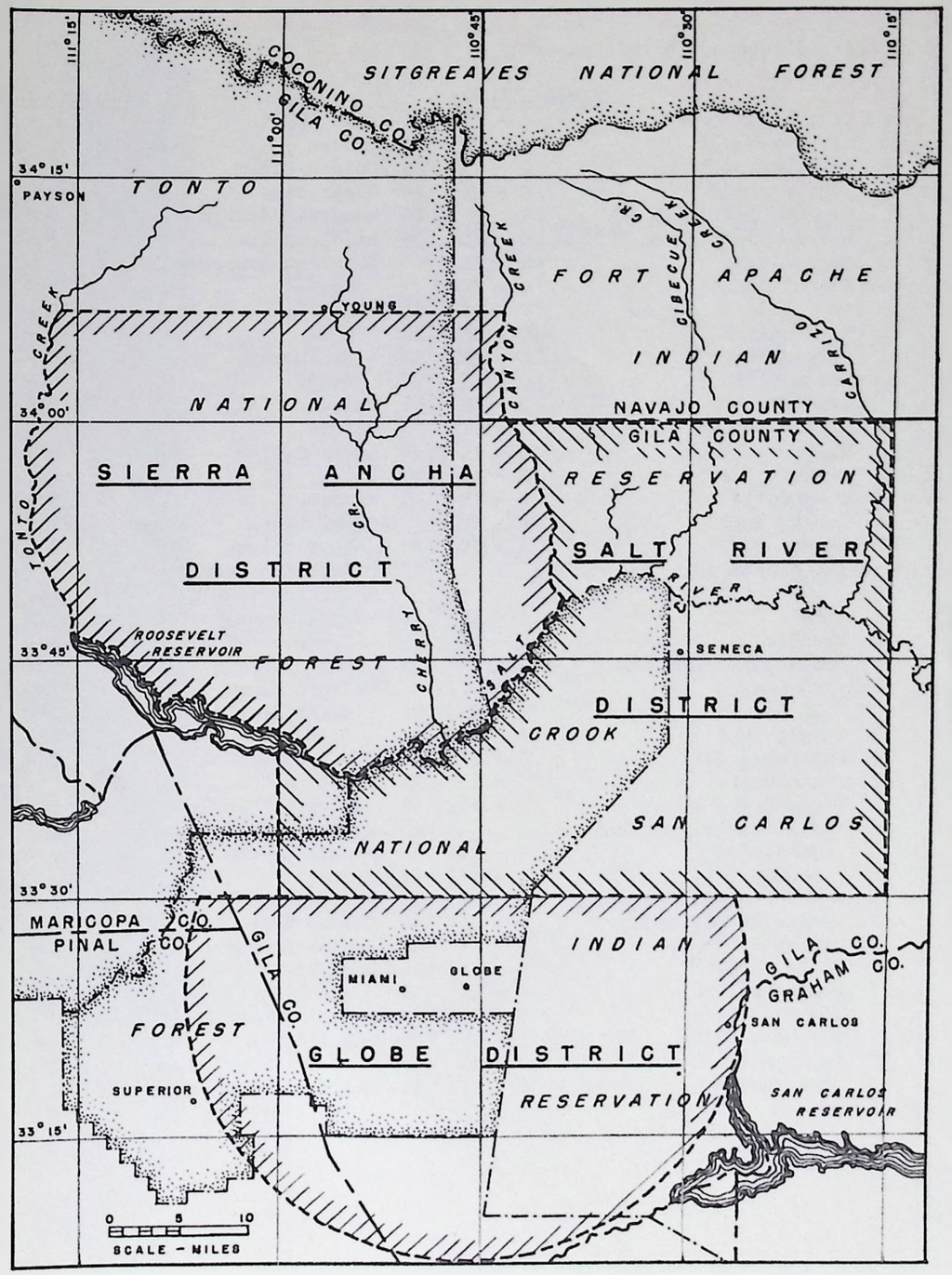


Figure 2. - Asbestos mining districts, central Arizona.

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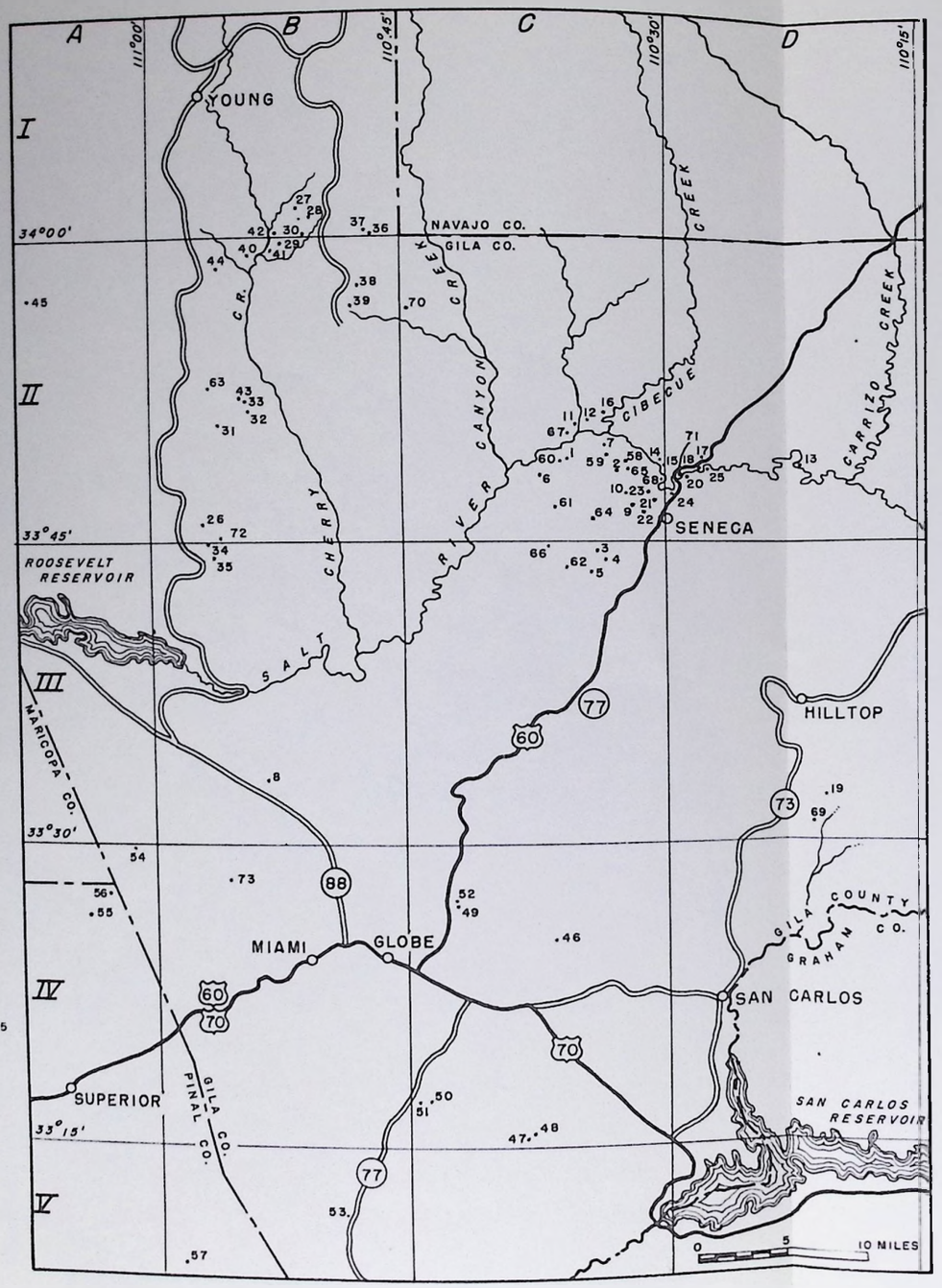


Figure 3. - Location map—asbestos deposits, central Arizona region.

Key to mine locations - figure 3

Deposits discussed in this paper

		Finding index
58	Salt River group	C - II
59	River group	C - II
60	Cliffbestos group	C - II
61	Wonder group	C - II
	Cibecue Mining Co.	Fig. 8
62	Little Favor group	C - III
63	Rosa claims	B - II
64	Alamo claims	C - II
65	Oso claim	C - II
66	Ruiz claims	C - III
67	Fiber King	C - II
68	Dream Girl	C - II
69	Cassadore	D - III
70	Double Buttes	C - II
71	Bluff claims	D - II
72	Loafer claim	B - II
73	Chuckwalla	B - IV
74	Lucky Lager	A - IV
75	El Marmol	A - IV

Deposits discussed in IC - 7706

1	Regal	C - II
2	Canadian	C - II
	Western Chemical Co.	
3	Victory	C - III
4	El Dorado	C - III
5	Triple Star	C - III
6	Fourth of July	C - II
7	Punto Negro	C - II
8	G and H No. 1	B - III
	Phillips Asbestos Co.	
9	Grandview	C - III
10	Ladder	C - III
11	Apache (Crown Asbestos)	C - II
12	Apache Extension	C - II
13	Stansbury	D - II
14	Horse Shoe	C - II
15	White Tail No. 2	C - II
16	Loey and Lena	C - II
17	Prochnow (Cibecue Mng.Co.)	D - II
18	Snake Hill	D - II
19	Bear Canyon	D - III
20	Sorsen	D - II
21	Pine Top	C - II
22	Emsco	C - II
23	Golden Fiber	C - II
24	Great View	D - II
25	Wonder and Silk	D - II
26	American Ores	B - II
	American Asbestos Cement Co.	Fig. 25
27	No. 1	B - I
28	Home	B - I
29	Buckhorn	B - II
30	Tony	B - I
31	Reynolds Falls	B - II
32	Pueblo	B - II
33	Lucky Strike	B - II
34	Globe	B - III
35	Miami	B - III
	Sloan Creek	Fig. 31
36	Last Chance	B - I
37	American Beauty	B - I
	American Fiber Co.	Fig. 33
38	Rock House, north group	B - II
39	May	B - II
	Melrose Mines	Fig. 36
40	White Beauty	B - II
41	J. W.	B - II
42	Man O'War	B - I
43	Metate No. 1	B - II
44	Bore Tree Saddle	B - II
45	Independent (Conway)	A - II
46	Metate Apache	C - IV
47	Mystery	C - IV
48	Chiricahua	C - IV
49	Chromo Butte	C - IV
50	Indian Springs	C - IV
51	Lone Pine	C - IV
52	G and H No. 2	C - IV
53	Mescal Mountain	B - V
54	Shackelford	A - IV
55	Kennedy (See Fig. 40)	A - IV
56	North American	A - IV
57	Ray Southern	B - V

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The asbestos-bearing strata are in the Mescal limestone formation of the Apache group, which from bottom to top consists of the Scanlon conglomerate, Pioneer shale, Barnes conglomerate, Dripping Spring quartzite, Mescal limestone, and Troy quartzite. The latter formation is Cambrian, the remainder are pre-Cambrian.

In this region (fig. 4) only the three upper formations of the Apache group have been extensively exposed by erosion. The Mescal limestone is divisible into three members: A lower member 175 to 200 feet thick; an algal member 80 to 150 feet thick; and an upper member 10 to 80 feet thick, composed of siltstone, shales, and shaly limestone.

In the lower member the individual beds vary from 1 inch to as much as 6 feet thick. The thin beds are of impure dolomitic limestone; the thicker, more massive beds are of relatively pure crystalline limestone. Some of the limestone strata contain nodules and masses of chert. Most of the massive beds occur within the topmost 45 feet of this member.

Overlying the lower member, the so-called algal member is massive-bedded and usually is composed almost entirely of spheroidal masses that have a concentric, shell-like structure with a maximum diameter of several inches. This member generally forms cliffs and is the only readily recognized horizon marker in the Mescal. At a few places in the region the upper beds lack the algal structure, and the bedding planes are smooth, rather than wavy.

The upper member consists of layers of siltstone (usually brown to black), thin shale, and sandy or shaly limestone beds. This member is present in only a few places in the region.

The Apache group has been intruded by diabase sills a few inches to several hundred feet thick. These sills usually are found along bedding planes, but locally they cut across the bedding. Diabase dikes, most of which are only a few feet wide, have been intruded into the limestone.

The general geology of the region is indicated on figures 4 and 5, which has been copied with slight modifications from a portion of the Geologic Map of Arizona.3/ With a few exceptions all the known asbestos deposits of Arizona are situated within the area covered by figure 4.

ASBESTOS GRADING

The Arizona standard of classification of crudes is as follows:

Crude grade	Length of fiber	
No. 1	3/4 inch or longer	) Spinning
No. 2	3/8 inch to 3/4 inch	) fibers
No. 3	1/8 inch to 3/8 inch	
No. 4	Less than 1/8 inch	

In the early day operations the asbestos was hand cobbed, limiting the production to the two higher grades. A number of small cruding mills were erected after 1923, most of which had a short span of life. Gradually a more or less standardized simple mill evolved, consisting of a crusher, one or two sets of rolls, and a sizing screen. These mills were capable of producing mechanically cobbed crude fiber.

3/ Arizona Bureau of Mines and Federal Geological Survey, Geologic Map of Arizona, 1928.

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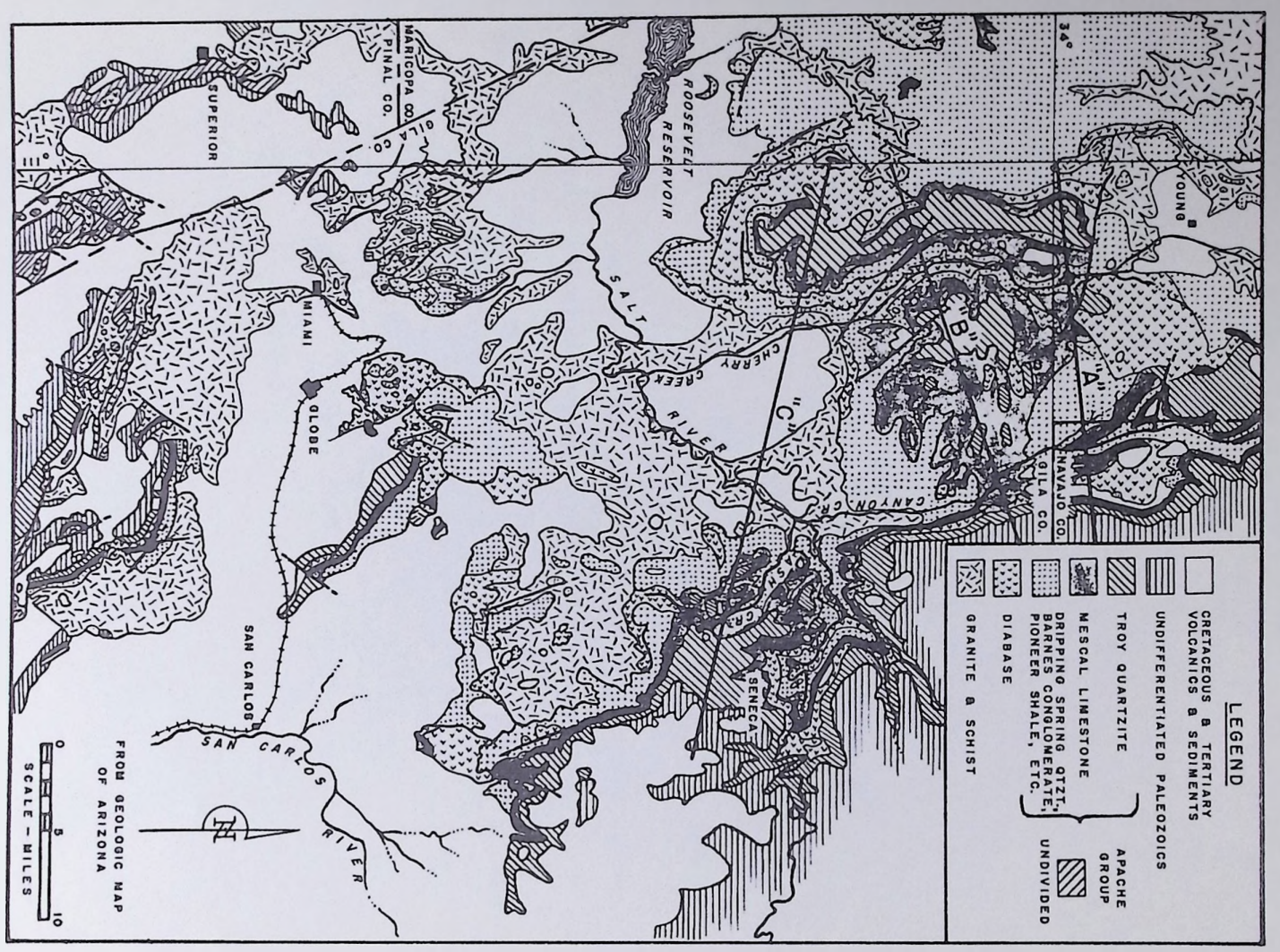


Figure 4. - Geologic map of the central Arizona asbestos region.

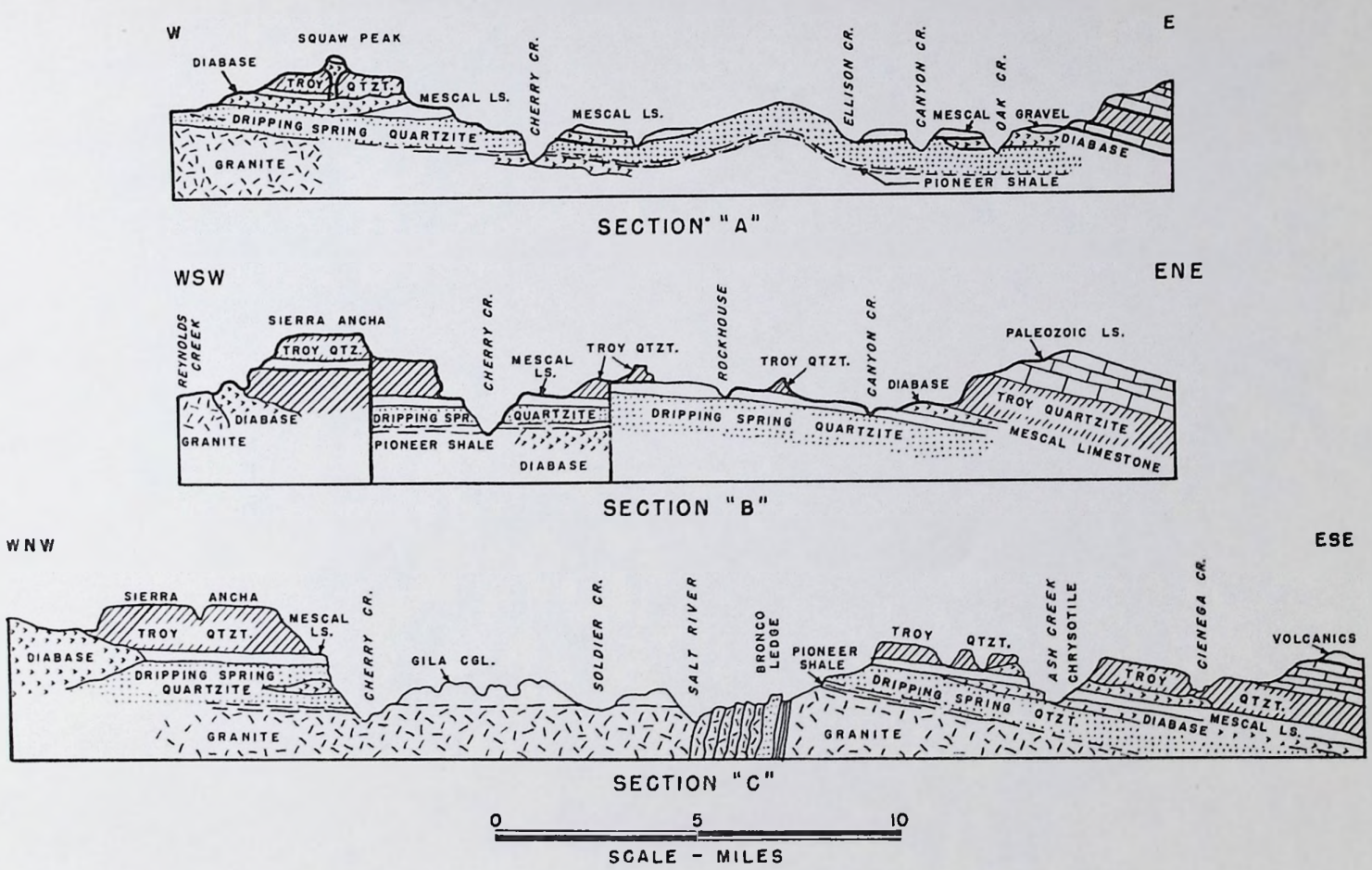


Figure 5. - Sections across the asbestos region. After N. H. Darton, Arizona Bureau of Mines Bull. 119, p. 229.

Chrysotile-Asbestos Deposits of Arizona (Supplement to Information Circular 7706) (1956)
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Some of the more recently built mills have added fiberizing equipment in addition to the cruding section. One of the larger mills is shown in figure 6. By processing the shorter fibers, various grades of milled fiber are produced. The material that is fiberized is graded according to the standard Canadian Classification, which is detailed in The Asbestos Industry 4/ and various technical articles dealing with asbestos milling. It also is briefly discussed in Information Circular 7706.5/

DESCRIPTIVE TERMS USED

In the following discussions the term "bone" is applied to a band or layer of serpentine in which the change to asbestos apparently was arrested in the initial stage. It may contain only minute traces of fiber or may have a considerable quantity of tufts of short fibers within the matrix of serpentine.

For the sake of convenience the anomalous term "roll" often is used to signify a crosscutting diabase sill without implying that the limestone was necessarily folded.

Spicular refers to the type of asbestos in which the fibers are not coherent; they tend to break away from the mass of the vein in tiny bundles. When mining this type of chrysotile much of the fiber is lost in the waste.

ESTIMATE OF FIBER CONTENT

Theoretically a 1-inch vein of fiber throughout 1,000 square feet of area will produce 6.5 tons of asbestos (all grades). A rough approximation of the fiber content of any given area can be made by determining the average cumulative thickness (in inches) of all fiber veins in the ore zone and applying the above factor.

SALT RIVER DISTRICT

For the purpose of this report the limits of the Salt River district are as shown on figure 2.

The Salt River and its tributaries have deeply dissected the nearly horizontal strata of the Apache group and the overlying Paleozoic formations. The Troy and Dripping Spring quartzites are great cliffmakers and form the sides of many canyons, and because the Mescal limestone lies between these formations it is often exposed on the steep canyon walls. Numerous asbestos deposits have been found in areas where this limestone has been intruded by diabase.

The detailed location of deposits discussed under this district are shown on figure 7.

Public Domain

Salt River Group

The Salt River group of four contiguous claims is owned by Roger Kyle under the firm name of Kyle Asbestos Mines of Arizona. The claims are situated on the

4/ Bowles, Oliver, The Asbestos Industry: Bureau of Mines Bull. 552, 1955, 122 pp.

5/ Stewart, L. A., Chrysotile-Asbestos Deposits of Arizona: Bureau of Mines Inf. Circ. 7706, 1955, 124 pp.

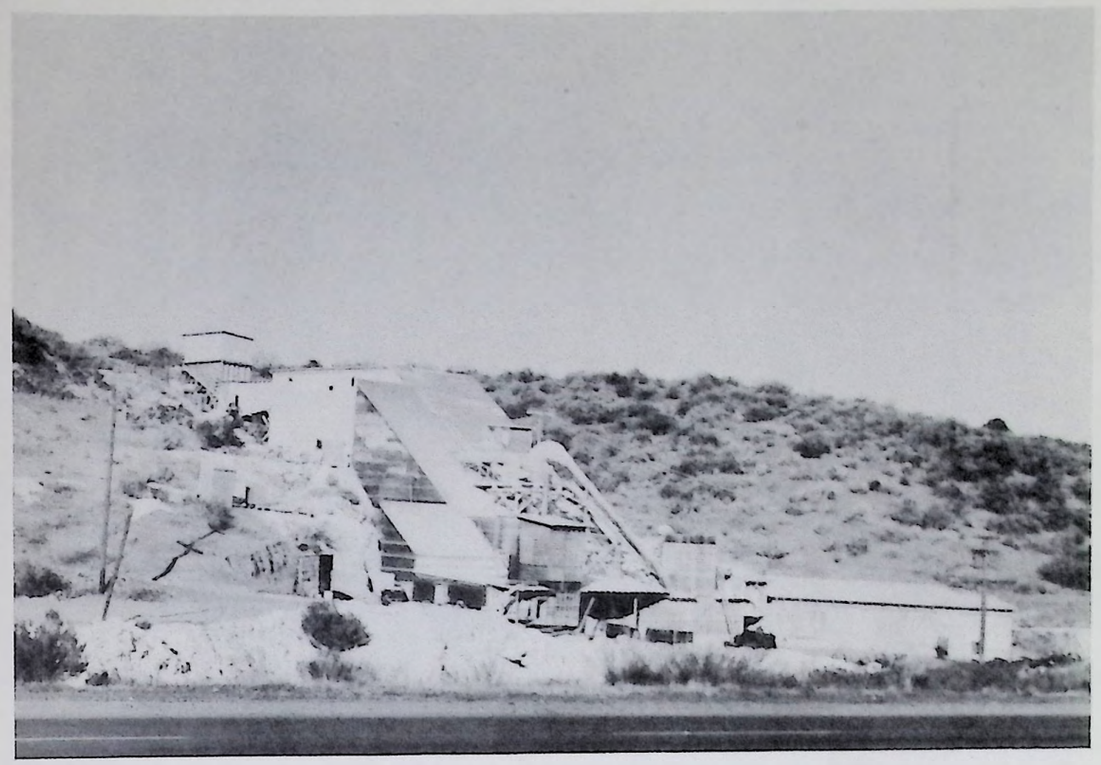


Figure 6. - Asbestos mill of the Jaquays Mining Corp. at Globe, Ariz.

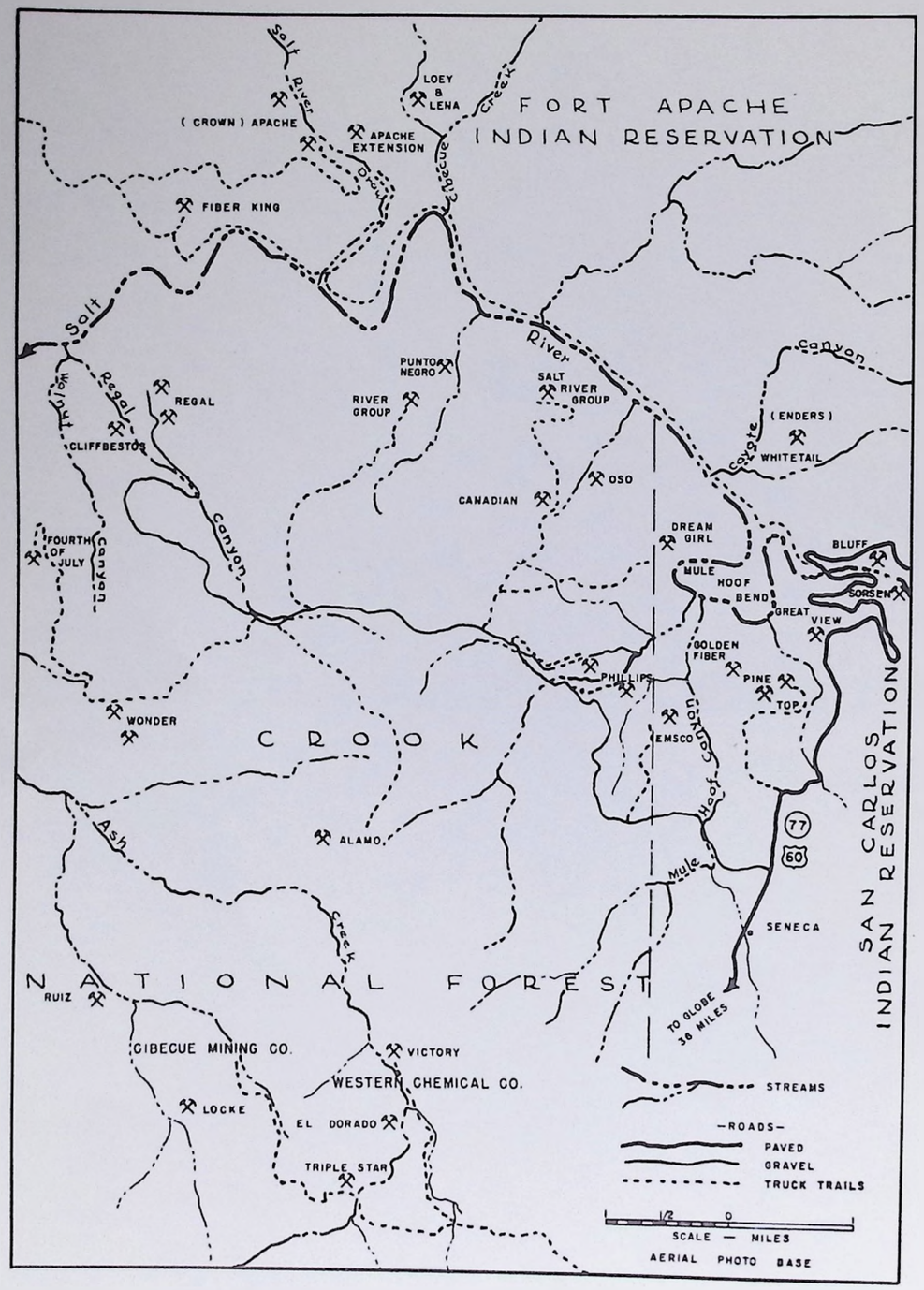


Figure 7. - Mine location map, major part of Salt River district.

south wall of Salt River Canyon below and north of the Canadian mine (Asbestos King claims). The property is in the Crook National Forest in approximate sec. 4, T. 5 N , R. 17 E., unsurveyed. The claims are accessible by turning north from the Regal road 4 miles from U. S. Highway 60, passing the Canadian mine, and continuing for 1 mile down a steep pilot road.

The claims were originally located by Kyle in 1922, and amended locations were recorded in 1935.

Geologic Setting

The steep-sided canyon of Salt River, which here is 3,000 feet deep and about 3 miles wide, exposes Troy quartzite, Mescal limestone, and Dripping Spring quartzite on the south side. Thick diabase sills intrude the latter two formations.

The 100-foot-thick limestone section that outcrops inside the north end of the claims lies under a thick diabase sill and rests on a section of Dripping Spring quartzite, which is underlain by diabase that goes to river level. The top of the quartzite member is about 650 feet above the river. The quartzite and limestone form steep cliffs. Asbestos-bearing zones are situated about halfway up in the limestone section at an altitude of approximately 3,900 feet.

The claims are numbered 1 to 4 from east to west. The camp site on claim 1 is near a perennial spring. No significant mineralization has been found on this claim. The limestone ledge where prospected on claim 2 is slumped and broken, but on claim 3 the formation is more massive and regular. Discordant diabase cuts through the limestone on the west side of this claim.

The boundary between claims 3 and 4 is cut by a steep-sided, rugged canyon, and the limestone section on the west side appears to differ from that on the other claims. The workings of claim 4 were not inspected, but the 2 adits appear to be in algal limestone.

Mine Workings

Claim 2

The workings on claim 2 are in the cliff face about 100 yards north of the pilot road. Three adits have prospected approximately 100 feet of outcrop, which consists of slumped and recemented blocks of weathered limestone. The west adit is caved, but 1/2 inch of short, harsh fiber shows at the portal. The middle adit was driven 30 feet southeastward, encountering tilted blocks that displace the 2 mineralized zones. The general dip of the blocks is 10° to 15° SE. The upper serpentine band at the best exposure contains 2 inches of soft fiber, part of which is in 1-inch strands. A second zone, 3 feet lower, contains 1/2 inch of asbestos at the bottom of a 6-inch serpentine zone. These zones pass into the floor near the face of the adit. Twenty feet east a parallel adit is in shaly beds approximately 10 feet higher in the section. A 4-inch serpentinized zone contains 1/2 to 1 inch of short, weathered fiber. The adit is caved 15 feet from the portal but is said to have been 35 feet long. The beds dip 20° E.

Claim 3

The workings on claim 3 are east of the end of the pilot road. An ore zone containing fiber that is surficially weathered has been exposed by 300 feet of dozed bench cut. At the west end of the bench a southwest-trending adit has been

driven carrying the fiber zone in the back. The adit is caved 50 feet from the portal but was said to have extended 75 feet deeper. A small stope on the east side 15 feet from the portal exposes a 4-inch serpentine band containing 1 inch of fiber in several veinlets. Beyond this stope the width of the serpentine zone increases to 8 inches, containing a total of 2 inches of asbestos, some of which is 1 inch long.

Two adits, one east and one south of the portal, have the same ore zone at floor level. Each has broken through to the main adit. The asbestos of this deposit, where unweathered away from surface, is somewhat spicular but fiberizes semisoft.

Claim 4

Two adits are visible across a precipitous gulch. These were not examined, but Kyle stated that 1 of them was 40 feet long in algal limestone and showed harsh fiber.

River Group

The River group of eight contiguous claims is owned by Roger Kyle under the firm name of Kyle Asbestos Mines of Arizona. The claims are located on the south wall of Salt River Canyon almost due south of the junction of Cibecue Creek and Salt River and 1-1/2 air miles northwest of the Canadian mine. The property is in the Crook National Forest in approximate sec. 32, T. 6 N., R. 17 E., unsurveyed. Claims 1 and 3 are accessible by turning north from the Regal road 5.7 miles from U. S Highway 60 and traveling north. The workings of claim 1 are 2.0 miles up and just east of the road; the road ends in 2.4 miles, and the No. 3 adit is 100 yards to the north. These workings are at an altitude of approximately 4,850 feet. This group was located by Kyle in 1935.

Geologic Setting

At this location the south side of Salt River Canyon exposes Dripping Spring quartzite and Mescal limestone formations, both of which are intruded by several thick diabase sills. Troy quartzite caps the high canyon rim.

Claims 1 and 3 cover a narrow promontory jutting northeast from the main mountain. The top of this ridge is a thin erosional remnant of limestone less than 1,000 feet wide and about one-half mile long cut off on all sides by topography and underlain by a thick diabase sill. Troy quartzite caps part of the limestone.

On the south end (claim 1) the diabase underlies 10 feet of the lower Mescal member, above which only about 35 feet of algal limestone is present overlain by Troy quartzite. At the north end of the ridge (claim 3) only 25 feet of algal limestone lies between the diabase and Troy quartzite. In this locality the limestone does not contain the usual algal structures.

The camp site is situated on claim 2, and there is a perennial spring on claim 4. Neither of these claims contains asbestos mineralization.

The remaining 4 claims lie along the segment of limestone beneath the diabase sill some 200 feet lower on the hillside. As only desultory prospecting has been done on this lower limestone, these claims were not examined.

Mine Workings

Claim No. 1

In essentially level bedded limestone, a 65-foot adit has been driven on an 8-inch, weakly serpentinized zone immediately under the base of the algal member and 10 feet above the concordant diabase contact. At the portal, the serpentine band contains several narrow veinlets of asbestos, but this mineralization pinches out within the adit.

Claim No. 3

A 10-foot trench trending S. 30° W. has been excavated in the top of the cliff face at the head of a narrow, steep-walled gorge near the north end of the ridge. This work has exposed a 4-inch, poorly serpentinized band that contains up to 1-1/2 inches of fairly harsh, short fiber. This zone is in the algal limestone member 20 feet above the underlying sill and 4 feet below a thin diabase sill. From the end of the trench a 12-foot adit was driven S. 50°E., but it failed to show an extension of the mineralization.

Cliffbestos Group

The Cliffbestos group of three contiguous claims is owned by Roger Kyle under the firm name of Kyle Asbestos Mines of Arizona. The claims are in the Crook National Forest in approximate secs. 1 and 2, T. 5 N., R. 16 E., unsurveyed. The claims are accessible by turning left from the Regal road 7.6 miles from U. S. Highway 60 and bearing right in 0.1 mile on a dim truck trail that ends 0.7 mile farther north. The workings are one-half mile southwest of the Regal mine on the opposite side of Regal Canyon at an altitude of approximately 4,300 feet.

In the early 1920's the area covered by these claims was part of the Regal group, but it reverted to public domain in the mid-1930's. Later, two claims, which were located by Ralph Castenada, were acquired by Kyle, and another claim was added to the group in 1941.

Geologic Setting

The claims are on the northeast side of a 1/2-mile-wide ridge between the nearly parallel northwest-trending Regal and Walnut Canyons. The west wall of the Regal Canyon (formerly called Corral Creek), approximately 800 feet high, exposes only Dripping Spring quartzite and Mescal limestone intruded by several thick diabase sills. The ridge is capped with algal limestone.

The top of the upper diabase sill is approximately 40 feet below the base of the algal member. In this stratigraphic section of lower Mescal limestone, several partly serpentinized zones are present, some of which contain traces to moderate amounts of asbestos, which have been prospected by 2 groups of workings approximately 700 feet apart.

Mine Workings

Claim 1

The workings are about 100 feet below the rim of the ridge on the steep cliff face in essentially horizontal, massive-bedded, lower Mescal limestone. The easternmost adit, 65 feet long, has exposed 3 asbestos-bearing zones that are approximately 16 feet below the base of the algal limestone and 20 feet above the upper

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diabase sill. Near the portal the upper zone, carried at the back of the adit, is a 5-inch serpentine band containing 1-1/4 inches of fiber in 2 veins. A second zone 1 foot lower consists of a 12-inch, poorly serpentinized band with 1 to 2 inches of fiber, some of which is three-fourths inch long. Eighteen inches below this, a lower zone contains up to one-half inch of asbestos.

A northeast-dipping, high-angle thrust fault of small throw cuts across the bedding 25 feet from the portal. This thrust passes into a bedding-plane fault cutting out the mineralization of the upper zone. Twenty feet beyond the fault, toward the face of the adit, the asbestos of both the other zones pinches out. The fiber of this deposit is harsh.

One hundred feet further west, a 50-foot adit has been driven on a zone containing irregularly arranged serpentine nodules that contain only traces of asbestos.

Claim 2 (Adjacent to the west sideline of claim 1.)

A short distance east of the end of the access road and approximately 60 feet lower, 3 adits have been driven in massive-bedded limestone. The east adit, 21 feet long, is in a stratum that contains extensive serpentinization, but no fiber was visible. Ten feet west a 12-foot adit driven in beds 10 feet higher in the section exposes a 6-inch serpentine band that contains several harsh veinlets up to three-eighths inch wide. This zone is 15 feet above the top of the diabase sill and 30 feet below the base of the algal limestone. This zone can be traced at least 100 feet west with similar degree of mineralization. A third short adit, 15 feet higher and 20 feet farther west, exposes a 4-inch, mottled, yellow serpentine band containing veinlets of short fiber. In this locality the beds strike N. 20° E. and dip 10° NW.

Claim 3

Claim 3, north of claim 1, was located for a camp site and water hole. Serpentine bands have been exposed by shallow cuts, but no fiber was observed.

Wonder Group

The Wonder group of seven claims, owned by G. L. Noel of Holbrook, Ariz., is situated in approximate sec. 5, T. 5 N., R. 16 E., unsurveyed, of the Crook National Forest. The property is 45 road miles north-northeast of Globe and is accessible by traveling 6.2 miles from U. S. Highway 60 on the Regal-Phillips mine road, turning left on the Fourth of July access road, and following this southwest 1.2 miles to a 3-way fork. The right fork goes to the Fourth of July workings; the other two go to the Wonder workings.

The claims were located by Louis Kuehne and G. L. Noel in the late 1930's. The greater part of the work was accomplished about 1950, since which time the property has been idle except for assessment work.

Geologic Setting

The main group of workings is along the north side of a small canyon tributary to Ash Creek. This canyon cuts through the southwest edge of an extensive mesa, which is capped with algal limestone of the Mescal formation.

The asbestos-bearing serpentine zone is a short distance below the mesa rim immediately under the base of the algal member at an average altitude of 4,800 feet.

The top of a 50-foot diabase sill underlies a section of the lower Mescal limestone at variable distances of 30 to 50 feet below the mineralized zone. Below the sill the 100 to 150 feet of limestone rests on Dripping Spring quartzite that has been intruded by diabase sills.

The geologic conditions are similar on the north side of the next small canyon to the south, except that the asbestos mineralization is present in a zone just above the diabase sill and 30 feet below the base of the algal limestone.

Mine Workings

About 500 feet S. 25° W. of the road fork, a crooked 85-foot adit was driven northward on the ore zone, which here is at the bottom of a 3-1/2-foot massive bed underlying the base of the algal limestone. The bedding strikes S. 70° W. and dips 12° N. At the portal there is a maximum total of 2-1/2 inches of green, spicular, fairly harsh, weak fiber, the longest strands of which are 1/2 inch. The amount of asbestos exposed along the adit walls is variable but of decreasing quantity.

An opencut with a 5-foot stub adit 550 feet farther southwest exposes only a 6-inch band of bone serpentine, and 20 feet farther along the outcrop a 12-foot adit shows the same band containing 1/2 inch of fiber at the top. This serpentine band is directly under the algal base.

About 200 feet southwest of the last-mentioned cut, the limestone is distorted and warped by discordantly rising diabase. At least 6 feet of limestone bedding under the algal is serpentinized. A 30-foot adit was driven north on a spectacular occurrence of asbestos in the topmost 2 feet, where possibly 100 narrow veinlets of soft fiber formed a wavy pattern in the serpentine.

This band pinched out abruptly within 10 feet from the portal. Beyond this only occasional narrow veinlets of harsh fiber were exposed rolling up and down with the bedding.

On top of the mesa, some 30 feet higher than the adit and about 100 feet northwest, a steeply dipping shaft was sunk to intersect the ore zone under the algal limestone. There is considerable magnetite in this area. A pile of ore was stacked on the dump, some pieces of which showed up to 4-inch bands of solid fiber. However, these bands contained numerous partings and thin flakes of serpentine, so that the fiber length was from 1/8 to a maximum of 3/4 inch. The quality was poor, as the fiber was glassy-harsh and brittle.

No exploration has been done west of the structural break where the limestone units are at a higher elevation. The underlying diabase sill terminates abruptly about 300 feet west of the last workings.

Minor workings on the north side of the next canyon are accessible by taking the left road fork south for 0.3 mile. A few hundred feet west of the end of the stub road a 10-foot adit in 2- to 3-foot, massive limestone beds exposes several narrow asbestos veinlets in a 6-inch serpentine band. Fifty feet west on the same zone a 12-foot bench cut shows 1 inch of soft fiber in several veinlets and a second, weaker zone 2 feet higher.

The lower zone is 30 feet below the base of the algal member and 2 feet above the top of a 35-foot, concordant diabase sill that has a general strike of N. 75° E. and dips 15° NW.

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Little Favor Group (Cibecue Mining Co.)

The Little Favor group of 50 contiguous claims is owned by the Cibecue Mining Co., Inc., of Phoenix, Ariz. The property is in the Crook National Forest in approximate sec. 36. T. 5 N., R. 16 E., unsurveyed, about 1-1/2 miles due west of the Western Chemical Co. operation (the old Johns-Manville Chrysotile camp). The company is composed of George Troik, Richard Haught, and Clifford Gardner.

The camp site, in the central portion of the claims, is at the end of a 3.3-mile road that branches west from the old Chrysotile road 1.5 miles from its junction with U. S. Highway 60. The Triple Star Mining Co. camp is 1.2 miles up this access road, from which point a considerable portion of the road is very steep.

From the camp area, a pilot road goes southeastward up to a saddle where workings are on each side of the ridge. A second pilot road leads southwestward up a gulch to the old Locke workings. Both these roads require the use of a 4-wheel-drive vehicle. The mill is at the junction of these pilot roads and the access road to camp.

History

The Globe Asbestos Co. consolidated a group of 57 mining claims that were located from 1917 to 1919. The property was operated by A. E. Minium and G. W. Locke, and a small production of hand-cobbed grades was reported for 1920, 1921, and 1922. Soon thereafter financial troubles beset the company, and the property was sold at a sheriff's sale. In 1931 after another change in ownership, title to the property passed to Tony Ramirez by virtue of a labor lien. Jack S. Campbell became a partner with Ramirez in 1945 and 3 years later relocated 50 claims over most of the area covered by the original claims. These claims were named Little Favor 1 to 50. Ramirez died in 1949 and Campbell became sole owner, selling the property to the Cibecue Mining Co. in 1953. The company installed a very small cruding mill but apparently only made a few test runs. The property, which was leased to C. C. Waterbury about mid-1954, was idle in September 1954.

Geologic Setting

The property includes the upper part of a 2-mile-wide V formed by northwest-trending Ash Creek on the east and a north-trending, unnamed, wet-season creek that joins the former a mile or so north of the claims. Troy quartzite caps the high hills, and Dripping Spring quartzite is exposed in the canyon walls on the north part of the claims. The Mescal limestone between these two quartzite formations has been intruded by several diabase sills of variable thickness, which sometimes split and occasionally include isolated masses of limestone. Because of the irregularity of the intrusions the limestone beds exhibit variable attitudes from essentially flat lying to dips of 30°.

Mine Workings

Asbestos occurs at numerous places on the property; the location of the deposits is referenced to approximate direction and distance from camp, which is centrally located on the claims (fig. 8).

Southwest of Camp

A very poor pilot road goes up a dry wash southwest of camp. One-quarter mile up this road and approximately 100 feet east, 3 small workings are in the creek bottom. On the west bank of the wash a location cut (claim 13) is in a 10-foot

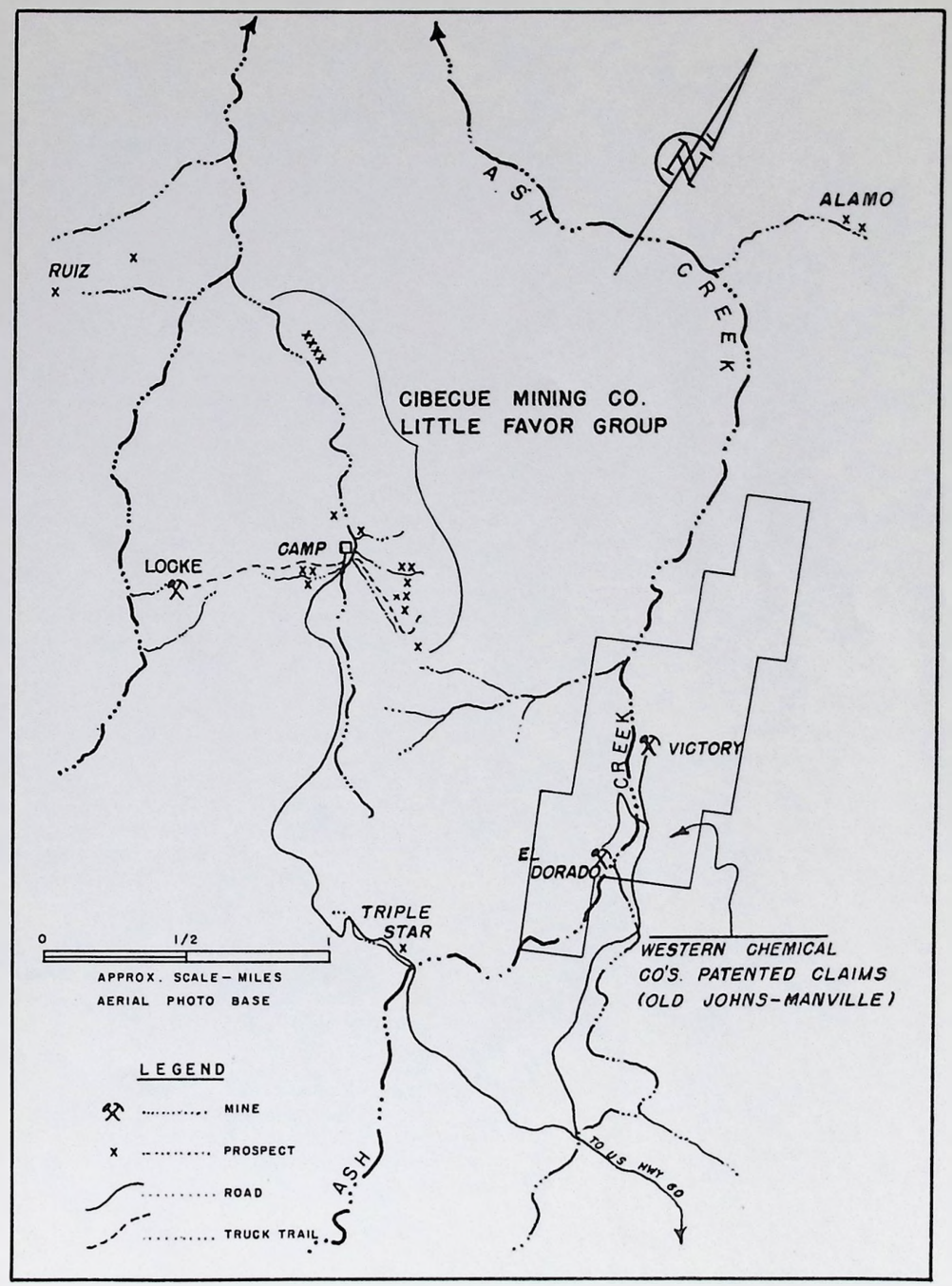


Figure 8. - Sketch location map, Cibecue Mining Co., Little Favor group and vicinity.

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stratum of limestone between diabase sills. On the same side and downstream 200 feet, a second opencut exposes an 8-inch serpentine zone in the floor containing more than 2 inches of short, harsh fiber. Across the wash a partly caved, 20-foot adit may have had a fiber zone in the floor, but it was covered with debris.

Locke Mine

The old Locke mine is one-half mile farther up this road. This is the site of the most extensive, early-day development of the property. It is on claim 9 at an approximate altitude of 5,500 feet.

A relatively flat-topped limestone spur extends south from a northeast-trending ridge. The limestone is terminated against the ridge by a discordant diabase sill, which strikes N. 30° to 35° E. and dips 70° to 80° NW. Two asbestos-bearing serpentine zones, 5 feet apart, occur in the limestone bedding adjacent to the diabase roll.

The deposit on the southwest margin of the limestone has been worked by a series of adits interconnected by stopes. The productive area was about 200 feet long by an average width of 60 feet; it contains numerous relatively small pillars, and, except for occasional passageways, most of the area has been backfilled.

The major adit, 265 feet long, follows or closely parallels the diabase contact (fig. 9). From the surface for 170 feet the east side of this adit is a backfilled stope connecting with 2 parallel adits, 130 and 65 feet long, respectively, 30 and 70 feet east of the diabase contact. Several short, branching adits have explored the area east and south of the major stope for approximately 50 feet. Two small stopes, now caved, were opened on the east side, and a small, near-surface area on the south was stoped and backfilled.

The ore zones were carried on the back and floor of the workings. The limestone has a northerly dip from 5° to 10°; consequently, the major part of the deposit was mined down the slope and debris has washed into the adits. The lower zone, where it could be seen in pillars near the portal, was composed of a 10- to 12-inch band of light-color, impure serpentine that contained 2 to 3 inches of fiber, part of which was in a 1-1/2-inch vein that had partings or serpentine inclusions that reduced the fiber length to 3/4 inch or less. The zone 140 feet from the portal of the major adit contained 1 inch of short, soft fiber. Elsewhere this zone usually was covered with debris.

The serpentine of the upper vein was generally 6 to 8 inches thick, and several veinlets contained a total of 1/2 to more than 1 inch of short, soft to semisoft fiber. At the face of the major adit, there was a total of 2 inches of short, fairly harsh, spicular fiber in the upper zone. The lowest zone was covered with 2 feet of water and mud.

The limestone is weathered and shows virtually no fiber in the southern part of the mine where the workings are close to the surface. From a drift intersection 60 feet from the portal, a 20-foot raise broke through to the surface. Deeper in the workings at the end of the 130-foot adit a 15-foot raise failed to disclose mineralization above the zones that were mined.

About 60 tons of hand-cobbed crude No. 1 and No. 2 is said to have been produced in the early 1920's. It is likely that a little more asbestos was mined from the stope borders and pillars in later years.

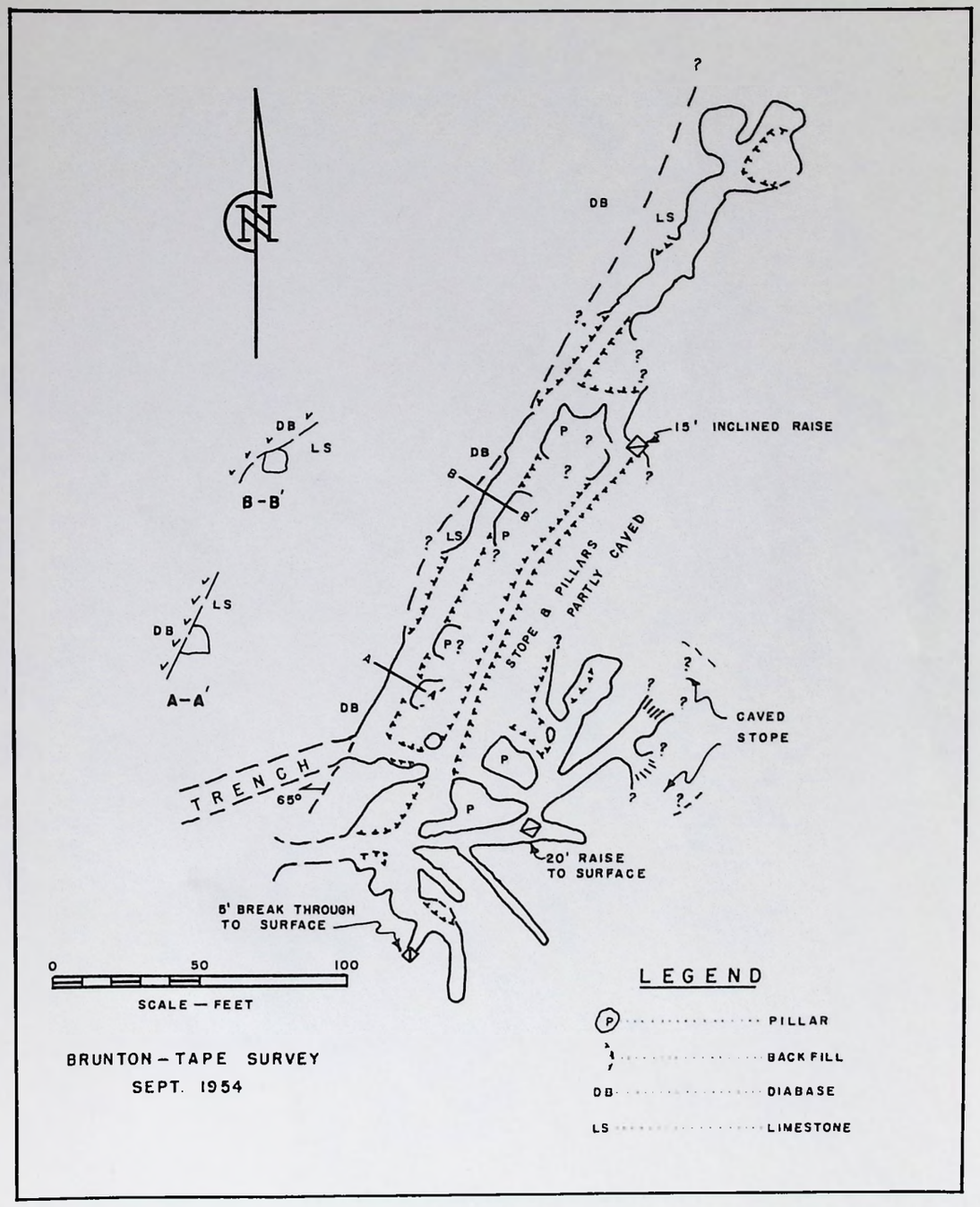


Figure 9. - Plan and sections, Locke mine, Cibecue Mining Co., Inc.

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Southeast and East of Camp

On a low ridge between draws 200 feet south of the mill, 2 adits 50 feet apart were driven in weathered limestone beds that dip 30° NE. The east adit is badly caved but appears to be about 20 feet long; the west adit is completely caved. A considerable amount of weathered fiber is visible on the dumps, but the outcrop could not be seen.

From the mill, a steep 1/2-mile pilot road goes southeastward up the ridge to a saddle at an altitude of 5,600 feet. Bench cuts on different levels, aggregating 50 feet in length, have explored fiber zones on the precipitous east side of the ridge approximately 100 feet below the saddle. On the floor of the south end of the cut approximately 40 feet below the base of the algal limestone, an 8-inch serpentine zone contains 1/2 inch of soft fiber in 2 veinlets. This zone is 10 feet above the top of a diabase sill concordant to the north, but southward the diabase cuts down to beds 10 feet lower in the section. A second serpentine zone 10 inches thick and 6 feet above the bottom band contains up to 2 inches of short, soft fiber in a dozen or more veinlets. The limestone beds strike S. 20° E. and dip 15° NE. The bench continues to the north with the second zone on the floor. The serpentine band decreases to 4 inches and contains short-stranded fiber in a bone structure. Farther north the zone shows traces of fiber and little veinlets of fibrous calcite. In this part of the cut there are traces of fiber in a third zone 4 feet higher, and in a cut 15 feet above the second zone a poorly serpentinized band contains several discontinuous, 1/8-inch fiber veinlets.

An unfinished road from the saddle goes a few hundred feet around the west side of the ridge. On the same level and about 800 feet farther northwest, a 30-foot adit was driven under a 10-foot diabase sill in limestone that dips 20°-25° E. The sill is at the base of the algal limestone. A decomposed, chalky serpentine zone about 3 feet below the sill contains up to 2 inches of incompletely formed, honey-color fiber that is dry and weak. The sill cuts downward across the limestone 20 feet within the adit and terminates the fiber zone.

Approximately 200 feet northwest an old assessment pit is above a diabase sill in algal limestone. Fifty feet down the hillside, in lower Mescal limestone, is a second pit. Neither of these shows asbestos mineralization. A draw 200 feet north is almost due east of camp. On the south side of the draw a 135-foot, southeast-bearing adit has been driven into nearly level limestone below a diabase sill. The adit was barren for 30 feet, and 40 feet from the portal a 15-inch serpentine zone contained 3 to 4 inches of fiber in about 20 veinlets, the best of which were 3/8 inch thick. A very small stope explored this showing to the south, but the length of fiber did not improve. In this area there are numerous thin, erratically distributed diabase dikes. Between 65 and 80 feet from the portal the roof has caved to the overlying, north-dipping diabase sill, which is 18 inches above a 6-inch serpentine zone composed almost entirely of minute veinlets of fiber. Some 1-inch, harsh fiber was seen in this area.

A dike of decomposed, red diabase, striking N. 80° E , was encountered at 110 feet, and the adit was turned to follow the dike, where a 6-inch serpentine band contained 2 inches of harsh fiber in strands up to 1/2 inch long. At the face the bedding warps downward, and only traces of fiber are present. A location monument at the portal indicates that this work is on claim 4.

Across the draw from the last-described workings and about 30 feet lower, a 60-foot adit 8 to 10 feet wide has been driven down dip in massive limestone beds that strike S. 75° W. and dip 12° N. A 4- to 6-inch serpentine zone carried on

the floor shows 2 inches of harsh fiber in several veinlets up to one-half inch thick. Because of debris washed in by rainstorms this zone can be seen only near the portal. A zone 2 feet higher in poorly serpentinized material, contains traces to 1/2 inch of harsh fiber. Fifty feet farther south a 15-foot adit has explored the same zones. Because of a caved portal and debris on the inclined floor, only the top vein can be seen; it likewise contains traces to one-half inch of harsh asbestos.

This area is very brushy and covered with heavy overburden, consequently the relationship of these favorable beds to diabase could not be determined.

North of Camp

Across the canyon north of the camp and about 100 feet higher, an asbestos-bearing serpentine zone is present in massive beds that strike east-west and dip 10° N. The 4- to 6-inch serpentine band 5 feet above the sill contains several veinlets of 1/8-inch fiber. A 10-foot adit has been driven at the midpoint of this outcrop, which can be traced for about 100 feet along the cliff face. To the east the zone is covered with debris, and to the west it fades out as the sill cuts discordantly downward to beds 30 feet lower in the section.

In a shallow cut 15 feet east of the adit in bedding 9-1/2 feet above the diabase, a second zone contains 3/8 inch of soft fiber.

Northwest of Camp

A few hundred yards downstream from camp on the west side of the canyon and about 70 feet above the stream bed a 75-foot adit has been driven S. 45° W. in relatively flat beds that are approximately 30 feet above the Dripping Spring quartzite. A band of black, barren, serpentinized material forms the floor of the adit, above which is thin-bedded, gnarly limestone breccia. No fiber was observed in the adit or on the dump, and no diabase was seen in the vicinity. Papers in a location monument indicate that this is on claim 2.

About 3/4 mile farther downstream an outcrop high on the east side of the canyon has been explored by 4 adits. From east to west the adits are spaced at intervals of 85, 60, and 30 feet and have lengths of 20, 15, 58, and 60 feet, respectively. The limestone ledge is medium bedded, striking N. 30° to 40° W. and dipping 8° to 10° NE. The lower zone consists of an 8- to 10-inch, poorly serpentinized band having irregular borders. Where seen near the portals it contains several fiber veinlets that are wavy and discontinuous but average 1 inch or more of asbestos. The fiber content of the middle zone, which is 4-1/2 feet above the lower zone, alternates from very thin, irregular veinlets to 1-1/2 inches of total fiber in a 10-inch serpentine band. These 2 zones were prospected down dip by the 3 easternmost adits, which have the lower band at floor level. Debris washed in by storms has covered the interior exposures of the latter zone.

The west adit carries the middle zone near floor level and an upper zone 3 feet higher on the back of the adit. This upper zone also is exposed in the cuts above the 2 adjacent adits to the east but contains either traces or narrow veinlets of fiber in a 4-inch serpentine band. All the asbestos in this deposit is soft.

The top of an underlying sill can be seen 5 feet below the bottom zone near the east adit, but elsewhere it is covered with dump material or overburden. Obviously the contact is discordant under the workings because 15 feet of limestone is exposed below the west adit. This deposit is about 350 feet above the canyon

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bottom and at least 100 feet stratigraphically below the base of the algal limestone. The altitude of the workings is approximately 5,350 feet.

The Mill

A small mill powered by a Dodge truck engine, was constructed near the junction of the two pilot roads with the access road. Ore is fed manually into a 4- by 6-inch jaw crusher; the crushed material passes through 12- by 6-inch crushing rolls to a 26-inch by 14-foot shaking screen. The latter is a series of removable panels of the following screen sizes: 14-mesh, 4-mesh, 3-mesh, 2-mesh, and 3/4-inch.

As only a few sacks of ore have been run through for a preliminary test, the capacity of this miniature plant is not known.

Alamo Prospects

The two Alamo claims are owned by Ramon R. Hernandez and Concepcion H. Hernandez and leased to Lawrence D. Poor. These claims are recent (Feb. 8, 1954) relocations of claims originally prospected in the early 1920's. The property is situated in approximate sec. 19, T. 5 N., R. 17 E., unsurveyed, of the Crook National Forest.

The claims are reached from U. S. Highway 60 by taking the Regal-Phillips mine road for 5.8 miles, turning back southeast on the old Regal-Chrysotile truck trail for 1 mile, and walking south for about 1-1/2 miles over a ridge that forms the top of the north wall of Ash Creek Canyon. The workings are about 100 feet down the south side of the ridge at an approximate altitude of 5,100 feet.

Geologic Setting

The claims are oriented north-south along the east-trending ridge. Claim 1 is west of claim 2, and the width of the 2 claims covers the outcrop of a 20- to 30-foot segment of lower Mescal limestone that lies between thick diabase sills, the upper of which forms the ridge top. The limestone is cut off by the union of the 2 sills about 200 feet west of the No. 1 workings. Overburden covers the limestone outcrop east of the No. 2 workings, but owing to the abrupt change in attitude of the beds to the east it is probable that the limestone likewise terminates against diabase on that side. The strike of the beds is generally west, dipping about 5° N. The limestone strata pass under the ridge and are exposed on the gentle north slope of the ridge.

Prospect Workings

The major work on claim 1 is confined to a northerly bearing 5-foot adit from a 15-foot opencut and a 20-foot bench cut eastward along the nearly level outcrop. These cuts expose an 18- to 24-inch zone of mottled, nodular, poorly serpentinized limestone that contains irregular and discontinuous veinlets of fairly soft asbestos that total up to 2 inches of fiber at the best showings. The fiber contains partings and random chips of serpentine that reduce the strand length to a maximum of one-fourth inch. The stub adit carries the zone at floor level, and the mineralization is weaker than in the cut. Toward the east end of the bench cut the asbestos mineralization decreases, whereas the banding of soft, serpentinized material increases.

At approximately the same elevation and about 600 feet to the west an adit on claim 2 bears N. 25° E. The opencut part of the workings is 30 feet long, and the

adit therefrom appears to be about 25 feet deep. The limestone bedding strikes N. 50° E. and dips 20° NW., therefore the adit is driven down a slope of approximately 10° . This work appears old, probably dating to the early 1920's, and the debris that has collected down dip is liberally strewn with cholla cactus balls collected by rats, so that entry can be made to only a few feet from the portal. The face of the working is opened to greater than drift width but is completely hidden by the debris washed in or possibly by roof caving.

The adit was driven under an 18-inch massive bed containing plentiful serpentinized nodules varying in size from 1 inch in diameter to 4 by 12 inches, each containing lenticular veinlets of asbestos varying from 1/64 to 1/8 inch in thickness.

A similarly mineralized bed was mined by the adit, as well as an underlying, poorly serpentinized zone that could be examined only at the portal. It is probable that not more than an average total of an inch of short fiber was present in the adit. The fiber observed in place and on the dump was semisoft to fairly harsh.

Oso Claim

The Oso claim, owned by Lawrence D. Poor, is situated below the Canadian (Asbestos King) mine on the east side of an unnamed canyon about one-half mile south of Salt River. This location is in approximate sec. 4, T. 5 N., R. 17 E., unsurveyed of the Crook National Forest and is accessible only by a steep climb down the mountain from the Canadian mine road.

Geologic Setting

A 100-foot-thick section of virtually level-bedded lower Mescal limestone between thick diabase sills is exposed in the walls of the canyon midway between Salt River and the Canadian mine. The limestone strata pass into the canyon floor on the south and are in fault contact with Dripping Spring quartzite about 2,000 feet north. The top of the limestone is at an approximate altitude of 4,075 feet, above which is a thickness of 550 feet of diabase. The top of this sill is in concordant contact with limestone beds about 6 feet below the base of the algal member in the Canadian mine workings.

For unavoidable reasons this examination was made without benefit of the guidance of one familiar with the property. Because of brush- and snow-covered slopes giving way to sheer cliffs, the writer (February 1, 1955) was unable to find the location or assessment pits. However, at several places on the cliff face, an asbestos-bearing zone was noted in massive beds a few feet below the overlying concordant diabase contact. The fiber vein was up to one-half inch thick, but the quality was fairly harsh. A reported lower zone was not found during the random examination.

Ruiz Prospects

The 6 claims owned by J. C. Ruiz and R. T. Ruiz are situated 2-1/2 miles northeast of Haystack Butte, a prominent landmark. The claims are in approximate sec. 6, T. 4 N., R. 17 E., unsurveyed, of the Crook National Forest.

The two original claims that show asbestos mineralization - the Longview and Eagle Nest - were located by J. C. Ruiz in 1930. Contiguous to these, four additional claims were staked in 1954, but these have not been thoroughly prospected yet.

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The property is reached from Globe by traveling north on U. S. Highway 60 for 20 miles to Seven Mile Wash. Just east of the bridge take a northerly bearing ranch road according to the following log:

	Miles
Seven Mile bridge	0.0
Turn left on ranch road	.1
Fork, keep straight ahead	3.8
Fork, take left	6.0
Fork, take right	13.7
"Cowboy John's" ranch house	14.2

From the ranch house a trail leads east for 2-1/2 miles to the saddle on a ridge some 800 feet higher. The Longview prospect is down the ridge to the left and the Eagle Nest is up the hill to the right.

Geologic Setting

Diabase forms the previously mentioned saddle where the ridge joins a high hill to the southeast. This diabase appears to be the lower side of a discordant diabase structure that cuts through the ridge and extends part way up the hillside. The upper side of the diabase cuts across the point of the hill with a general northeast strike and dips steeply to the southeast. The contact is against nearly level-bedded limestone, and asbestos mineralization has been found adjacent to the diabase in two favorable horizons on the Eagle Nest claim.

The Longview claim covers part of the northeast-trending ridge, which is truncated by the south branch of Ash Creek. More than 100 feet of Mescal limestone overlies Dripping Spring quartzite which forms the steep canyon wall. Asbestos zones are exposed by workings on the crest of the ridge about 1,300 feet northeast of the saddle. No diabase was observed in the limestone section anywhere near this deposit.

One explanation to account for this mineralization would be the assumption that a diabase sill originally overlaid the crest of the ridge but has been eroded away.

Prospect Workings

Eagle Nest Claim

About 150 feet above the saddle on the west side of the hill and adjacent to the crosscutting diabase an 8-foot opencut exposes 3 feet of poorly serpentinized material between layers of fairly heavy bedded limestone. Near the bottom of this bed, 2 (sometimes 3) zones each contain 1/4 to 5/8 inch of parted, fairly harsh fiber. The altitude of this cut is 5,450 feet.

On the point of the hill about 200 feet northeast and at a slightly higher elevation, a 12-foot, southerly bearing adit with a 12-foot westerly branch has explored a 4- to 6-inch weakly serpentinized zone that, at the outcrop, is 3 feet above the diabase contact. Near the surface a 1/4-inch asbestos veinlet is at the top of the band, and 2 inches lower several veinlets contain an aggregate of 3/4 inch of semisoft fiber. Within the adit the fiber content appears to be decreasing, probably reflecting the increased distance from diabase occasioned by the dip of the contact.

Longview Claim

On the crest of the ridge, at an altitude of 5,300 feet, asbestos was observed on the dump of a partly caved shaft. The shaft was said to be 12 feet deep with a zone that at the bottom contained an average of 3/4 inch of fiber. Material on the dump showed a maximum total of 2 inches of asbestos that was weathered, which originally could have been semisoft fiber of fair tensile strength. A few sacks of hand-cobbed asbestos were produced from this work.

Near the collar of the shaft irregular veinlets of short, harsh fiber were present in a narrow, poorly serpentinized zone. No outcrop could be seen around the knoll because of overburden, but at the time of the examination (June 22, 1954) the owner was beginning another excavation 50 feet south.

Fort Apache Indian Reservation

Fiber King Area

The Fiber King property reverted to the Fort Apache Indian Reservation upon expiration of the lease in 1951. The mine is on the north side of Salt River 1.5 miles north of and across the river from the Regal mine. It is in approximate sec. 25, T. 5 N., R. 16 E., unsurveyed. The property is accessible by traveling down the north bank of Salt River on the Indian Service road that branches off U. S. Highway 60, 0.1 mile north of the bridge. This road passes the mine 8.2 miles from the highway.

History

The claims covering this area were first located in 1921 as the Salt Bank group by W. G. Shanley, who produced a small amount in 1923. Late in 1927 three claims were relocated by Roy and C. O. Reidhead as the Riverside group.

In 1941 Charles Ireland and Gladys Eakers secured a lease on five claims. Desultory work was done for the next few years. John Bacon secured a lease on two adjacent (Victory) claims in 1942 and produced a small amount from these and the Fiber King claims. In 1946, under an operating agreement, the Globe Asbestos Co., a subsidiary of Rheem Research Products, Inc., mined considerable asbestos. Charles Ireland continued to produce some fiber from 1947 to 1949.

When the lease expired, an application for renewal was made by other parties, but final action never was taken.

Geologic Setting

In this area the high, steep, north side of Salt River Canyon is modified by several benches and is scalloped by tributary canyons. The Dripping Spring quartzite and Mescal limestone are intruded by several diabase sills. Troy quartzite cliffs rim the crests of the high ridges.

In the central part of the property a relatively narrow ridge exposes more than 100 feet each of the lower and algal Mescal members. This limestone section is underlain and overlain by thick diabase sills. Asbestos-bearing zones outcrop at several places under the base of the algal limestone and in beds 100 feet lower and a few feet above the underlying sill. The major deposit is in this lower horizon on the southeast side of the hill near a discordancy in the underlying diabase at an approximate altitude of 3,500 feet.

Mine Workings

Lower Horizon

The major deposit is localized adjacent to a discordant diabase structure that has a general trend of N. 20° W. The top of the underlying sill cuts up from the east, becomes concordant westward for about 30 feet and again rises, cutting off the favorable beds in that direction. The mineralized zone is in massive bedding about 5 feet above the concordant part of the structure. An adit has been driven N. 10° W. for 220 feet. Stopes carrying the ore zone on the back are opened for 25 feet west and to a maximum of 90 feet east of the adit (fig. 10).

The apparent dip of the limestone and of the concordant part of the sill exposed in the adit is about 5° N. for 80 feet from the portal, beyond which the limestone is virtually level and the diabase is below floor level. In 1943 the adit floor was on diabase, but in later operations the drift floor was lowered to make a level haulageway.

The crosscutting diabase that terminates the deposit to the west is exposed in a crosscut and in one corner of a backfilled stope, which probably is against or close to the diabase for the remaining length of the stope to the north. Near this contact the serpentinized zone is 18 to 24 inches thick and usually contains 2 inches of short fiber in numerous veinlets.

The stopes on the east side of the adit have been worked to the commercial limit of the deposit. The serpentine zone progressively becomes thinner to the east. In the stope faces that are accessible the zone is 5 to 8 inches thick, and the fiber content varies from a maximum of 2 inches of very short fiber to areas that are virtually barren. In the small stope at the end of the adit there is about 1-1/2 inches of short fiber on the west side and 3/4 inch on the east side; the central part is in a pinch.

The asbestos of the major portion of this deposit was soft and of good tensile strength, although most of it was fairly short.

Beginning 60 feet east of the adit, a bench cut 50 feet long and a 30-foot crosscutting trench exposed only traces of fiber. The floor of the bench is 15 feet above the adit level and about 20 feet above the underlying diabase. The trench prospected the limestone beds to the diabase contact.

On the south side of the next canyon, about 400 feet north, asbestos is exposed for an outcrop length of 50 feet along a minor monoclinal structure. A 30-foot adit was driven S. 35° W. into this deposit. From 1-1/2 to 2 inches of semisoft fiber was mined from a small side stope to a depth of 20 feet. The face of the adit is virtually barren. The zone is 5 feet above the concordant diabase sill.

Across the canyon 100 feet northeast a short adit was driven in a segment of limestone within a narrow troughlike depression in the top of the sill. A zone containing up to 3 inches of harsh fiber was exposed, but this was virtually cut out by a break in the formation 15 feet from the portal.

Late in 1942 John A. Bacon prospected a deposit on the Victory claim about 2,000 feet southwest of the Fiber King deposit. At the surface there was 1 to 2 inches of soft and semisoft asbestos in an 8-inch serpentine zone about 5 feet above a concordant diabase sill. An adit was driven N. 15° E. for 75 feet. Sixty feet from the portal the underlying diabase cut upward to the ore zone and terminated

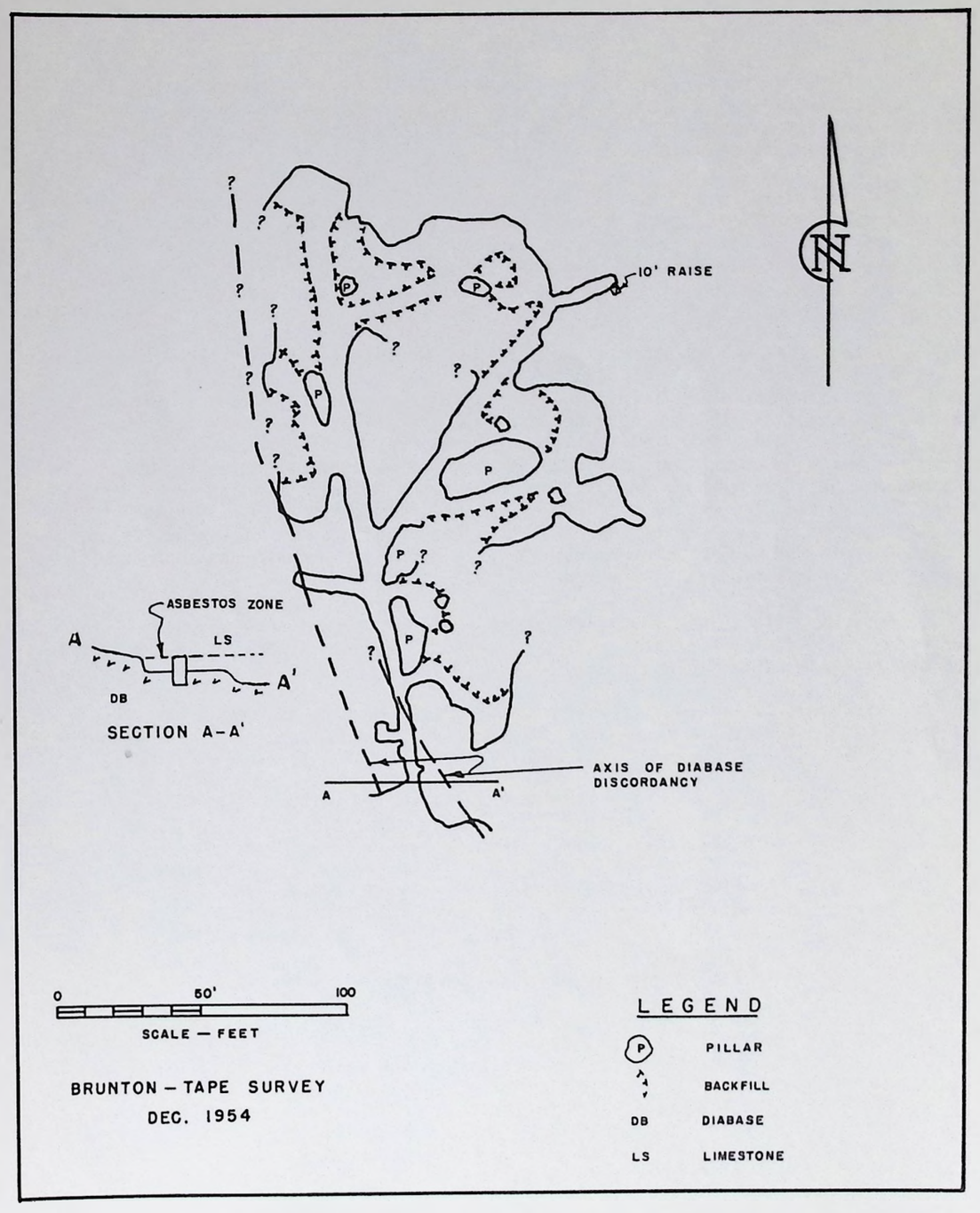


Figure 10. - Plan and section, Fiber King mine.

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the deposit. A second adit 65 feet west was driven due north but encountered the same diabase roll 55 feet from the portal. The axis of the discordancy was N. 70° E., or approximately parallel to the surface.

The fiber zone virtually pinched out in the adits 30 feet from each portal, where the limestone beds, which dip 8° to 10° at the surface, become almost horizontal. A small production, some of which was No. 1 length, was made from a bench cut and near surface stopes.

This deposit is in a limestone section below the diabase sill that underlies the Fiber King workings. Because of the thinning of this sill southward, it is likely that these 2 deposits are in the same horizon, that is, in bedding 100 feet stratigraphically below the algal limestone.

Upper horizon

Asbestos-bearing serpentine is exposed in a bench cut for an outcrop length of 50 feet 300 feet N. 40° W. of and 100 feet higher than the Fiber King adit previously discussed. The mineralized zone occurs in beds 2-1/2 feet below the base of the algal limestone and 30 feet above a discordancy in the same diabase sill that underlies the main adit. Strong, premineral bedding-plane faulting along the algal base has formed a wedge of gouge thickening to the west. The strongest mineralization occurs near the apex of the wedge at the east end of the cut. An adit driven 50 feet N. 18° W. shows up to 1-1/2 inches of fiber at the top and 1/2 inch at the bottom of a strong serpentine zone. The fiber is soft but short and becomes even shorter in a 10-foot, northeast-bearing crosscut. Apparently a small production was made, as the adit is wide.

Across the hill to the northeast 2 cuts above 100 feet apart prospect small lenses of fiber at the base of the algal limestone. A maximum of 1-1/2 inches of asbestos, some of which is No. 2 grade, is exposed.

On the southeast face of the hill, about midway between the above-described occurrences, another opencut shows a full face of serpentinized material with only narrow fiber veinlets 8 inches, 2, 3, and 4 feet below the algal base.

Bluff Claims

This property, consisting of two claims, is leased from the Fort Apache Indian Reservation by Charles O. and M. V. Reidhead. It is readily accessible as U. S. Highway 60 passes by the opencut work 1 road mile north of Salt River bridge. One-half mile farther up the highway a pilot road turns south down a ridge for one-half mile to prospects below.

The deposits are in approximate sec. 25, T. 5 N., R. 17 E., unsurveyed.

History

Claims covering this area were originally located under the same name in 1921 by J. Hansen and Arch and Eph Penrod, but only desultory prospecting was done at that time. Under the Reidhead lease, the Salt River Asbestos Mining Co. of Mesa, Ariz., worked the property from 1949 to 1950 and produced a small amount of asbestos. This company erected a small cruding mill near the property, but the plant was destroyed by fire before it was put in operation.

In September 1954 the Arizona Asbestos Mining Co. secured an operating agreement under the same lease and was doing exploration work in October 1954.

Geologic Setting

The claims are on the north side of Salt River Canyon upstream from the bridge. For 1/2 mile from the bridge where the canyon runs east, Dripping Spring quartzite forms the gorge of the river, above which about 175 feet of lower Mescal limestone forms steep cliffs. A diabase sill above the limestone forms a bench over which the highway passes. The remainder of the Mescal formation above the highway is intruded by several thick sills of diabase, and Troy quartzite caps the canyon wall.

One-half mile east of the bridge the river swings southeast around a ridge projecting southward from the main mountain mass, at which point the Dripping Spring quartzite is cut out by a thick sill coming up from below river level. Except for some upward warping near this discordancy, the lower Mescal limestone strata continue relatively level but are in discordant contact with the underlying sill and also with the continuation of the previously mentioned overlying sill. The limestone is gradually wedged out by the union of the two sills but appears again between the sills as a reverse wedge which forms the end of the ridge.

Of interest to this report are the asbestos-bearing serpentine zones that are present at various places in the segment of lower Mescal limestone that is below the highway.

Mine Workings

Considerable benching and opencut work have been conducted just south of the highway approximately 1 road mile upstream from the bridge. The limestone beds are wedged out at road level by a discordant diabase structure that dips northward. Near the top of this limestone wedge an asbestos-bearing serpentine zone has been exposed and partly mined out by opencut work. On the north side of the remaining limestone knob and 2 feet below diabase a 9-inch serpentine band contains nearly 4 inches of fairly harsh asbestos in 1/16- to 1/4-inch veinlets. About 50 feet southward, on the opposite side of the knob, the same zone, which here is 14 feet below the diabase, exposes nearly 2 inches of soft fiber, in shallow opencuts, some of which is No. 1 length. This mineralization is about 175 feet above the top of the Dripping Spring quartzite and at an approximate altitude of 3,700 feet.

The present operators (October 1944) are dozing a bench to another zone said to be 40 feet lower in the section. The outcrop of this zone was not seen by the writer because of dump material from the work above. During this work a lens of mineralization was uncovered about 15 feet below the upper zone. It contained up to 2 inches of harsh fiber but was of very limited extent.

One-half mile southeast of the above-described work, on the west side of a ridge, minor asbestos-bearing zones occur in the limestone between two thick diabase sills. About midway along the ridge and a few feet below the upper sill, a shallow cut exposes 1-1/2 inches of short fairly harsh fiber in a poorly serpentinized zone. This occurrence is 18 feet above a 10-foot sill that has been intruded in beds 50 feet above the underlying diabase.

Farther south, where the limestone is only 30 feet thick between discordancies of both major sills, a 3-foot zone of serpentinized material contains several discontinuous and erratically disposed veinlets of soft asbestos. This zone, 5 feet above the underlying diabase contact, has been prospected by 3 bench cuts for a lateral distance of 80 feet. The fiber content is distributed in several veinlets, none of which is more than 1/2 inch thick.

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The diabase sills unite south of these workings. Near the end of the ridge, limestone again appears between the sills, but no mineralization was observed in this section.

San Carlos Indian Reservation

Dream Girl Prospect

The Dream Girl prospect is in the extreme northwest corner of the San Carlos Indian Reservation, just north of the Mule Hoof bend of Salt River and approximately 600 feet inside the west boundary. According to the reservation map, it is in approximate sec. 27, T. 5 N., R. 17 E., unsurveyed. This is about 1-1/2 airmiles west-northwest of the Salt River bridge.

The property can be reached by following the Regal road for 4 miles from U. S. Highway 60, driving north 0.3 mile on the Canadian mine road, then east on a primitive road for 1.4 miles. From the end of this road a trail leads north for about 500 yards to the mine workings.

In 1941 T. J. Long and George W. Wright purchased the nucleus of this six-claim group from Dennis Sullivan and partner and located the remainder of the claims along the general contour of the mountain.

The mine was opened, and a small amount of asbestos was produced in the next 2 years. At this time the property was accessible only by a trail, and it was not realized that the workings were on the reservation. About 1944, after a road was dozed to a point near the mine, Reservation authorities requested cessation of work because no lease had been granted.

As far as known, the property has remained idle since that time.

Geologic Setting

North and west of the western extremity of the Mule Hoof bend of Salt River, cliffs of diabase and Dripping Spring quartzite form the gorge of the canyon. Overlying the quartzite is a thickness of 150 feet of lower Mescal limestone, above which a thick diabase sill forms gentler slopes up to steep cliff faces that expose the remainder of the Mescal formation. This limestone stratum is intruded by additional sills. Troy quartzite forms the upper part of the cliffs.

The mine workings are about 900 feet above the stream bed. A discordant diabase structure dipping steeply northward trends along the face of the ridge. In the immediate mine area, the bottom of the diabase structure flattens southward and is concordant with the limestone bedding. The ore zones average 3, 6, and 9 feet below this concordant contact in a V-shaped area that is limited on the south by topography and on the north by the downward diabase discordancy.

A small detached and warped segment of limestone surrounded by diabase is exposed 50 feet higher. Small amounts of asbestos are present near the top of this limestone segment.

Mine Workings

The V-shaped area formed by the surface diverging from the discordant diabase has been well explored by adits 25, 45, and 90 feet long. In the latter adit a stoped area has been connected to the surface at the west end of the mine (fig. 11).

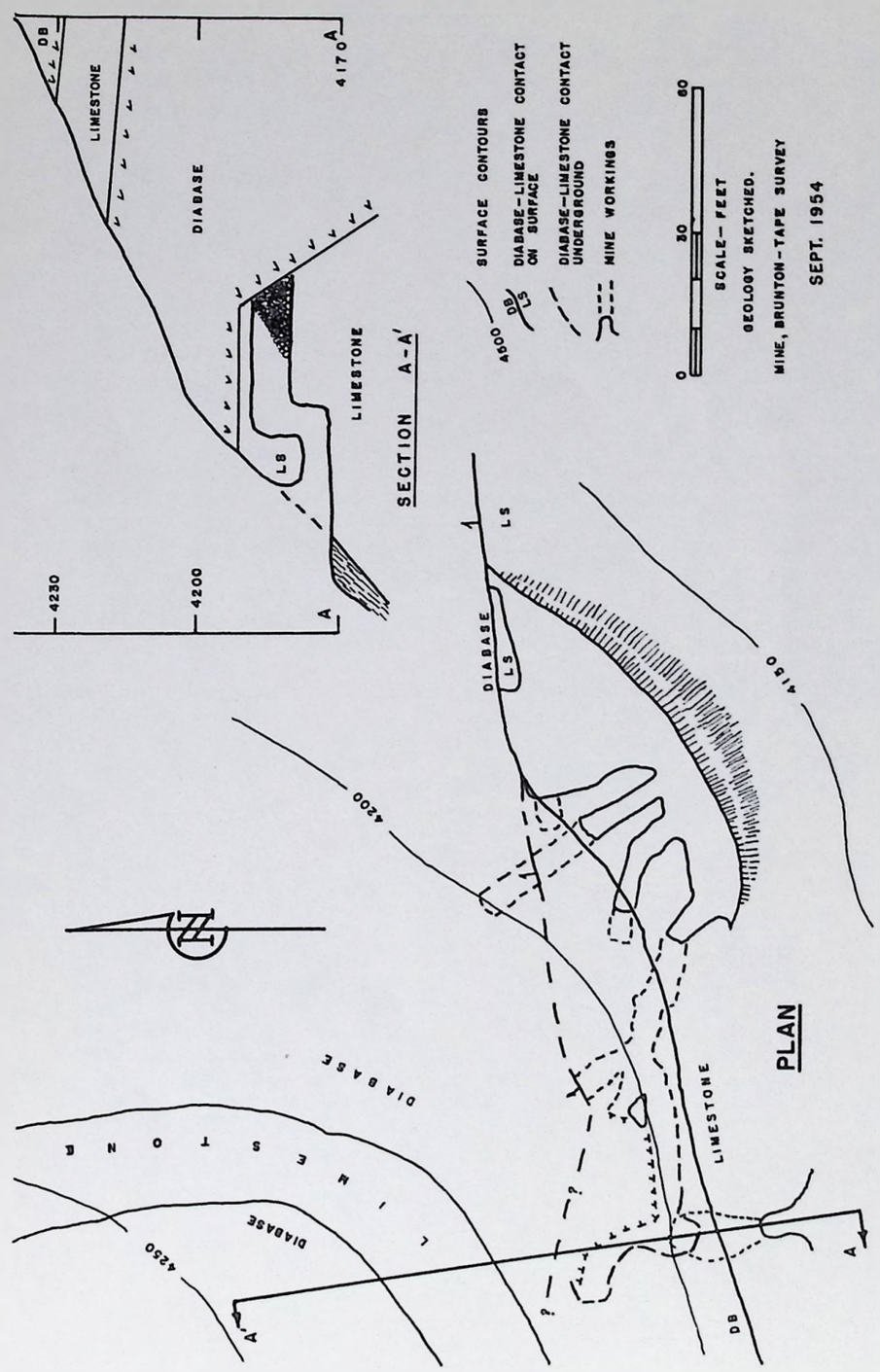


Figure 11. - Plan and section, Dream Girl mine.

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East of the adits asbestos was recovered from a triangular block of limestone 40 feet long.

Most, if not all, of the minable asbestos has been removed. At the west end of the workings the upper zone shows only a trace of fiber, 1 foot lower a band of discontinuous nodular serpentine contains 1/4 to 1/2 inch of fiber, and the lower zone at floor level shows a total of 1 inch of short fiber.

In 1942 before stopes were started, the top zone, which is carried on the back, showed 3/4 inch of fiber in a 4-inch serpentine band; at floor level the 8-inch serpentine band contained up to 1-1/2 and 2 inches of asbestos, some of which was No. 1 length. The middle zone had an average of one-half inch of fiber. Like several mines in the Salt River area, a persistent 1-inch band of dark-green serpentine was present about 1 foot above the bottom ore zone.

All the fiber from this mine is soft and of excellent tensile strength. The altitude of the mine is approximately 4,175 feet.

Upper Workings

Asbestos is present near the top of the thin limestone stratum about 60 feet above the main workings. In the 300-foot length of limestone the strike ranges from N. - S. to N. 25° W., with dips varying from 12° E. to 20° SW. Two opencuts expose minor amounts of soft to semisoft fiber in discontinuous patches at various attitudes.

About one-fourth mile west of the Dream Girl workings high on the cliff face, asbestos mineralization is present in the algal limestone. A total of 2 to 3 inches of very harsh fiber is exposed in a bench cut 20 feet long and in a 30-foot adit about 20 feet above a diabase sill and an equal distance below the base of the Troy quartzite. Similar mineralization is shown in a 40-foot adit under the sill. These latter explorations are known as the Garcia workings and are said to be on the Phillips Asbestos Co. property.

Cassadore Deposit

The Cassadore deposit is so called because of its proximity to the perennial Cassadore Spring. The history and original claim names are not known. The condition of the cuts indicates that the work was done many years ago.

Cassadore Spring is 14 miles north of the San Carlos Indian Agency on the graveled road that connects with the Fort Apache Indian Agency at Whiteriver. The deposit, situated in approximate sec. 30, T. 2 N., R. 19 E., unsurveyed, of the San Carlos Reservation, is reached by traveling 1.7 miles north from the spring, then turning east on the ridge top for 0.1 mile to a pole corral. From the corral a 4-wheel-drive vehicle can be taken southward on the ridge top for 1 mile, from which point it is necessary to walk about 1 mile to the deposit.

At the bottom of the ridge traversed to reach the area, the top of a thick diabase sill crosses the bed of a dry wash and rises westward along each side of the gulch. The limestone beds above the diabase have a general southeast dip of 15° to 25°. On the south side of the creek, the diabase concordantly contacts the base of the algal member for about 150 feet up the hillside slope and then gradually cuts discordantly downward through beds of the lower Mescal member. A shallow cut close to the discordancy exposed only poorly serpentinized material under the algal limestone. The next cut, 85 feet west, showed several narrow veinlets of harsh fiber

in a zone 1 foot below the base of the algal limestone, which was about 12 feet above the diabase sill.

The next cut, 250 feet farther west, exposed discontinuous veinlets totaling 1 inch of fairly harsh fiber in a weathered serpentine zone 5 feet above the diabase contact and about 35 feet below the base of the algal limestone. The underlying sill remains essentially concordant westward around the hill.

Each of 3 more cuts on the same zone in the next 150 feet showed a total of 1-1/2 to 2 inches of semisoft fiber, which was usually in short strands owing to inclusion of bone serpentine. There are indications in this area of the presence of an upper diabase sill in the algal limestone.

About 350 feet southward around the hill, where the formations are well exposed, an opencut in beds 20 feet above the diabase is barren of mineralization. The base of the algal limestone is 15 feet above the cut, and the upper sill, 10 to 12 feet thick, is well exposed 10 feet higher in the section.

On the north side of the creek the upper contact of the lower diabase undulates from the base of the algal member to beds not more than 8 feet lower. No asbestos mineralization or opencuts were seen on this side.

The lower Mescal member on both sides of the creek is composed of thin-bedded, impure limestone. The average altitude of the outcrop is 3,900 feet.

SIERRA ANCHA DISTRICT

For the purpose of this report the limits of the Sierra Ancha district are as shown in figure 2.

This rugged mesa, known as the Sierra Ancha, is one of the most prominent topographic features in the central part of the State. Its highest point, Aztec Peak, has an altitude of about 7,700 feet. The sierra consists of a thick succession of the nearly horizontal formations of the Apache group. Large bodies of diabase have been intruded into the strata at various horizons. The Sierra Ancha forms the east side of the Tonto Valley and the north side of the Salt River Valley. Cherry Creek has cut a canyon about 4,000 feet deep along the east side of the Sierra, separating it from another high, rugged plateau. Farther east this second plateau is deeply trenched by Canyon Creek, forming a canyon nearly as deep as that of Cherry Creek.

At numerous places within this area asbestos has been found in favorable beds of the Mescal limestone. Several mines have been productive, and there are a great number of smaller prospects.

Public Domain

Rosa Claims

The Rosa group of 10 contiguous claims is owned by Elias Sandoval, Adelfino Gonzales, and Ygnacio Ruiz and held under lease by John V Bustamante, Jr. The claims are in the Sierra Ancha Mountains, in secs. 7, 8, 17, and 18, T. 6 N., R. 14 E. of the Tonto National Forest. This locality, 50 miles north of Globe, is reached by taking the Globe-Young road to the Reynolds Creek Ranger Station and turning east on the Reynolds Falls mine road. A turn north 2.3 miles from the Ranger Station is made on a graded Forest Service road for 0.4 mile to the camp site at Cienega Spring, from which a trail leads north for one-half mile to Rosa No. 1 claim. The remaining claims are at the same general altitude around the mountain to the west.

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History

The original location of 20 claims was made by William Andrews, probably in the late 1920's. Later title to the claims passed to Apolonio Rosales, and in 1938 F. E. Chisum relocated many of the claims as the New Deal group. After the death of Chisum in 1951, 10 of the claims were relocated by Sandoval and partners. Bustamante secured a lease on the group in 1953.

Only a small amount of asbestos has been produced from these claims.

Geologic Setting

The claims, numbered Rosa 1 to 10 from east to west, sideline each other along the southwest side of McFadden Horse Mountain at an average altitude of 6,150 feet. At the eastern end of the property the upper part of the Dripping Spring quartzite lies concordantly above a thick diabase sill that forms the lower part of Reynolds Creek valley. Above the quartzite the full thickness of the Mescal limestone and the upper siltstone member is present, overlain by Troy quartzite. Only the 4 eastern claims were investigated, as it was stated that only assessment work had been done on the remaining 6 claims.

Erratic, small deposits of asbestos occur along limestone bedding about 60 feet above the base of the Mescal formation. The only diabase observed in the limestone section was a discordant structure, cutting the beds on the east side of the property and a local, narrow sill well under the main mineralization of the No. 2 claim.

Mine Workings

Claim 1

North of the campsite and approximately 300 feet higher limestone ledges that continue westward are terminated abruptly on the east against decomposed and highly altered diabasic material that contains much magnetite, mostly in tiny granules. No asbestos was observed in the limestone adjacent to this discordancy. Several hundred feet southwest a northerly bearing, 15-foot adit and a nearby westerly bearing, 35-foot adit exposed a 6- to 10-inch poorly serpentinized band that contains several veinlets of glassy-harsh fiber.

Claim 2

About 800 feet west of the claim 1 workings, a lens of mineralization has been prospected by 2 adits connected by a raise and crosscut, and by short lateral drifts (fig. 12). Three mineralized zones are present in massive limestone beds, which strike N 60° W. and dip 9° NE. The lower zone consists of 2 stringers of 1/8-inch, semisoft fiber associated with very little serpentine. A 50-foot adit was driven northeast carrying this zone just above floor level. Two other zones 14 and 21 feet above this band were prospected by a 30-foot adit, and a 16-foot crosscut was driven southeast to connect with a raise from the lower adit.

In this latter work the middle zone, averaging 1/2 inch of semisoft fiber, was carried at floor level, and the upper zone, containing 1/2 inch of harsh fiber, was carried at the back of the adit and crosscut. Small-scale thrust faulting is present around the raise. A drift was driven 18 feet southeast, with the middle zone 4 feet above the floor. One to two inches of short, soft fiber in a 6- to 8-inch, poorly serpentinized band appears on the southwest wall. On the opposite

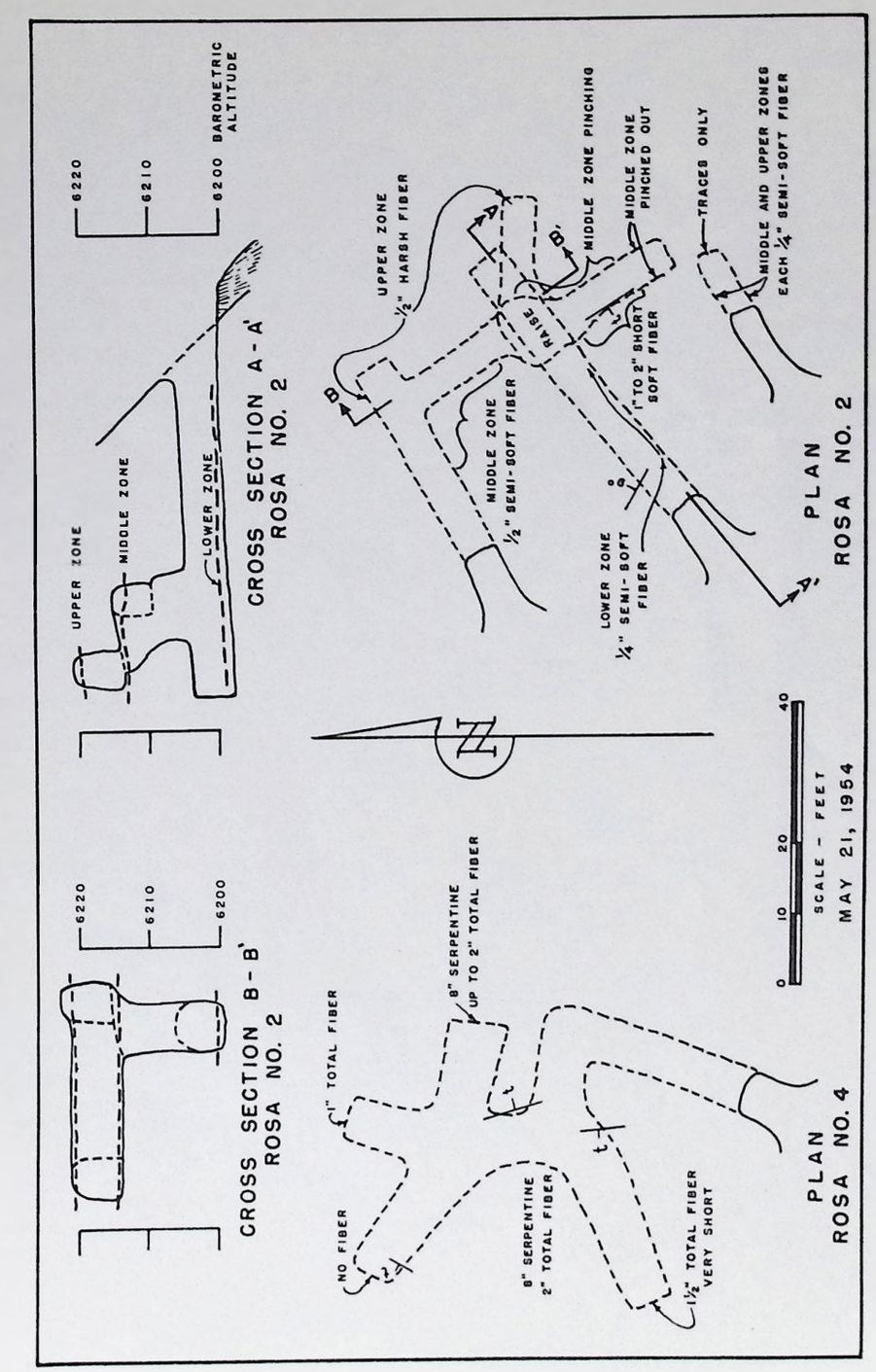


Figure 12. - Plan and sections of Rosa workings.

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side the mineralization is weaker, and the asbestos pinches out on both sides 12 feet from the raise. This middle zone passes under the floor of a 15-foot, east-bearing drift. The upper zone is exposed at the back of this drift, where it contains about one-half inch of harsh asbestos.

A third stub adit a short distance southeast exposes small quantities of semi-soft fiber in the middle and upper zones.

The lower zone is approximately 65 feet above the base of the Mescal formation. No diabase was seen near these workings.

A few hundred feet to the west, across a gulch, a 25-foot adit with a 10-foot left branch exposed 3 weak bands of mineralization, each 2 feet apart. The 2 upper bands each contained a 1/16- to 1/8-inch veinlet of spicular asbestos. The lower zone, at floor level, showed the best serpentinization on the property, a 2-foot band, which, however, contained only 1/2 inch of soft fiber with partings. Fifty feet further west and 10 feet lower, a 35-foot adit was driven under a narrow, decomposed diabase sill. There was little serpentinization and no fiber. Thirty feet lower on the hillside, a 30-foot adit was driven in shattered limestone that contained serpentinized bands with only traces of fiber. At the top of an unserpentinized, 12-inch layer of limestone, an unusual occurrence of chrysotile was noted that is interesting merely from an academic standpoint. A thin film of fiber appeared to be irregularly plastered to the limestone. A sample was taken, which when cut with a diamond saw indicated that strands of fiber were compressed in the vertical grooves of a stylolitic structure with an amplitude of about one-half inch.

The Rosa No. 4 adit was about 500 feet farther west. An adit and side drifts, totaling about 140 linear feet, were driven in an intricate pattern (fig. 12). Except for the northwest branch where the fiber pinches out at the face, asbestos is exposed throughout the workings. As at the No. 2 adits, the best mineralization was concentrated near small-scale thrust faults. The asbestos is good, soft quality but is characterized by numerous partings. The serpentinization is weak and the banding of the veinlets erratic, curling up and down around unserpentinized nodules.

The presence of asbestos mineralization on these claims with no visible nearby diabase intrusion is somewhat of an enigma. It could be explained by the supposition that the presence of the asbestos is the outer border phase of the mineralization related to a discordant diabase structure that may have existed on the valley side but is now entirely eroded away.

Loafer Claim (Old Knighton Property)

The Loafer claim was located in 1952 by Walter B. Lambert and Randolph Pete Johnson. This area was originally covered (1929) by the Zimmerman Dome claims of Knighton and Watkins and was locally known as the Knighton workings. The claims are in secs. 20 and 21, T. 5 N., R. 14 E. of the Tonto National Forest, about three-fourths mile east of the American Ores mine.

The property is reached from the Globe-Young Highway by turning east 33 miles north of Globe; after 1 mile on this road take the right fork and continue to the Roy Hitson ranch at the end of the road, a distance of 3.5 miles. The workings are on the mountain side 1 airmile west of the ranch house.

Geologic Setting

These claims are on the southerly trending Zimmerman Point ridge, on the southeastern slope of the Sierra Ancha Mountains at an altitude of approximately 5,700 feet. The cliffs above the workings are Troy quartzite, below which the upper Mescal siltstone member has a thickness of approximately 20 feet and is underlain by 50 to 60 feet of algal limestone. A thick diabase sill underlies the limestone, but the contact is obscured by overburden. The prospects are on the east side of a fault, west of which is diabase.

Mine Workings

The major work consists of a 128-foot adit driven N. 3° W. near the top of the virtually level bedded algal limestone segment. At the outcrop and for 15 feet into the adit, 2 serpentinized zones about 3 feet apart contain asbestos in an irregular, lenticular pattern. The top 6- to 8-inch zone carried at the back of the adit varies in fiber content from several narrow veinlets up to local lenses that contain 2-1/2 inches of solid fiber with partings. The asbestos is fairly harsh and of poor tensile strength. The lower zone is similar in occurrence but contains less fiber.

Fifteen feet from the portal crosscuts have been driven along a strong fracture for 30 feet west and 12 feet east. The mineralization weakens in both these crosscuts, as it likewise does in an easterly bearing, 8-foot crosscut 33 feet from the portal.

The 2 zones pinch out a few feet north of the fracture, but midway between them an 8-inch serpentine band develops and gradually thickens to 16-inches, with several narrow, soft fiber veinlets at the top and bottom of the zone. Fifty feet from the portal, this zone is split by a narrow limestone wedge that gradually pinches out the mineralization. Other discontinuous and erratic serpentinized zones appear at various positions in the drift walls but contain only traces of fiber. The face was barren.

The outcrop adjacent to the adit has been prospected by several shallow surface cuts, one of which connects with the west crosscut.

A few hundred feet west of these workings and at about the same altitude, a N. 30° E. adit 20 feet long was driven in beds warped by the fault. The bedding strikes N. 45° E. and dips 20° NW. Only weak serpentinization and a little fibrous calcite were observed.

Approximately 1,000 feet east of the main adit and 100 feet lower, another 20-foot adit was driven S. 80° W. in thin beds just below the base of the algal member. The serpentinization was weak and no fiber was seen. The formations here are virtually level.

Fort Apache Indian Reservation

Double Buttes Prospects

The Double Buttes property consists of three claims on the Fort Apache Indian Reservation. These claims were prospected by Glenn Ellison and William Henry Farrell in 1952, but there is no record of a lease application.

This location, in approximate sec. 34, T. 7 N., R. 15-1/2 E., unsurveyed, is 104 road miles north of Globe. The major outcrop, on claim 3, is reached by traveling east from the Rock House of the Q Ranch, passing through the Reservation fence at 1 mile, and continuing on a dim trail over boulder-strewn ridges for a total distance of 3-1/2 miles. It is then necessary to climb up the south side of the mountain, over the saddle between the buttes, and part way down the north slope. The outcrop is at an approximate altitude of 5,350 feet, or about 100 feet below the saddle.

Geologic Setting

The tops of the buttes are approximately 700 feet above the surrounding drainage and 200 feet above the saddle between them. Each hill is capped with Troy quartzite. The major prospect is on the north slope of the west butte where the upper siltstone member of the Mescal formation, underlain by a few feet of algal limestone rests concordantly on a thick diabase sill.

A second prospect is situated on a small limestone knoll 1-1/4 miles west-southwest of the above location. The thin-bedded and shaly limestone appears to be a remnant of the lower stratum of the lower Mescal member and is underlain by a thick diabase sill.

The Prospects

A 14-foot-thick stratum of massive but smooth-bedded algal limestone outcrops on a point extending north from the west butte. The limestone is overlain by a 4-foot bed that is mainly chert, above which are alternating bands of brown and black siltstone.

An asbestos-bearing serpentine band in the algal stratum 7 feet above a concordant diabase sill has been prospected by several pits. The southernmost cut was old and caved. Two recent cuts had been made 25 and 35 feet north. At each cut the asbestos content varied from 1 to 2 inches and contained numerous partings. The fiber was white and weak. Farther north, on the point of the hill, a bench cut exposed a 1-foot zone of poorly serpentinized material containing up to 4 inches of fiber and bone, mostly in narrow veinlets. The bottom band showed 1-1/2 inches of fiber of cottonlike consistency with virtually no tensile strength.

On the knoll 1-1/2 miles southwest of the above locality, sparse showings of short, weak fiber were present in a shallow pit above the diabase.

GLOBE ASBESTOS DISTRICT

For the purpose of this report, the Globe district is considered to include that area south of the Salt River district and within a 20-mile radius of Globe.

In contrast to the relatively level bedded formations in the Salt River and Sierra Ancha districts, postmineral block faulting has been prevalent in the Globe district. Discontinuous exposures of tilted Mescal limestone are widely dispersed over the district.

Asbestos mineralization has been found at various places in this area where favorable beds are in proximity to diabase sills.

Chuckwalla Claims

The three Chuckwalla claims were located in 1951 by Raymond Wilson, Ben Wilson, and Frank Meadows of Miami, Ariz. The claims are about 6 air miles northwest of

Maimi in approximate sec. 34, T 2 N., R. 14 E., unsurveyed, of the Crook National Forest, at an average altitude of 4,200 feet.

The property is accessible by traveling north on State Highway 88 (the Apache Trail) for 5 miles from its junction with U S. Highway 60-70, then west on the road up Gerald Wash for 5 miles. The workings are on a limestone hill immediately to the northwest.

Geologic Setting

The area is complexly faulted, forming relatively small, tilted segments in which the various members of the Apache group are exposed, as well as diabase and granite. The latter two also occur in masses that are miles in extent.

Within the limits of the property, a block of lower Mescal limestone forms the dip slope of a hill. This limestone segment, about 2,000 feet long by 1,000 feet wide, has a general northwest strike with dips ranging from 20° to 45° SW. It is intruded near the midpoint by a diabase plug; and a curving fault contact brings patches of Dripping Spring quartzite, Barnes conglomerate, Pioneer shale, and diabase against the west and south sides of the block. In a low saddle to the north, a diabase sill cuts off the limestone.

North of the saddle a small, detached segment of limestone contains a 20- to 30-foot stratum of algal limestone and 5 feet of lower Mescal member underlain and surrounded by diabase.

Prospects

Lower Limestone Block

Near the south end of the limestone a shallow cut, in beds striking N. 30° W. and dipping 30° SW., shows an 8- to 10-inch, undulating serpentine zone containing up to 3 inches of fiber, part of which is in 1-inch strands. The serpentine is white and chalky, and the asbestos is fairly harsh and weak. Locally, postmineral stresses have crushed and deformed the fiber veins.

Two more pits near the diabase plug and one to the northwest near the fault shows similar mineralization, but the fiber is generally short. In all exposures, the physical condition of the fiber seems to be due to surficial weathering rather than to initial harshness. As the mineralized bed is only 2 or 3 feet below the surface on a dip slope, there is no possibility of gaining depth.

Upper Limestone Block

This segment of limestone forms a knoll about 400 feet long, underlain by a generally concordant diabase sill. On the north side of the knoll in a cliff face a 10-inch, weathered serpentine zone contains numerous, narrow veinlets of asbestos. This band is in massive-bedded limestone immediately under the base of the algal member and 5 feet stratigraphically above the sill. The formation strikes N. 60° E. and dips 35° SE. A diabase structure south of the knoll appears to cut off the limestone within 100 to 150 feet down dip.

Limestone exposures northeast and southeast of the property show serpentinization, but no asbestos has been found.

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MISCELLANEOUS DEPOSITS

Hewitt Wash Deposits (Pinal County)

Asbestos mineralization occurs in one locality in Hewitt Wash in northeastern Pinal County, and a second deposit has been reported. This locality, in unsurveyed T. 1 S., R. 11 E. of the Crook National Forest, is accessible via the old Queen Creek road, which branches north from U. S. Highway 60-70, 2 miles east of Florence junction. Northeast of this junction 4.7 miles a ford across Queen Creek leads north to the mouth of Hewitt Wash directly opposite.

This ford also is accessible from Superior by traveling 4.5 miles west on U. S. Highway 60-70 and turning northwest on the old Queen Creek road. Turn north across Queen Creek 4.7 miles from this junction as before.

Hewitt Wash is so named on the Federal Geological Survey Pickett Post Mountain quadrangle sheet, but locally it is known as Martinez Sand Wash.

The higher ridges and hills on either side of Hewitt Wash are mainly Tertiary volcanic rocks. Numerous faults have broken and tilted the formations. Occasional blocks of Apache sediments are exposed on the sides of the wash.

Lucky Lager Claims

The Lucky Lager group of four claims was located in January 1954 by Howard Hunt and Hewitt Wolfe of Globe. The property is 7 airmiles west-northwest of Superior, in approximate sec. 22, T. 1 S., R. 11 E., unsurveyed. It is 1.6 miles up Hewitt Wash from the ford previously mentioned. At this point claim 1 is on the east bank of the wash.

Geologic Setting

Lucky Lager claim 1 covers part of a relatively low east-west-trending ridge connected with the south side of Roblas Butte by a diabase saddle. Tilted Mescal limestone, intruded and underlain by diabase, is exposed along the top and part way down the sides of the ridge. Asbestos mineralization occurs in one of the limestone units.

The Prospects

The limestone strata that outcrop across the ridge have a general strike to the northeast, with observed readings varying from 20° to 80° and dips ranging from 25° to 50° SE. One massive-bedded unit, approximately 40 feet thick, has been separated from the main mass of limestone by a 30-foot-thick concordant diabase sill and is overlain by diabase that forms the eroded slope down the northwest side of the hill. Only the edge of this tilted limestone unit is visible, projecting a few feet above the diabase.

At the south end of this outcropping limestone bed, a shallow cut on the upper side near the diabase contact exposes a 6- to 8-inch poorly serpentinized band containing an inch of harsh fiber in 1/16- to 1/4-inch veinlets. A nearby cut to the east shows similar mineralization. A zone on the lower surface, about 3 feet above the underlying diabase, shows narrow stringers of asbestos separated by bone serpentine.

The general appearance of these massive beds suggests that this limestone is in the algal member, which here is smooth bedded and lacks the characteristic algal structures.

The other three claims of this group are along the mountain to the north and were located for minerals other than asbestos.

El Marmol Claims

Asbestos mineralization was reported on the El Marmol claims by J. A. Gordon, one of the owners, who said it was accidentally discovered while prospecting the four claims for other minerals. This property, in approximate sec. 14, T. 1 S., R. 11 E., unsurveyed, is about 2.5 miles up the wash from the Lucky Lager claims.

Investigation of this area showed a fairly thick section of lower Mescal limestone with a southeast dip overlying Dripping Spring quartzite near stream level. The limestone was cut off by a nearly vertical, discordant diabase structure trending N. 80° E.

No guide was available for this examination. The location monument of claim 1 was found on the diabase-limestone contact, but no asbestos was observed in this locality.

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