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ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES AZMILS DATA

PRIMARY NAME: MIDNIGHT OWL

ALTERNATE NAMES:

EL ORO
RAND GOLD MINES
LITHIA KING

YAVAPAI COUNTY MILS NUMBER: 218B

LOCATION: TOWNSHIP 8 N RANGE 2 W SECTION 31 QUARTER NW
LATITUDE: N 33DEG 59MIN 56SEC LONGITUDE: W 112DEG 30MIN 47SEC
TOPO MAP NAME: RED PICACHO - 7.5 MIN

CURRENT STATUS: PAST PRODUCER

COMMODITY:

BERYLLIUM
LITHIUM PEGMATITE
COLUMBIUM COLUMBITE
TANTALUM
BISMUTH

BIBLIOGRAPHY:

ADMMR MIDNIGHT OWL FILE
ADMMR EL ORO GROUP FILE
AZBM BULL 180 MIN. & WATER RES. AZ 1969 P 98
USBM RECON OF BERY-BEARING PEGMATITE DEPTS
IC 8296 1966 P 22
JAHNS, PEGMTITE DEPTS WHITE PICACHO DIST AZBM
BULL 162 1952 P 98

MIDNIGHT OWL MINE
(Lithia King)

NW $\frac{1}{4}$ Sec. 31, T8N, R2W

YAVAPAI COUNTY

SEE: ABM Bull. # 162 p. 18, 22, 25, 26, 28, 31,
37, 39, 40, 45, 48, 59,
65, 66, 69, 73, 74, 77, 98

ABM # 180 p. 98, 110, 108, 208, 209

USBM IC 8298 p. 22

Occurrence and Alteration of Lithium Minerals, White Picacho Pegmatites, AZ
by David London, Geology File - 1979, p. 19, 20, 23, 26-32, 36, 39,
51, 62, 76, and plate 5

MILS Sheet sequence number 0040251405

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

INFORMATION FROM MINE CARDS IN MUSEUM

ARIZONA

1372 Beryl

YAVAPAI COUNTY

MIDNIGHT OWL MINE

MILS #218 B

3-AKA's

midnight owl (file)

MIDNIGHT OWL

YAVAPAI COUNTY

KAP WR 8/22/86: During the last year a test lot of ore from the Outpost Mine (file) and the Midnight Owl Mine (file) was milled to recover tantalum and any other recoverable minerals. A pilot gravity mill was temporarily erected at Anderson Camp at the base of the Anderson Mill. The mill used Sid Anderson's Wifley table and rented crushing and grinding equipment.

KAP WR 8/22/86: Steelhead Resources has hopes of acquiring Fansteel's interest in the Outpost Mine (file) and the Midnight Owl (file).

KAP WR 7/1/88: Rupert Spivey, New Mexico was in to discuss the sodium feldspar market. He is investigating the possibility of producing it from the White Picacho District. He has obtained leases from Fansteel on the Outpost (file), the Homestead Claim (file) and the Sunrise (Midnight Owl Mine - file) all in Yavapai County. He reported that Fansteel owns the properties having completed their purchase from Sidney Anderson. He also reported that Fansteel is returning part of the Midnight Owl property to Sidney Anderson. Steelhead Resources (card) no longer has an interest in the district.

MIDNIGHT OWL

YAVAPAI COUNTY

KAP WR 7/12/85: It was rumored that Fannsteel's plans to produce tantalum from the claims they acquired from Sid Anderson (see Homestead file and Midnight Owl file) has been postponed awaiting further evaluation of the economic viability of the proposal.

KAP WR 8/23/85: Rupert Spivey was in for suggestions of possible markets for potential byproducts from Fannsteel's planned mining and milling operation for tantalum at the Anderson Pegmatites (see Homestead - file and Midnight Owl- file) White Picacho District, Maricopa-Yavapai Counties. From Mr. Spivey's comments it appears there is again a general go-ahead for some type of operation. Possible byproducts include beryl, quartz, mica, feldspar, bismuth minerals and lithium minerals.

KAP WR 6/20/86: While in route to properties in other parts of the White Picacho District, Yavapai County it was noted that there are fresh tailings at the base of the mill at Anderson Camp. These are likely the result of a pilot mill test on the tantalum ores at the Midnight Owl (file), Outpost (file) and the Homestead (file) mines, White Picacho District, Yavapai County by Fansteel Metallurgical Corporation (card). There was no one at Anderson Camp.

KAP WR 8/22/86: Rupert Spivey has left Fansteel and is working for Stealhead Resources, Ltd., Spokane, Washington to develop the Sunrise Mine (see Midnight Owl Mine - file) to produce feldspar.

KAP WR 8/22/86: Sid Anderson and one of the owners of Hiway Ceramics in Yuma formed a partnership to renew the State lease on the Sunrise Mine (see Midnight Owl Mine -file).

KAP WR 8/22/86: Fansteel has backed off considerably on their plans to develop the Outpost Mine (file) and the Midnight Owl Mine - file for tantalum.

CJH WR 8/29/80: Sidney Anderson, 602 W. University Drive, Mesa, Arizona 85201, phone 964-6934, reports that Fansteel is interested in columbium, tantalum claims. They will purchase 30 lode and placer claims in San Domingo Wash and Trilby Wash, owned by Mr. Anderson.

NJN WR 2/5/82: Visted the White Picacho pegmatite district, Yavapai County with Ken Phillips. Our objective was to gather some beryl samples and check on activity in the area. At the Homestead Claim (Midnight Owl Mine File, Yavapai County - Maricopa County) we ran into Sidney Anderson who showed us some hand cobbled beryl that was stockpiled. He also showed us some in place in a working face.

NJN WR 1/27/84: Sandra Doud, 14008 N. 61st Ave., Glendale, AZ. 85306, Ph: 978-5179 brought in beryl and other minerals for identification from the Midnight Owl Mine and Trilby Mine (f).

NJN WR 3/15/85: Rupert Spivy with Fansteel Inc. (c) visited. He reported that Fansteel has purchased most of Sidney Andersons (c) Claims in the White Picacho District (Outpost (f), Homestead (f) Midnight Owl (f)). Mr. Spivy will be moving out to the claims to set up their mining operations. Mining will begin at the Outpost (f) Yavapai County and Outpost Extension Claims with tantalum being of primary interest. A pilot gravity mill consisting of spirals and tables with a capacity of 30 tons per day will be set up first. A drilling program on 10' centers is planned to further define the tantalum zone before mining. Initially only tantalum will be produced, other materials will be stockpiled. Later it is hoped feldspar and some other products can be shipped.

KAP WR 5/17/85: Mr. Hal McGarr of Fansteel Metallurgical Corporation, One Tantalum Plaza, North Chicago, ILL. 60064 (c) came in to the office. He is working with Robert Spivy, also of Fansteel. They have set up an office in Wickenburg which they are sharing with Milton Hood and can be reached by phone by 684-7843. Their Arizona mailing address is P O Box 205, Morristown, Arizona 85343. Their efforts are still directed towards developing the tantalum resources of the claims they purchased from Sidney Anderson, the Outpost (file), Homestead (file) and the Midnight Owl (file). Production of co-products such as beryl, mica and feldspar were discussed.

VERBAL INFORMATION SUMMARY

MINE: Midnight Owl

COUNTY: Yavapai

DATE: 12/23/94

BY: Diane Bain

Gary Branum, 221 E. 2nd Avenue, #10, Mesa, AZ 85210, phone 969-8195, reports he has filed on the main workings of the Midnight Owl. After access problems with the owner of the Independence Mine are resolved, Braunum welcomes rockhounds to visit and collect on his claims.

Information for files:

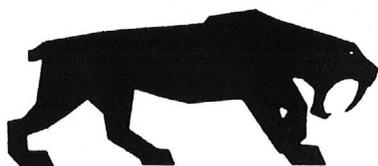
November 20, 1987

filchito (F)
Monsieur. ouc (f)
KINGMAN FELDSPAR MINE (F)

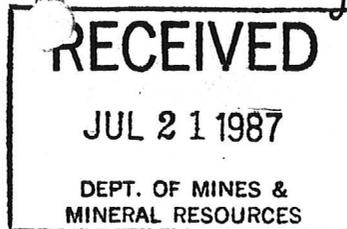
KC
11/25

From: John H. Jett

Received a telephone call from Wally McGregor, President of Steelhead Resources. They are giving up their feldspar property near Wickenburg and plans for a plant. They have purchased Tenneco's zeolite business and another property near San Bernardino which is closer to their plant in Santa Fe Springs. However, their ultimate goal is to eventually move their plant to the desert near Wickenburg in about 1½ years or so.



**saber
communications
international**



business news

JULY 22, 1987

FOR IMMEDIATE RELEASE

CONTACT: WALLACE MCGREGOR
(509) 467-5700

CLIENT: STEELHEAD RESOURCES, LTD.

BOB BATES
(714) 955-2552

STEELHEAD RESOURCES LEASES FANSTEEL CORPORATION'S ARIZONA
FELDSPAR MINES

PHOENIX, Arizona--Steelhead Resources, Ltd., Spokane, Washington, and Vancouver, B.C., Canada, today announced the augmentation of their high-grade feldspar reserves, in the White Picacho Mining District, near Wickenburg, Arizona, through the leasing of a group of 12 mining claims comprising 340 acres, from Fansteel Corporation, Chicago, Illinois. The White Picacho Mining District lies about ten miles east of Wickenburg, and forty-five miles northwest of Phoenix. Steelhead Resources is one of the leading producers of potassium and sodium feldspar in the western U.S. The announcement of the leasing was made by Wallace McGregor, president, Steelhead Resources.

"The acquisition of the Sid Anderson properties, announced previously on March 5, 1987, combined with the Fansteel lease provides Steelhead Resources with large reserves of high-quality feldspar in the White Picacho District," McGregor stated.

(more)

2081 BUSINESS CENTER DR., SUITE 180 • IRVINE, CA 92715 (714) 955-2552

According to McGregor, Rupert B. Spivey, Steelhead Resources' vice president of mining, is working to bring the mining operation into full production as rapidly as possible. Steelhead Resources is also expanding its feldspar mining operations at Daggett, in the Ord Mountains, near Barstow, California.

The feldspar ore from Arizona will be temporarily shipped to Steelhead Resources' milling plant at Santa Fe Springs, near Los Angeles. Planning is underway for the construction of a 300-ton-per-day flotation mill at the Wickenburg site.

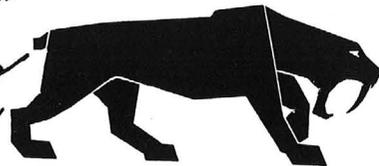
Steelhead Resources supplies high-grade sodium and potassium feldspar to manufacturers of ceramic glazes, sanitary fixtures, dishes, pottery and abrasives, in the western U.S. The company has recently expanded their marketing program to include overseas markets.

Steelhead Resources, Ltd., is a Canadian publicly held company that is traded on the Vancouver Stock Exchange. The company specializes in the exploration for, mining, processing and marketing of industrial minerals, and precious metals.

The company's U.S. corporate office is located at N. 9516 Division Street, Suite B, Spokane, Washington 99218, telephone: (509) 467-5700. Their Canadian office is at 330-885 Dunsmuir Street, Vancouver, B.C., Canada V7C 1N5, telephone: (604) 669-3404.

#

*John
Pls. note
Rathie
release
date
Bates
Bates*



STEELHEAD COMMUNICATIONS INTERNATIONAL
Business Center Dr., Suite 180, Irvine, CA 92715, U.S.A.
Worldwide Marketing/Sales Communications

Robert G. Bates, President
(714) 955-2552 Telex-277780-EXEC

STATE OF ARIZONA
DEPARTMENT OF MINERAL RESOURCES
MINERAL BUILDING, FAIRGROUNDS
PHOENIX, ARIZONA



*Anderson
Property
(Midnight Owl?)*

July 14th, 1952.

Alreco Metals Corporation,
50 Broad Street,
New York 4, N.Y.

Attn: Mr. E. G. Koch.

Dear Mr. Koch:-

Your letter of July 3d received.

It seems to be the rule that when your letters arrive I am out of town. I had a two-week vacation the last part of June, returning to the office on the 2nd but spent only one day before going into the field.

Your report of Mr. Anderson's actions is most surprising. I have never had any business dealings with him but I have met him frequently in the office and around his properties. He has seemed to be thoroughly dependable and above board.

When I saw his deposit of amblygonite it had just been discovered and no estimate could be formed of its probable size or productive capacity. I felt sure from the surrounding country, the size and persistence of the pegmatite dikes in general that he would have quite a supply of good clean amblygonite. That was in either 1947 or 1948 and it is my understanding that he has done considerable work on the property since then.

Whether his small plant, more or less of a type used for experimentation, can do any good on the amblygonite I cannot say. He has concentrated successfully other materials in small lots but I don't know much more about it.

I am sorry it has turned out so unsatisfactorily from your viewpoint. There is no way we have of exerting any pressure in the matter. We tried to help both parties.

Very truly yours,

A. L. Flagg.

WEEKLY REPORT

To: John H. Jett, Director
From: Ken A. Phillips, Mineral Resources Engineer
Subject: Weekly Report for Week Ending August 31, 1979

KAP

MONDAY, AUGUST 27

Sid Anderson reported the following results of analysis on clean feldspar from his mine: Probably from the NE corner of Section 16, T7N, R3W.

SiO ₂	60.0%	Al ₂ O ₃	23.2 %
K ₂ O	7.8%	Fe ₂ O ₃	0.86%
Na ₂ O	3.2%	(Some iron possibly from crusher)	

The corrogated feldspar (mixed feldspar and quartz) ran 85.4% SiO₂.

KP/WR 10/5/79 - Met with Sidney Anderson in Prescott on his way to the Kusisto's home in Mayer to check on some used equipment for sale by Ike. Mr. Anderson is pricing equipment for a possible feldspar mill to process feldspar-quartz pegmatite from his Sunrise Mine (claim) on the State School Section in his claim group area in the White Picacho District, Yavapai County (also possibly in Maricopa Co.).

ALRECO METAL CORPORATION
FERROUS AND NON-FERROUS METALS
50 BROAD STREET
NEW YORK 4, N. Y.

RECEIVED 7-7-52

ANSWERED _____

July 3, 1952

CONFIDENTIAL

Department of Mineral Resources
State of Arizona
Mineral Building, Fairgrounds
Phoenix, Ariz.

Attention Mr. A.L. Flagg, Office Engineer.

Dear Mr. Flagg:

You will recall the correspondence which we had with you in connection with our negotiations with Mr. Earl F. Anderson for amblygonite. You were very helpful to us in advising us regarding the formalities and also in getting us the necessary forms for a chattel mortgage.

We are sorry to report that so far this business has not worked out satisfactorily at all. Mr. Anderson has disappointed us greatly, because up to now he has not made any shipments at all and it appears now that many of the assurances he has given us are contrary to facts, and that we have greatly over-estimated his reliability. It transpires now that the advance payment, which we made to him and which he was supposed to use to acquire a bulldozer, was in fact not spent for this purpose and that the bulldozer has never been bought by him. We have the impression that he used our remittance for payment of old debts and consequently he is just in the same position as before being unable to operate his mine properly on account of lack of equipment.

In our special case he made a promise to ship 200 tons in May and after weeks of not responding to our reminders he made a new promise to ship these 200 tons in the first half of June. Again this promise was broken, and he assured us then that he would ship 50 tons of material on June 25th. Also this shipment was not forthcoming, and we have not heard from him for the last two weeks.

We have warned him repeatedly that while we did not want to hurt him, he would have only himself to blame if

Dept. of Min. Resources,
Phoenix, Ariz.
7/3/52

his attitude would lead to very stern measures. We have not left him in doubt that apart from being responsible for the financial loss which he has caused us there may also be a criminal and fraudulent side to this matter, because he obviously accepted a payment from us under false pretenses. Since all this does not seem to have the desired effect, we see no way than to open proceedings against him. We would appreciate it very much if you would kindly let us know the names of some suitable firms of lawyers in Phoenix, who can represent us in our proceedings against Mr. Anderson.

We are very sorry about this development but it seems now that Mr. Anderson does not possess the sense of responsibility necessary for concluding a business of this nature. He does not seem to realize that if he accepts commitments and even pre-payments and if he gives assurances and fixes dates for shipments, the other fellow expects him to do his share and to fulfill his contract. We are also unfavorably impressed by some fanciful story he wrote us about his intention to improve his ore by gravity separation. Apparently he has neither the ~~equipment~~ ^{equipment} nor a conception of the technical requirements involved for this method.

We do not know whether you are able to exert pressure on him to fulfill his obligations or whether you can give us any advice. Needless to say that incidents like this are doing harm to the legitimate and reliable miners. Our willingness to give Mr. Anderson a break and to help him in the development of his mine has met with very deplorable results, and you will understand that in future we will be very hesitant to take similar risks again.

Thanking you again for your kindness and looking forward to hearing from you, we remain

Very truly yours,

ALRECO METAL CORPORATION


E.G. Koch

EGK/br

perthite is virtually free from interstitial quartz, but massive quartz is present as core segments, which form 5 per cent to 25 per cent of the rock.

In many places the pegmatite is transected by numerous tiny, irregular veinlets of sugary quartz, and by even thinner veinlets of fine-grained, waxy, yellowish green muscovite. Some prisms and stubby, rounded crystals of schorl are concentrated along fractures, and others are scattered irregularly through the rock. Garnet is a rare constituent of the outer zones, and a few small, tabular crystals of columbite occur within and adjacent to the large quartz masses in the inner part of the pegmatite body.

The deposit has some promise as a source of high-quality potash feldspar. Little interstitial quartz and mica are present in the part of the perthite-rich intermediate zone that is best exposed in and above the Main cut, where an average of approximately 18 per cent of coarse quartz does occur in the form of core segments. This quartz could be removed by hand cobbing, and about 400 tons of commercial feldspar could be recovered from the zone to a depth of 20 feet. The reserves of high-grade material might well be considerably greater than this, however, as the inner part of the intermediate zone almost certainly extends to greater depths. Moreover, abundant medium-grade feldspar is present in the much more extensive outer parts of the intermediate zone, and reserves of such material that could be recoverable by hand sorting probably amount to at least 500 tons per 10 feet of depth in the pegmatite body.

* MIDNIGHT OWL (LITHIA KING) MINE

The Midnight Owl pegmatites (18, Pl. I) are in the northeastern part of the district, a short distance north of the divide between the Trilby Wash and Buckhorn Wash drainages, and lie in the north half of the NW $\frac{1}{4}$ of sec. 31, T. 8 N., R. 2 W. They are exposed along the steep north slope of Independence Gulch, and can be reached via San Domingo Wash or Trilby Wash over ungraded truck roads. Since the summer of 1950, two of the deposits have been worked for beryllium, lithium, and columbium-tantalum minerals by the owners, Earl F. Anderson and Sidney B. Anderson of Mesa.

Several pegmatite dikes are exposed in the mine area, where they form a belt that trends nearly due east. Though broadly tabular, they are very irregular in detail, and bulges, thick, stubby projections, and long, thin, branches are common (Pl. XXIV). The principal dike trends east, but its component segments and major branches are elongate in northeasterly, easterly, and southeasterly directions. It terminates westward in a very large bulge that measures 80 by 140 feet in its nearly rectangular outcrop plan, and a slightly smaller bulge marks the junction of major branches in the eastern part of the mine area (Pl. XXIV). In the central part of the area is a third bulge, 90 feet long and about 40 feet in outcrop breadth, and from it major branches extend southward and northwestward. Between bulges

the main dike is 15 feet to 25 feet in outcrop breadth. Most observed contacts between pegmatite and country rock are steeply inclined, but gentle to moderate dips appear along the margins of the major bulges (Pl. XXIV).

Nearly all of the mining has been done in the thick eastern and western bulges of the main pegmatite body. Open-cut methods have been employed thus far. The irregular Upper cut, in the northeast part of the west bulge, is 40 by 50 feet in plan and 25 feet in maximum depth. The Lower cut, about 250 feet to the east, is a slightly smaller opening in the central part of the east bulge (Pls. XV, XXIV).

The country rock in the mine area is mainly a dark gray quartz-hornblende-mica gneiss, in which a well defined foliation trends northeast and dips steeply northwest through most of the mine area. Exposed on the hillside immediately west of the main pegmatite body are numerous thick layers of silvery gray quartz-muscovite schist that contains scattered metacrysts of garnet, chloritoid, and altered staurolite. Schorl is locally abundant in both of these rock types near the pegmatite contacts. The schist and gneiss occur as inclusions and septa in most of the pegmatite dikes, and are particularly abundant near the margins of some bulges. A large septum of schist is exposed in the northwest part of the Upper cut, and several wallrock inclusions have been encountered during the course of mining in the Lower cut (Pl. XXIV). Two tabular masses, 3 feet in average thickness, of greenish gray, punky appearing rock may be post-pegmatite dikes of intermediate to basic composition.

The border zone of the main pegmatite body and its principal offshoots is a fine- to medium-grained aggregate of quartz and albite, with subordinate perthite, schorl, apatite, muscovite, and beryl. It is particularly well exposed in the Upper cut and on the lower hill slope to the southwest of this cut, as well as at the north end of the Lower cut.

The wall zone is similar in mineralogy to the border zone, but contains a higher proportion of potash feldspar and is much coarser grained. It ranges in thickness from a knife edge to at least 20 feet, with an average of about 3 feet. Most of this outer-zone pegmatite is readily recognized, even in areas of few outcrops, by concentrations of schorl, which form dark-colored crystals as much as 8 inches long and locally constitute more than half of the rock. Some of these crystals are grouped in aggregates 5 inches to 12 inches in diameter, but most are scattered irregularly as individuals, or are intergrown with quartz in crudely graphic pattern.

Apatite forms rough, thickly tabular crystals in much of the wall-zone pegmatite. The largest of these are very dark green, and some of them are marked by outer rims of distinctly lighter color. Beryl occurs as scattered anhedral crystals $\frac{1}{8}$ inch to $3\frac{1}{2}$ inches in maximum dimension. It is pale green to white, and in places constitutes as much as 40 per cent of the rock. Biotite and muscovite are locally abundant in both wall and border

zones, especially within and adjacent to thin wisps of partly digested country rock.

The outer intermediate zone is a coarse- to very coarse-grained, granitoid aggregate of flesh-colored perthite and gray quartz, with subordinate spodumene, albite, and schorl. Less common constituents, in general distributed irregularly through the rock, include muscovite, lepidolite, beryl, and amblygonite. This zone is fairly continuous in and near the main pegmatite bulges, where it is 5 feet to 30 feet thick. It is the chief unit that has been mined in the Upper cut (Pl. XXIV), where spodumene and a little amblygonite have been recovered. The spodumene is pale bluish, pinkish, and dark pinkish gray, and forms wedge-shaped crystals less than 2 inches long. These commonly are fringed with albite, and in places have been altered to very fine-grained, dense, waxy-appearing aggregates of muscovite that are pale yellow to greenish gray.

As traced in a direction away from the walls in the eastern parts of the main dike, the outer intermediate zone coarsens markedly and grades into another intermediate zone that contains less spodumene and more perthite. This coarse- to very coarse-grained unit varies considerably in composition from place to place, but in general consists of perthite and quartz, with subordinate albite and muscovite, and minor spodumene and schorl. It is well exposed on a small ridge about 25 feet southwest of the Lower cut, and constitutes the major part of the exposed pegmatite in the central bulge (Pl. XXIV). Although it contains some widely scattered plates and laths of spodumene, this zone seems to be analogous in position and relative age to the outer part of the spodumene-free perthite-quartz zone that appears as a very thick, curving lens in the west bulge (Pl. XXIV).

The innermost zones of the two main bulges differ more markedly, as shown in Table 6. In the west bulge the perthite-quartz intermediate zone grades inward into a hood-like unit of massive quartz, and this unit in turn grades into the innermost intermediate zone, which consists of massive quartz with very large, elongate crystals of spodumene (Pl. XXIV). The core, which is exposed on the ridge immediately west of the open cut, is very coarse-grained quartz-amblygonite pegmatite.

The lithium minerals in these innermost zones form some very large crystals. Many of the spodumene logs and laths are at least 3 feet long, and a few are as much as 11 feet long and 10 by 18 inches in section. Most of these crystals are partly altered, and range in color from light gray through pinkish and bluish gray to very dark gray. Under the microscope, however, many of them appear surprisingly fresh, although mica and clay minerals are present along numerous closely spaced fractures and cleavage planes.

Some of the amblygonite in the core forms rough, nearly equidimensional masses 12 inches or less in diameter, and many of these show crude but distinct crystal form. Other masses are much larger, and one unusually large pod, 20 feet in maximum

PEGMATITE DEPOSITS OF THE WHITE PICACHO DISTRICT 101

TABLE 6.—GENERAL CORRELATION OF EXPOSED ZONES IN MAJOR BULGES OF MIDNIGHT OWL PEGMATITE BODY

Zone	General texture	West bulge	Central bulge	East bulge
Core		Quartz - amblygonite pegmatite		Quartz - spodumene - perthite pegmatite
Intermediate zones	Very coarse grained, non-granitoid	Quartz - spodumene pegmatite	Quartz - spodumene pegmatite	Perthite - quartz - albite - spodumene pegmatite, with beryl, columbite-tantalite, lepidolite, and phosphate minerals
		Massive quartz	Perthite - quartz pegmatite, with local pods of massive quartz	
		Perthite - quartz pegmatite	Perthite - quartz - albite - muscovite pegmatite, with minor spodumene and schorl	
		Coarse to very coarse grained, mainly granitoid	Perthite - quartz - spodumene - albite pegmatite, with minor schorl, micas, beryl, and amblygonite	
Wall zone	Medium to coarse grained, granitoid	Perthite - quartz - albite pegmatite, with some schorl, micas, and beryl		
Border zone	Fine to medium grained, granitoid	Quartz - albite - schorl - perthite pegmatite		

exposed dimension, appears to be an aggregate of crystals 3 inches to more than 4 feet in diameter. Associated with the spodumene and amblygonite are individual crystals and coarse aggregates of lepidolite and schorl. Much of the lepidolite occurs with cleavelandite, and the distribution of these two minerals is clearly controlled by fractures in the host quartz, spodumene, and amblygonite.

In the east bulge the second intermediate zone grades inward into a thick, lens-like zone of perthite-quartz-albite-spodumene pegmatite that also contains amblygonite, apatite, beryl, columbite-tantalite, lepidolite, lithiophilite-triphyllite, and spessartite. This unit in turn grades into the innermost exposed zone, which consists of dark-colored massive quartz, coarse lath spodumene, and minor blocky perthite. Some albite is also present as interstitial aggregates, irregular veinlets, and locally as prominent stockworks in the quartz. This zone probably corresponds in position to the inner intermediate zone of the west bulge (Pl. XXIV, Table 6), and hence further exploration of

the east bulge might well reveal a core of quartz—amblygonite pegmatite.

The spodumene in the two inner units of the east bulge occurs typically as a mesh of lath-shaped and log-shaped crystals, most of which are chalky and considerably altered. Some are replaced pseudomorphically by lepidolite, pink muscovite, and albite. Interstitial to the spodumene crystals are very coarse-grained quartz and perthite, as well as cleavelandite, sugary albite, dark bluish gray apatite, white to pale greenish blue amblygonite, white to pale yellowish green beryl in anhedral crystals $\frac{1}{2}$ inch to 11 inches in maximum dimension, thinly tabular to stubby crystals of columbite-tantalite as much as 5 inches in diameter, and scattered but locally abundant prisms of schorl. Golden brown to wine-colored euhedral crystals of spessartite are scattered irregularly through the rock. Amblygonite and apatite are most closely associated with the spodumene, and some flesh-colored lithiophilite-triophylite appears as large, irregular groups of crystals that are stained by manganese oxides. Bismutite and other bismuth minerals are present as fracture fillings and small, pod-like masses, especially in the quartz-rich parts of the zones.

Most of the lithiophilite-triophylite forms crudely faced crystals $\frac{1}{2}$ inch to 5 inches in diameter, and some clusters of such individuals are as much as 24 inches in maximum dimension. All the crystals thus far exposed are thickly encrusted with manganese oxides, which also stain the adjacent crystals of quartz, feldspar, spodumene, and muscovite. Needle-like crystals of purpurite and strengite form felted masses that line tiny vugs and open fractures in the manganese oxides, and they also occur with stewartite along fractures in the lithiophilite-triophylite.

The west bulge has been mined for spodumene, and in addition is a potential source of commercial amblygonite and beryl. At least 1,800 tons of pegmatite that contains approximately 8 per cent of coarse-grained spodumene appears to be present to a depth of about 30 feet, and the reserves may prove to be much greater when the vertical dimensions of the intermediate zones this and the central bulge, and in at least three exposures with cent to 40 per cent of the border zone and wall zone in both this and the central bulge, and in at least three exposures with areas of 40 square feet or more this mineral forms approximately 6 per cent of the rock. Nearly all the crystals are too small for recovery by hand sorting.

The east bulge has been worked for spodumene, beryl, and columbite-tantalite. The rock thus far mined has contained an average of approximately 6 per cent of spodumene and 1.1 per cent of beryl recoverable by hand sorting. This intermediate-zone beryl is much coarser than the wall-zone crystals in the other parts of the dike. Although the spodumene-beryl-columbite ore is well exposed in the 12- by 20-foot face of the Lower cut, exposures beyond the cut to the west and southwest are so poor,

and the general structure of the dike is so imperfectly known, that no meaningful estimate of reserves can be made at the present time.

INDEPENDENCE PROSPECTS

Additional deposits of spodumene, amblygonite, and beryl occur south of the Midnight Owl workings, chiefly in two pegmatite dikes that are exposed high on the opposite side of the canyon (19, Pl. I). These dikes, which lie on the Independence claim, are very irregular and in general seem to be thinner than those on the Midnight Owl property.

Neither of the dikes is well exposed for its entire length, but both plainly contain discontinuous, beryl-bearing border zones, as well as lens-shaped, lithium-bearing inner zones. The border zones and adjacent parts of the wall zones are medium- to coarse-grained aggregates of perthite, plagioclase, and quartz, with subordinate beryl, apatite, and schorl. The beryl is anhedral, and few of the crystals are more than 2 inches in maximum dimension.

Spodumene and a little amblygonite occur in quartz-rich intermediate zones and segments of the core, where they are associated with scattered coarse crystals of perthite and with irregular aggregates of albite and lepidolite. A few pods of "burr rock," comprising fine-grained to medium-grained book muscovite in massive quartz, are scattered through the inner parts of both dikes. Some of this rock also contains a little spodumene and fine-grained albite.

LONG DIKE MINE

A very large, mica-bearing pegmatite dike crops out boldly a short distance north of the Midnight Owl workings, and extends across the line between secs. 30 and 31, T. 8 N., R. 2 W. A thinner, juxtaposed dike has been mined on a small scale for scrap muscovite by Earl F. Anderson of Mesa, mainly in an open cut near the bottom of a canyon that drains eastward into Independence Gulch (20, Pl. I). This cut is 30 feet long, 15 to 18 feet wide, and its 20-foot face is being advanced along the base of a high, nearly vertical cliff. Some of the mined material has been trucked about 5 miles to a small mill in San Domingo Wash, and some has been hauled about 50 miles to Aguila for processing.

The large dike is 15 feet to 50 feet thick, with an average thickness of about 25 feet, and is traceable for a distance of at least 1,800 feet along the strike. It is somewhat sinuous in plan, but in general trends N. 65° E. and dips 55° to 70° NNW. It is enclosed by greenstone and by amphibole schist and quartz-biotite schist in which a well marked foliation trends north-northeast and dips moderately to steeply west-northwest. Some layers of the country rock are impregnated with large amounts of muscovite, especially along and near contacts with the pegmatite.

Most of the large dike is a medium- to coarse-grained aggregate of perthite, quartz, plagioclase, and muscovite. Irregular intermediate-zone masses of graphic granite are common in the central parts of the dike, as are several pods of massive quartz. The pods are 6 inches to 10 feet in maximum dimension, and probably are segments of a discontinuous core. Some of them are studded with small but thick books of muscovite, and such masses of "burr rock" have been prospected for mica in several places. Accessory minerals in the pegmatite include garnet, schorl, apatite, and rare beryl. Beryl and columbite-tantalite also are present in tabular masses of quartz, 6 inches to 3 feet thick, that transect the outer zones of the dike at several places.

The smaller, mica-rich dike is about 10 feet thick, and diverges in an east-southeasterly direction from the main dike at the canyon bottom. It adjoins the main dike as traced southwestward from the point of junction, but tapers out approximately 25 feet beyond the open cut. The contact between the two dikes is smooth in detail, but some broad fluting is visible in the walls of the cut. A small fault, also exposed in the cut, displaces the main dike about 2 feet, but evidently antedates the other, mica-rich dike.

The smaller dike is mainly a fine- to medium-grained aggregate of albite, perthite, quartz, and very abundant muscovite, with a discontinuous border zone of quartz—muscovite "burr rock." All the mica occurs as crinkled, ruled, sheared, and torn books of green to yellowish green color, and most of these books are tightly intergrown. The mica content for the entire thickness of the dike ranges along the strike from 30 per cent to 80 per cent, and the average is nearly 40 per cent. The total tonnage of such pegmatite available for mining probably is not very large, however, as the pegmatite appears to pinch out not far beyond the cut.

NEW LOOKOUT PROSPECTS

Several muscovite-bearing pegmatite dikes have been extensively prospected on the slopes and ridges west of the Midnight Owl mine. These dikes (21, Pl. I) consist mainly of medium- to coarse-grained perthite and quartz, with widely scattered sugary albite. Small books of muscovite are abundant in the border zones, and larger books fringe pods of massive quartz in the central parts of the dikes. Some muscovite also occurs within the quartz pods to form "burr rock." None of these deposits contains as high a proportion of muscovite as the small dike that has been worked at the Long Dike mine.

LONE GIANT PROSPECT

The lithium-bearing Lone Giant dike (22, Pl. I) is exposed on the walls of Independence Gulch, about 2,800 feet east of the Midnight Owl mine, and lies in the SE $\frac{1}{4}$ of sec. 30, T. 8 N., R. 2 $\text{\textcircled{E}}$. This dike dips steeply, trends north, and is traceable

W

for a distance of several hundred feet along its strike. It appears to be 4 feet to 25 feet thick.

The dike comprises a fine- to medium-grained quartz—albite—perthite—schorl border zone, a coarser-grained wall zone of similar composition but with a higher proportion of perthite, an outer intermediate zone rich in coarse, blocky perthite, an inner intermediate zone of perthite, quartz, and lath spodumene, and a discontinuous core of quartz—amblygonite pegmatite. In general these zones are lithologically similar to those in the thickest parts of the Midnight Owl dikes.

Beryl occurs both as small, anhedral masses in the outer zones and as much larger, anhedral to subhedral crystals in the spodumene-bearing intermediate zone. The coarser beryl commonly is associated with tabular crystals of columbite. Lepidolite, albite, and some muscovite form scattered fine-grained aggregates in the inner part of the dike.

