

# Mica Deposits of the Blue Ridge in North Carolina

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GEOLOGICAL SURVEY PROFESSIONAL PAPER 577

*Work done in part in cooperation with the  
North Carolina Department of Conservation and  
Development and in part in cooperation with the  
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By FRANK G. LESURE

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*This report is based on work done by J. C. Olson,  
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# MICA DEPOSITS OF THE BLUE RIDGE IN NORTH CAROLINA

By FRANK G. LESURE

## ABSTRACT

Pegmatites in the Blue Ridge of North Carolina are important sources of sheet and scrap mica, feldspar, kaolin, and quartz. Small amounts of beryl, columbite-tantalite, monazite, samarskite, and uranium minerals also have been produced. The mica-bearing pegmatites occur in mica and hornblende gneiss and schist throughout the Blue Ridge province but are concentrated in the Spruce Pine and Franklin-Sylva districts.

The Blue Ridge is geologically complex; the rocks are mainly polymetamorphic orthogneisses and paragneisses and schists that are part of a large thrust sheet that has moved at least 30 miles to the northwest in the northern part of the area. This thrust sheet is bounded on the east by the Brevard fault zone and on the west by the Unaka Mountain belt which consists of metamorphosed and nonmetamorphosed late Precambrian and Cambrian sedimentary rocks in various complex folds and thrust-faulted blocks.

During an early Precambrian metamorphic period a thick sequence of sedimentary and volcanic rocks was altered to gneiss and schist. Parts of the sequence were migmatized to layered granitic gneiss and intruded by masses of granite and granodiorite. In the early or middle Paleozoic a second period of regional metamorphism resulted in the widespread intrusion of pegmatite associated in some areas with large masses of finer grained granodiorite. The pegmatites are in areas where the metamorphic intensity in the second period of metamorphism reached at least the kyanite-muscovite subfacies of the almandine amphibolite facies. Some deformation of the pegmatites occurred after crystallization, and later faulting in the pegmatites is probably related to a late Paleozoic deformation that culminated in widespread thrust faulting.

The pegmatites have a simple mineralogy and structure and range in composition from granite to granodiorite. The principal minerals are oligoclase, perthitic microcline, quartz, and muscovite. Biotite and garnet are the main accessory minerals, but a wide variety of other minerals has been found in minor amounts.

Two-thirds of the pegmatite bodies are tabular, a quarter of them are lenticular, and the remainder are of irregular shape. About half the bodies are discordant with the foliation of the enclosing country rock. Simple zoning has been reported in about 40 percent of the deposits but may have been overlooked in some others. The most common type of zoned pegmatite has a plagioclase-quartz-muscovite wall zone and a quartz or quartz-perthite core. A few deposits have perthite intermediate zones or cores. More than half the deposits are deeply weathered, and for many of these the geology is incompletely known.

Sheet mica generally is scattered throughout unzoned deposits or is concentrated in wall zones. In some deposits, mica is concentrated in shoots within a zone. The size and quality of the mica vary widely between districts, within districts, and even

within a single deposit. About 50 percent of the deposits contain some stained mica, about 15 percent contain mica with mineral intergrowths, and about 30 percent contain mica that has been deformed after crystallization.

Descriptive data are available on 1,350 mines and prospects. About 100 mines have an individual production greater than 10,000 pounds of sheet mica, but more than half of the deposits have produced less than 500 pounds each. Total production of sheet mica for the region is unknown. Production in recent years has been 25-50 percent of the total weight and 45-85 percent of the value of United States production. About half of the scrap mica and half or more of the feldspar produced in the country have come from the Blue Ridge area.

Reserves of sheet mica cannot be calculated but probably as much mica remains in the ground as has been mined. A few new deposits have been found in the last 20 years, but most of the recent production has been from old mines. Reserves of scrap mica, feldspar, and clay are extensive.

## INTRODUCTION

Since 1868 the pegmatites of the Blue Ridge in North Carolina have been among the principal sources of sheet muscovite in the United States. Production of feldspar, kaolin, quartz, and scrap mica has also been large; minor amounts of beryl, columbite-tantalite, monazite, samarskite, uranium minerals, vermiculite, zircon, and other minerals have been produced as byproducts. The production of sheet muscovite has not been continuous since mining began; the principal periods of production include 1867-85, 1896-1913, 1916-20, 1922-30, 1935-46, and 1952-62.

Since 1961 the Blue Ridge province has produced annually one-quarter to one-half of the sheet mica mined in the United States. This production represents 45-85 percent of the total value of sheet-mica production. Most of this mica has come from two districts in North Carolina: the Spruce Pine district in Avery, Mitchell, and Yancey Counties and the Franklin-Sylva district in Haywood, Jackson, and Macon Counties. The other districts in the Blue Ridge (fig. 1) have produced only small amounts of mica during recent years and have never been important producers.

The pegmatite districts of the Piedmont province (fig. 1), which have also been important sources of muscovite, are described by Jahns and others (1952-53).

## MICA DEPOSITS OF THE BLUE RIDGE IN NORTH CAROLINA

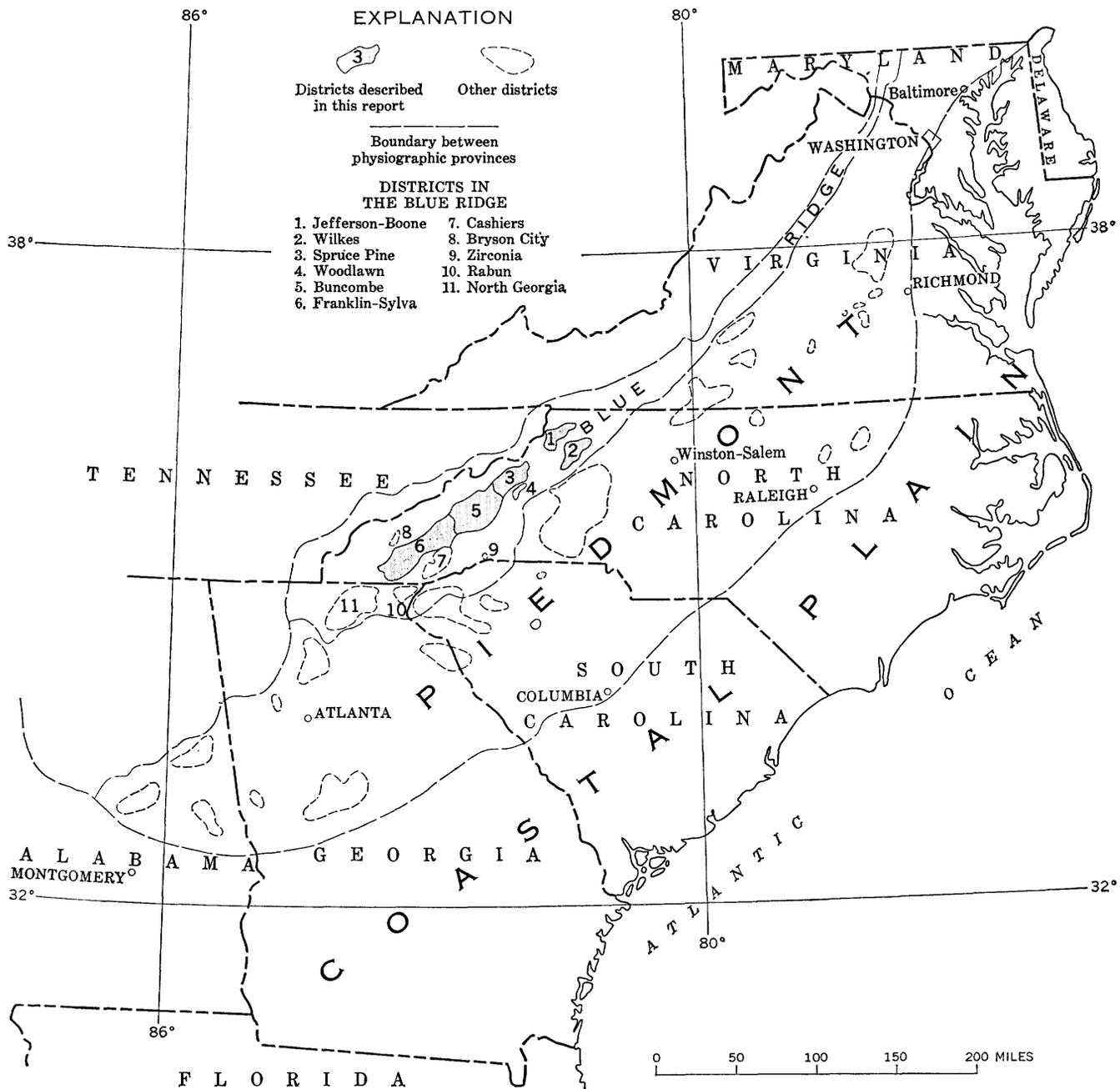


FIGURE 1. Map showing location of pegmatite districts in the southeastern United States.

#### INVESTIGATIONS

This report is based on studies of the mica deposits in the Blue Ridge of North Carolina made between 1939 and 1962 by geologists of the U.S. Geological Survey. From 1939 to 1945, 25 geologists and assistants mapped more than 200 mica deposits and examined nearly 800 others as part of the Survey's strategic minerals investigations (Kesler and Olson, 1942; Olson, 1944; Olson and others, 1946). The following men mapped in one or more of the principal districts in the Blue Ridge for

periods ranging from 2 weeks to several years: V.C. Fryklund, Jr. (1943-44), L. W. Goldthwait (1944), W. R. Griffiths (1943-45), J. B. Hadley (1944), E. W. Heinrich (1944-45), J. E. Husted (1944-45), W. P. Irwin (1944-45), R. H. Jahns (1944-46), T. L. Kesler (1939-41), M. R. Klepper (1943-44), D. M. Larrabee (1943-44), R. W. Lemke (1943-45), Roswell Miller III (1944), J. J. Norton (1943), J. C. Olson (1939-45), J. J. Page (1941-43), J. M. Parker III (1940-46), L. C. Pray (1944), W. C. Stoll (1943), and R. A. Swanson

(1945). Field assistants working for periods of 3–20 weeks included W. B. Allen (1943), Edward Ellingwood III (1944), P. W. Gates (1943), F. W. Hinrichs (1939–40), and L. W. Seegers (1943). The studies were under the supervision of T. L. Kesler (1939–41), J. C. Olson (1941–44), and R. H. Jahns (1944–46). During the period 1941–45 the work was done in cooperation with the North Carolina Department of Conservation and Development, and was integrated with the activities of the Colonial Mica Corp., an agent for the Metals Reserve Co.

Between 1945 and 1953, emphasis was placed on areal geologic mapping in the Spruce Pine district (Parker, 1952; Kulp and Brobst, 1956; Brobst, 1962), study of the feldspar deposits in the Bryson City district (Cameron, 1951), and examination of the pegmatites of the Cashiers and Zirconia districts (Olson, 1952). These studies were also done in cooperation with the North Carolina Department of Conservation and Development.

From 1951 to 1959 the Defense Minerals Exploration Administration (DMEA) and its successor, the Office of Minerals Exploration (OME), aided in the exploration for sheet muscovite by granting loans to individual operators. The exploration work was guided by the joint efforts of geologists from the U.S. Geological Survey and of mining engineers from the U.S. Bureau of Mines. The field examinations for the Geological Survey were made by D. H. Amos (1953–55), S. A. Bergman (1955–58), E. L. Boudette (1957), R. A. Laurence (1951–62), F. G. Lesure (1957–62), A. R. Taylor (1955–56), K. H. Teague (1951–55), and Hel-muth Wedow (1958) and for the Bureau of Mines by W. A. Beck (1951–59), S. A. Feitler (1957–58), A. L. Peyton (1951–57), and L. E. Shirley (1952–58). More than 500 deposits were examined, some of which were mines mapped during World War II. The DMEA program in the southeast was under the direction of R. A. Laurence, regional geologist for the U.S. Geological Survey and Executive Officer of District V of DMEA, and V. J. Lynch, of the U.S. Bureau of Mines, who was Acting Executive Officer of District V of DMEA.

Notes, maps, and written descriptions from all the investigations during the 25 years before 1963 have been used in preparing this report. No maps of individual deposits accompany this report, but maps of most of the important deposits are available either in reports by Olson (1944) and Olson and others (1946) or from U.S. Geological Survey open-file depositories, as indicated in table 4.

#### GEOGRAPHY

The Blue Ridge province, which forms the mountainous backbone of the Appalachian Highlands in the

southeastern United States, extends southwest from south-central Pennsylvania to northern Georgia for a total distance of 570 miles (fig. 1). The province is roughly wedge shaped. The northern half from Pennsylvania to Roanoke, Va., is less than 14 miles wide; summit altitudes rarely exceed 4,000 feet. The southern half of the province widens to a maximum of 70 miles in southwestern North Carolina and ends abruptly in northern Georgia. Many peaks and divides are above altitudes of 6,000 feet.

The Blue Ridge province is bounded on the southeast and around the southern end by the Piedmont province (fig. 1) and on the northwestern side by the Valley and Ridge province. The borders of the Blue Ridge are clearly defined in most places at the base of an abrupt slope, but, locally, the transition is too gradational to fix the boundary accurately.

In North Carolina the term "Blue Ridge" in its topographic sense is applied only to the main divide which lies near the southeastern edge of the province. The steep slope from the Piedmont to this divide is termed the "Blue Ridge front." The high linear mountain ridges along the northwestern edge of the province are called the Unaka Mountains. The mountain groups, ranges, and peaks between the Blue Ridge front and the Unakas generally lack a systematic orientation. The major valley bottoms are broad, but the slopes steepen rapidly along smaller streams. Slopes of 20°–45° are common in the headwater areas. Slopes inclined less than 10° form a minor part of the total area.

Much of the Blue Ridge province in North Carolina is drained by tributaries of the Tennessee and New Rivers, both of which flow into the Ohio River. The major rivers draining eastward to the Atlantic head along the Blue Ridge front. The area has a humid climate, and surface and ground water are generally abundant.

The mountains are heavily wooded. Rock exposures are generally limited to a few steep slopes, streambeds, and roadcuts. The depth of weathered rock ranges from a few feet to more than 100 feet.

#### GEOLOGY

The Blue Ridge province in North Carolina contains old sedimentary and igneous rocks that have a complex metamorphic and structural history. The area was mapped in reconnaissance by Arthur Keith and his associates from 1892 to 1906 (Keith, 1903; 1904; 1905a, b; 1907a–c). Recently, more detailed mapping has been completed in the Spruce Pine area (Olson, 1944; Parker, 1952; Kulp and Brobst, 1956; Brobst, 1962), the Hot Springs area (Oriel, 1950), northeastern Tennessee (Ordway, 1959; King and Ferguson, 1960), the Grandfather Mountain window area (Bryant, 1962,

1963; Bryant and Reed, 1962; Reed, 1964a, b; Reed and Bryant, 1964), the Great Smoky Mountains (Hamilton, 1961; Hadley and Goldsmith, 1963; King, 1964; Neuman and Nelson, 1965), and the Bryson City area (Cameron, 1951). On plate 1 the geology of the Blue Ridge has been generalized from Keith's folio maps and the more recent mapping.

The Blue Ridge geologic province, which does not coincide exactly with the physiographic province, has been divided into three major geologic belts by King (1955, p. 338): A narrow Brevard belt on the east, a wide Blue Ridge belt in the center, and the Unaka belt on the west. These belts differ in rock type, grade of metamorphism, and structure. More than half of the province is formed by the Blue Ridge belt, which contains a basement complex of older Precambrian mica gneiss and schist, hornblende gneiss and schist, migmatite, and granite gneiss, and locally extensive areas of younger Precambrian metasedimentary rocks. Intruded into these rocks are small stocks and dikes of younger Precambrian and Paleozoic granite, granodiorite, pegmatite, and ultramafic rocks. The presence of younger Precambrian and Cambrian metasedimentary rocks below rocks of the basement complex in the Grandfather Mountain window indicates that much of the Blue Ridge belt is an overthrust sheet that has moved to the northwest at least 30 miles (Bryant and Reed, 1962, p. 162). Several periods of regional metamorphism and deformation have obscured the stratigraphic relations of the various metamorphic and igneous rocks (Long and others, 1959; Bryant and Reed, 1962; Hadley and Goldsmith, 1963, p. B96-B107).

Mica-rich pegmatites are found only in the Blue Ridge belt and are restricted in general to the broad areas of mica and hornblende gneiss and schist. The only pegmatite district not in these rocks is around Bryson City where feldspar-rich mica-poor pegmatites cut metasedimentary rocks of the Ocoee Series near the edge of the Unaka belt (Cameron, 1951). The areas of granite gneiss in the Blue Ridge belt contain a few feldspar-rich pegmatites north of the Spruce Pine district and possibly a few mica-rich pegmatites southeast of Spruce Pine near the Grandfather Mountain window. Other pegmatites mentioned by Keith (1903, p. 3) in his description of the Cranberry Gneiss were not shown on the folio maps and are not shown on plate 1 of the present report.

The Brevard belt contains low-rank metamorphic rocks and may be a major fault zone along which high-rank rocks have been retrogressively metamorphosed (Jonas, 1932, p. 238; Reed and Bryant, 1960). Keith (1905b, 1907b) mapped the belt as Brevard Schist and interpreted it to be a downfolded mass of Cambrian rock. More recent reconnaissance and de-

tailed studies have indicated that the rocks are phylonites and blastomylonites derived by cataclastic retrogressive metamorphism of the rocks on either side of a fault zone (Reed and Bryant, 1960; Reed and others, 1961; Cazeau and Brown, 1963, p. 33), but the direction and amount of faulting are not known. A few intensely sheared pegmatite pods are present in the less intensely retrograded rock (Reed and others, 1961, p. C67).

The Unaka belt contains less metamorphosed sedimentary and volcanic rocks of late Precambrian and early Paleozoic ages (King, 1955, p. 364) and a few small areas of the basement complex exposed in various thrust sheets. The large thrust fault along which the Blue Ridge belt has moved is probably represented in the numerous thrust faults exposed in the Unaka belt (pl. 1).

#### LOWER PRECAMBRIAN BASEMENT COMPLEX

##### MICA AND HORNBLLENDE GNEISS AND SCHIST

Most of the Blue Ridge belt is composed of a thick sequence of interlayered mica gneiss and schist and hornblende gneiss and schist. The mica-rich rocks comprise Keith's Carolina Gneiss, and the hornblende-rich rocks, his Roan Gneiss. Keith (1904, p. 2) described the Carolina Gneiss (of former usage) as "an immense series of interbedded mica-schists, garnet-schists, mica-gneiss, garnet-gneiss, and fine-grained granitoid layers." The Roan Gneiss (of former usage) he described as "a great series of beds of hornblende-gneiss, hornblende-schist, and diorite, with some interbedded mica-schist and mica-gneiss (Keith, 1904, p. 3). Recent workers in the Spruce Pine district, however, did not use Keith's terminology; instead, they mapped areas of predominately mica schist, mica gneiss, or hornblende gneiss (Olson, 1944; Parker, 1952; Brobst, 1962). The different rock types are not shown separately on plate 1.

The mica-rich rocks are the more abundant of the two groups, and mica gneiss is probably more abundant than mica schist. The gneiss and schist are interlayered and grade from one to the other. Both are light to dark gray and fine to coarse grained. Both are composed of various amounts of feldspar, quartz, muscovite, and biotite. The feldspar is chiefly oligoclase or sodic andesine (Parker, 1952, p. 6; Bryant, 1962, p. D12). In the gneiss, feldspar and quartz layers alternate with layers of biotite and muscovite. Biotite tends to be more common in the gneiss; muscovite more common in the schist. Garnet may be abundant in either gneiss or schist. Graphite, apatite, epidote, staurolite, kyanite, sillimanite, and orthoclase are present in some layers. Biotite and garnet generally are more abundant near layers of hornblende-rich rock, but large belts of garnet gneiss are found in areas where hornblende gneiss is scarce (Keith, 1904, p. 2).

Kyanite-rich gneiss and schist are abundant in certain linear belts 3–8 miles wide and 20–40 miles long. Such belts are found in the Black and the Great Craggy Mountains (Keith, 1905b), in the region northwest of Asheville (Keith, 1904), in the Balsam and Pisgah Mountains (Keith, 1907b), and in the Nantahala and Cowee Mountains (Keith, 1907a). An extensive belt of sillimanite gneiss has been traced from Warne in Clay County to Sylva in Jackson County (Hash and Van Horn, 1951). A few lenses of marble occur locally (Keith, 1904, 1905b; Brobst, 1962, p. A8; Conrad, 1960).

Hornblende schist and gneiss are interlayered in various proportions with the mica-rich rocks throughout the Blue Ridge belt. The hornblende schist is dark green to black and consists mostly of hornblende, oligoclase-andesine, quartz, garnet, epidote, and monoclinic pyroxene (Bryant, 1962, p. D12). Minor amounts of actinolite, anthophyllite, biotite, chlorite, and zoisite are also present locally (Brobst, 1962, p. A8). The hornblende gneiss contains layers of hornblende alternating with layers of quartz or layers of feldspar, quartz, and garnet. Some hornblende-rich rocks are more massive and resemble diorite gneiss or metagabbro (Keith, 1904, p. 3.).

The hornblende gneiss and schist are more abundant in the northeastern parts of the Blue Ridge belt. Keith (1903, 1904, 1905b, 1907c) mapped a broad area of Roan Gneiss in Ashe and Watauga Counties, another in Avery, Mitchell, and Yancey Counties, and a third in Buncombe and Madison Counties. South of Asheville, however, in the Pisgah (Keith, 1907b) and Nantahala (Keith, 1907a) quadrangles the hornblende gneiss and schist occur only as scattered narrow belts within a broad area predominantly of mica gneiss. In the northeastern areas the hornblende and mica gneisses are commonly interlayered. Layers of each range in thickness from a few inches to many feet and are parallel. Many of the mica mines are in areas of such interlayered rock. To the southwest this small-scale interlayering is not so common. Near Franklin most of the hornblende gneiss is restricted to lenses and tabular bodies of massive gneiss. Some of these units cut the layering and foliation of the mica gneiss.

Metamorphism and deformation have so obscured the original character of the interlayered mica and hornblende gneiss and schist units that little can be said about their origin. The well-layered mica schist and gneiss units were probably argillaceous and quartzose sediments. According to Hadley and Goldsmith (1963, p. B12), the presence of feldspar and mafic minerals and the absence of rocks with more than 65 percent quartz indicate that the sediments may have been muddy or feldspathic sandstone or graywacke or that they con-

tained volcanic material. The interlayered hornblende gneiss and amphibolite may have been iron-rich dolomitic sediments or andesitic or basaltic tuffs (Hadley and Goldsmith, 1963, p. B12); the more massive hornblende gneisses are probably metamorphosed intrusive bodies of gabbro or diorite.

#### LAYERED GRANITIC GNEISS

The area shown as layered granitic gneiss on the geologic map (pl. 1) includes most of what Keith mapped as "Cranberry Granite" and also the small area that he mapped as "Henderson Granite" northeast of Old Fort (Keith, 1905b). In the Cranberry, Keith (1904, p. 3–4) included granite of various texture and color, schists and gneisses derived from granite, and small bodies of metabasalt, metadiabase, metarhyolite, pegmatite, quartz-diorite, and mica and hornblende gneisses similar to the Carolina and Roan Gneisses of former usage. According to Bryant (1962, p. D13), the Cranberry in the type area consists of masses of gray layered and nonlayered granitic gneiss and layers of green to black amphibolite, hornblende gneiss, and epidote-biotite schist. He redefined the unit as the Cranberry Gneiss because of the prevalence of gneissic structure and the heterogeneous composition (Bryant, 1962, p. D13). Hamilton (1960) found massive uniform granite, layered granite, quartz monzonite and granodiorite, migmatite, and gneiss in areas of northeastern Tennessee mapped as Cranberry by Keith. According to Hamilton (1960, p. 13), at least some of Keith's metarhyolite layers are mylonite. Oriel (1950, p. 32) found many diverse rock types in areas of Keith's Cranberry Granite near Hot Springs, N.C., and in other areas also this unit probably includes many types of metamorphic and plutonic rock.

The age and stratigraphic relationships of the layered granitic gneisses to other rocks in the Blue Ridge are not clear. Keith thought the Cranberry was younger than the gneisses of the Carolina and Roan, but recent workers in the Spruce Pine area have interpreted the Cranberry as interlayered with the mica and hornblende gneisses in a transition zone and consider the Cranberry to be the oldest unit of a thick sedimentary sequence that has been metamorphosed and granitized (Brobst, 1955, p. 581; Eckelmann and Kulp, 1956). Bryant (1962, p. D14) also recognized a mixed zone between Cranberry Gneiss and the mica and hornblende gneisses and suggests that the transitional rocks are a migmatite zone and the Cranberry a more granitized part of that zone. Because of structural complications, it is uncertain whether or not the Cranberry Gneiss lies stratigraphically below the mica and hornblende gneisses (Bryant, 1962, p. D14).

## GRANITE AND NONLAYERED GRANITIC GNEISS

Large masses of lower Precambrian nonlayered granitic gneiss and gneissic granite are found within layered gneiss along the western edge of the Blue Ridge belt and as isolated areas in the Grandfather Mountain window and in the southeastern part of the Great Smoky Mountains. The layered granitic gneiss unit also contains numerous other smaller bodies of nonlayered gneiss not mapped by Keith and too small to show on plate 1. The larger bodies of nonlayered gneiss in the layered gneiss were mapped by Keith as Beech Granite in the Cranberry and Roan Mountain quadrangles (Keith, 1903, 1907c) and as Max Patch Granite in the Asheville and Greeneville quadrangles (Keith, 1904, 1905a). Recent work by Bryant (1962, p. D15) indicates that "the Beech Granite is a coarse-grained inequigranular white to light-pink, cataclastic granite or quartz-monzonite gneiss." According to Bryant, no pegmatite has been found in the Beech Granite of the type area on Beech Mountain west of Boone. The Beech Granite is probably intrusive into the Cranberry Gneiss (Keith, 1903, p. 3; Bryant, 1962, p. D16).

A similar nonlayered granite gneiss occurs in elongate masses and irregular bodies along the edge of the Blue Ridge belt northwest of Asheville. Keith (1904, p. 4) named this gneiss the Max Patch Granite after typical exposures on Max Patch Mountain in Madison County, N.C. He described the gneiss as a light-gray to red coarse-grained granite gneiss which in places contains feldspar that is altered to epidote and saussurite (Keith, 1904, p. 4). Bradley (1874) applied the term "unakite" to some of the more altered Max Patch Granite that consisted of epidote, orthoclase, and quartz. According to Keith, the Max Patch Granite intrudes the layered granite gneiss (Keith, 1904, p. 4).

Oriel (1950, p. 31-33) found little true granite in areas mapped as Cranberry and Max Patch near Hot Springs, N.C. In Haywood County along the eastern edge of the Great Smoky Mountains and southwest of Hot Springs, Hadley and Goldsmith (1963, p. B13-B14) mapped as basement complex an area of plutonic rocks that is continuous with a large area in the adjoining Asheville quadrangle mapped by Keith (1904). They described a finer grained phase of the plutonic series that roughly corresponds to Keith's Cranberry Granite and a coarser phase that corresponds to what he mapped as Max Patch. They also found small bodies of pegmatite rich in pink or flesh-colored potassium feldspar and generally sheared (Hadley and Goldsmith, 1963, p. B14, B20).

Recently, Bryant (1962, p. D5) has named the nonlayered gneiss within the Grandfather Mountain window the Wilson Creek Gneiss. This unit includes rocks that Keith (1903, p. 3) mapped as Cranberry

Granite, Carolina Gneiss, and Beech Granite. The Wilson Creek Gneiss has an average composition of quartz-monzonite and is generally a light-gray medium to coarse-grained cataclastic rock. Veins and pods of pegmatite are abundant, but in general are too small to justify prospecting or mining. The pegmatite consists of quartz, microcline, and albite; the maximum grain size is 4 inches (Bryant, 1962, p. D6). According to Bryant (1962, p. D20), the Wilson Creek Gneiss formed as a massive granitic rock, but its genetic relationship to other lower Precambrian rocks is not known.

Nonlayered and layered granite gneisses also occur in the basement complex in the southeastern part of the Great Smoky Mountains. Around Bryson City, N.C., the granite gneiss is a fine- to coarse-grained equigranular to markedly inequigranular rock that ranges in composition from granite to granodiorite (Cameron, 1951, p. 10). Inclusions of biotite and hornblende schist and gneiss and layered granitic rocks rich in biotite and hornblende also are found in the complex. The different rock units represent intrusive rocks of different ages and granitized metasediments. All the rocks have been metamorphosed and deformed after intrusion (Cameron, 1951, p. 10). Pegmatite bodies ranging from thin seams to large irregular and tabular masses as much as 500 feet in length occur in the complex and in the metasediments that surround the complex. The pegmatite fills fractures formed after development of the granite complex and seems to be related more to the later regional metamorphism than to the formation of the granite (Cameron, 1951, p. 42).

Granitic rocks east and northeast of Bryson City are described by Hadley and Goldsmith (1963, p. B13-B24) as biotite flaser and augen gneisses that have a composition of quartz monzonite and granodiorite. Small layers of mica gneiss, hornblende gneiss, and migmatite are common. A few lenses and irregular bodies of sheared pegmatite ranging in width from several inches to several feet occur in the granitic rocks in the Dellwood area (Hadley and Goldsmith, 1963, p. B20). The principal minerals are pink potassium feldspar, subordinate plagioclase and quartz, and scarce biotite and garnet.

## UPPER PRECAMBRIAN ROCKS

## BAKERSVILLE GABBRO

The term Bakersville Gabbro was first used by Keith (1903) for rocks on Hump Mountain in the southwestern part of the Cranberry quadrangle. The name is taken from exposures near Bakersville, Mitchell County, N.C., where an extensive area is underlain by similar rocks (Kulp and Brobst, 1953). According to Bryant (1962, p. D16-D17), the rock on Hump Mountain is a dark-gray to black, massive to schistose, and locally

porphyritic, metagabbro. Labradorite, monoclinic pyroxene, and opaque minerals are present in the less metamorphosed parts, and hornblende, garnet, calcic oligoclase-andesine, monoclinic pyroxene, biotite and opaque minerals are found in the recrystallized parts. Wilcox and Poldervaart (1958) describe similar metagabbro from near Bakersville as part of a large dike swarm.

The Bakersville Gabbro intrudes both the layered granitic gneiss and the interlayered mica-hornblende gneiss. The gabbro is younger than the early plutonic metamorphism but older than the late regional metamorphism (Kulp and Poldervaart, 1956, p. 399).

A few bodies of metagabbro were also mapped by Keith (1904) near Alexander and Stocksville in Buncombe County. This gabbro Keith considered to be related to the hornblende gneiss of his Roan Gneiss and older than the Bakersville Gabbro which he considered unmetamorphosed. These bodies of metagabbro are not shown on plate 1.

#### OCOEE SERIES

Metasedimentary rocks of the Ocoee Series of late(?) Precambrian age make up most of the Great Smoky Mountains and also occur in small downfolded areas in the Blue Ridge belt (King, 1955, p. 360). Because detailed information is lacking, the smaller downfolded areas of Ocoee or equivalent rocks are not shown separately in the broad area of mica and hornblende gneiss on plate 1. The metasedimentary rocks include variably metamorphosed conglomerate, sandstone, and siltstone and have been divided into three groups and a number of formations (King and others, 1958). Where highly metamorphosed, the metasedimentary rocks closely resemble the schists and gneisses of the older mica gneiss unit, but they contain no hornblende gneiss layers (Hadley and Goldsmith, 1963; King, 1955, p. 360). Southeast of the kyanite isograd shown on plate 1, the metasedimentary rocks contain small scattered pegmatite lenses; locally, as around Bryson City, large masses of pegmatite are found in the Ocoee Series (Cameron, 1951; Hadley and Goldsmith, 1963, p. B104). The boundary between metasedimentary Ocoee rocks and the mica gneiss unit is not well established in the Alarka, Cowee, and Nantahala Mountains southwest of Dillsboro.

Metasedimentary rocks that may be equivalent to the Ocoee Series have been mapped in the Grandfather Mountain window (Bryant, 1962, p. D9) and parts of the northeastern Tennessee (King and Ferguson, 1960, p. 29-32), but in those areas they contain interbedded mafic and felsic volcanic rocks. In the Grandfather Mountain area the metasedimentary rocks are low-rank phyllites, arkosic quartzites, and

graywackes. These rocks contain some quartz veins and quartz-microcline veinlets but no large pegmatites.

### PALEOZOIC SEDIMENTARY ROCKS

#### CHILHOWEE GROUP

Quartzite, phyllite, and arkosic quartzite of the Chilhowee Group of Early Cambrian(?) and Early Cambrian age and the Shady Dolomite of Early Cambrian age are exposed in a thrust sheet below rocks of the basement complex in the Grandfather Mountain window east of the Spruce Pine district (Bryant and Reed, 1962). More complete sections of unmetamorphosed Chilhowee Group, Shady Dolomite, and Rome Formation (Lower Cambrian) are exposed in thrust sheets and windows in the Unaka Mountains to the northwest (Oriel, 1950; King and Ferguson, 1960). None of these formations contains pegmatites.

#### ROCKS OF THE MURPHY MARBLE BELT

Metasedimentary rocks consisting of phyllite, schist, quartzite, and marble that are distinctly different from the Ocoee Series occur in an elongate area southwest of Bryson City (Keith, 1907a; Van Horn, 1948; King, 1955, p. 363). These rocks have been interpreted as a downfolded mass of Paleozoic metasedimentary rocks (Keith, 1907a), as windows of Chilhowee rocks in the Great Smoky overthrust sheet (Stose and Stose, 1944, p. 377), and as older metasedimentary rocks of the Ocoee Series (Van Horn, 1948, p. 20). According to Van Horn (1948, p. 7-8), small masses of fine-grained pegmatite consisting of plagioclase, quartz, and muscovite, are "distributed in migmatitic fashion" in mica schist near the center of the belt.

#### CAMBRIAN AND ORDOVICIAN ROCKS

Along the western edge of the Unaka belt, relatively unmetamorphosed sedimentary rocks of Cambrian and Ordovician age occur in windows and thrust sheets. No pegmatite deposits are associated with these rocks.

### PALEOZOIC(?) INTRUSIVE ROCKS

#### ULTRAMAFIC ROCKS

More than 275 bodies of ultramafic rock, mostly dunite but including other varieties of peridotite and pyroxenite, and associated soapstone and amphibolite derived from them, are scattered throughout the Blue Ridge belt in the layered granitic gneiss and the mica and hornblende gneisses (Hunter, 1941, p. 11). These ultramafic deposits are not shown on plate 1, but are shown on the maps by Keith (1903, 1904, 1905b, 1907a-c), Cameron (1951), Brobst (1962), Bryant (1962), and Hadley and Goldsmith (1963). Most of the unaltered ultramafic rocks are dunites consisting of olivine and minor accessory minerals. Pratt and Lewis (1905, p. 28-34) describe 15 other kinds of ultramafic

rocks that contain various proportions of olivine, pyroxene, and amphibole, and several types of rock formed by secondary alteration. Contacts between ultramafic rock and the enclosing gneiss and schist are relatively sharp and generally roughly concordant (Pratt and Lewis, 1905, p. 26; Hadley, 1949, p. 113; Miller, 1953, p. 1137). The outer edges of most ultramafic rocks are altered and sheared, and even the fresh dunite in the larger masses is generally granulated. Where cut by joints and faults, the dunite is altered to chlorite, talc, vermiculite, asbestos, or serpentine.

Many of the ultramafic deposits are only a few feet or few tens of feet wide and a few hundred feet long; but one of the largest masses is 2,000 feet wide and 8,000 feet long and covers an area of 300 acres on Buck Creek in Clay County. This deposit consists chiefly of dunite (90 percent), but includes troctolite (8 percent) and some edenite-amphibolite; it has been mined for corundum (Hadley, 1949). Another extensive deposit forms a ringlike structure 6 miles long and 3.5 miles wide between Addie and Webster in Jackson County. According to Miller (1953, p. 1137), the principal rock types there are dunite, websterite, and enstatite pyroxenite.

The age of the ultramafic rocks is not well established, but it is probably early Paleozoic. The ultramafic rocks are younger than the gneisses that they intrude, but, they are also deformed (Cameron, 1951, p. 9; Miller, 1953, p. 1134; Hadley and Goldsmith, 1963, p. B73). In several places in the Spruce Pine district, and in Buncombe and Jackson Counties dunite is cut by later granitic pegmatites. Hadley and Goldsmith (1963, p. B74) consider the metamorphosed ultramafic bodies in the eastern Great Smoky Mountains to be younger than the Ocoee Series, although nowhere are ultramafic bodies found cutting rocks of the Ocoee Series.

The dunite masses have been an important source of corundum (Pratt and Lewis, 1905, p. 358-368), a minor source of chromite, and more recently, a major source of olivine for refractories (Hunter, 1941). Some vermiculite (Murdock and Hunter, 1946) and anthophyllite asbestos (Bryant, 1962, p. D28) have also been mined from altered deposits.

#### GRANITIC ROCKS AND PEGMATITE

Younger granitic rocks and pegmatite intrude the basement complex throughout much of the Blue Ridge. The largest bodies are the masses of quartz monzonitic to granodioritic composition that Keith (1907b) mapped as Whiteside Granite in parts of Jackson, Macon, and Transylvania Counties. Smaller masses of coarse-grained muscovite granodiorite, often times called alaskite, intrude mica and hornblende gneiss in the Spruce Pine district (Olson, 1944, p. 22-25; Parker,

1952, p. 8-11; Brobst, 1962, p. A10-A11; Bryant, 1962, p. D18-D19), and dome-shaped bodies of medium-grained massive granite intrude similar rocks in the northern part of Wilkes County and adjacent Alleghany County (Watson, 1910, p. 152; Stuckey and Conrad, 1958, p. 22). Pegmatites, some of them associated with the larger masses of granitic rock, are common in the mica and hornblende gneiss unit (pl. 1). Other dikes and sills of trondhjemite (Hadley and Goldsmith, 1963, p. B71), prophyritic quartz monzonite and leucogranite (Cameron, 1951, p. 12), and granite (Olson and others, 1946, p. 5-6) are widely scattered throughout the district but are not shown on plate 1.

None of these intrusions is dated accurately, but at least some of them are probably Paleozoic. Age determinations reported for minerals from several pegmatites and the Whiteside Granite range from 170 to 708 million years (table 1), but these dates may reflect the final metamorphism and not the time of original crystallization.

#### WHITESIDE GRANITE

The Whiteside Granite was named by Keith (1907b, p. 4) from exposures on Whiteside Mountain in Jackson County. Similar dome-shaped masses of granite mixed with gneiss occur in adjacent parts of Macon and Transylvania Counties (pl. 1). The areas that Keith mapped as Whiteside contain numerous sills, dikes, and irregular mass of granite interlayered with and cutting mica gneiss. Gneiss in contact with granite generally contains much added feldspar and quartz, and has been described as migmatite (Olson, 1952, p. 5) or lit-par-lit injection gneiss (Sharp and Allen, 1938). The granite itself probably has a range in composition: Heinrich (1953, p. 75) describes it as a tonalite-granodiorite, and Griffiths and Overstreet (1952, p. 787) call it a biotite-muscovite-quartz monzonite. The rock is composed of potassium feldspar, plagioclase, quartz, muscovite, and biotite in various proportions (Olson, 1952, p. 3). Minor amounts of magnetite, ilmenite, pyrite, garnet, zircon, and monazite form the principal accessory minerals. The color is typically white or light gray but becomes darker where the biotite content is greatest. Some of the granite is massive, but much of it is weakly foliated.

Little detailed information about the Whiteside Granite has been published. Differences in heavy mineral content and mode of occurrence between several masses suggest different rocks of more than one age of intrusion (W. R. Griffiths, written commun., 1964). Lead-alpha determinations on monazite and zircon from the Whiteside range from 358 to 708 million years (table 1) and are not definitive. The age of the Whiteside may therefore be Precambrian, Paleozoic, or both. A Paleozoic(?) age is used in this report.

TABLE 1.—Age determinations on various minerals from the Blue Ridge of North Carolina and Tennessee

Source rock	Location	Mineral	Age of mineral, in millions of years								Reference		
			U <sup>238</sup> / Pb <sup>206</sup>	U <sup>235</sup> / Pb <sup>207</sup>	Pb <sup>207</sup> / Pb <sup>206</sup>	Th <sup>232</sup> / Pb <sup>208</sup>	Rb <sup>87</sup> / Sr <sup>87</sup>	K <sup>40</sup> / Ar <sup>40</sup>	Lead- alpha	U/Pb chemical			
Pegmatite	North Carolina Spruce Pine district: Avery County: C. Ridge.	Muscovite.....						348±17				Deuser and Herzog, 1962, p. 1999.	
	Mitchell County: Abernathy mine.....	Biotite.....						311±16				Do.	
		Muscovite.....						340±20				Do.	
	Chestnut Flat mine.	Uraninite.....	385	390	400±50							Aldrich and others, 1958, p. 1128.	
		Uraninite.....	370	375	420±50							Do.	
		Muscovite.....						375	335			Do.	
		Potassium feldspar.						385				Do.	
	Deer Park.....	Uraninite.....									340	Føyn, 1938, p. 18; Rodgers, 1952, p. 418.	
		Monazite.....									580	Bliss, 1944; Rodgers, 1952, p. 421.	
	Flat Rock mine.....	Uraninite <sup>1</sup> .....									350	Hillebrand, 1891, p. 65-67; Rodgers, 1952, p. 419.	
		Uraninite <sup>2</sup> .....									370	Do.	
		Uraninite.....									340	Boltwood, 1907, p. 79; Rodgers, 1952, p. 418.	
		Uraninite.....	344±4	346±5	372±15							Eckelmann and Kulp, 1957, p. 1124.	
		Gummite.....			355±20							Do.	
	Hootowl mine.....	Feldspar.....							278			Carr and Kulp, 1957, p. 776.	
		Muscovite.....							334±15			Long and others, 1959, p. 594.	
	McKinney mine.....	Samarskite.....	367±18	353±20	300±40	400±80						Eckelmann and Kulp, 1957, p. 1124.	
		Samarskite.....	314±10	316±10	342±20	302±30						Do.	
		Muscovite.....							334±15			Long and others, 1959, p. 594.	
		Muscovite.....							348±15			Do.	
		Feldspar.....							231			Carr and Kulp, 1957, p. 776.	
		Feldspar.....							242			Do.	
	Minpro mine.....	Feldspar.....							248			Carr and Kulp, 1957, p. 776.	
		Muscovite.....							341±13			Long and others, 1959, p. 594.	
	Stony Point.....	Uraninite.....									310	Von Foullon, 1883, p. 7; Rodgers, 1952, p. 419.	
	Wiseman mine.....	Samarskite.....	307±6	312±13	380±80	205±50						Eckelmann and Kulp, 1957 p. 1124.	
	Specific localities not given.	Uraninite <sup>3</sup> Outside layer.										330	Alter and McColley, 1942; Rodgers, 1952, p. 418.
		Middle layer.										340	
		Core.....										350	
		Samarskite.....	282±13	292±17	405±60	170±10							Eckelmann and Kulp, 1957, p. 1124.
Uraninite.....				355±20								Do.	
Yancey County: Mudhole mine.	Muscovite.....						328±18				Deuser and Herzog, 1962, p. 1999.		
Wilkes County: Haw mine.	Muscovite.....						334±17				Deuser and Herzog, 1962, p. 1999.		
Caldwell County: McGee mine.	Muscovite.....						317±15				Do.		

See footnotes at end of table.

TABLE 1.—Age determinations on various minerals from the Blue Ridge of North Carolina and Tennessee—Continued

Source rock	Location	Mineral	Age of mineral, in millions of years							Reference		
			U <sup>238</sup> / Pb <sup>206</sup>	U <sup>235</sup> / Pb <sup>207</sup>	Pb <sup>207</sup> / Pb <sup>206</sup>	Th <sup>232</sup> / Pb <sup>208</sup>	Rb <sup>87</sup> / Sr <sup>87</sup>	K <sup>40</sup> / Ar <sup>40</sup>	Lead- alpha		U/Pb chemical	
Pegmatite—Con.	North Carolina—Con. Madison County: Mars Hill.	Feldspar.....						290			Carr and Kulp, 1957, 776.	
		Feldspar.....						293			Do.	
		Monazite.....								4 600	Marble, 1936; Rodgers 1952, p. 421.	
		Monazite.....								4 680	Do.	
		Monazite.....								4 620	Lane, 1937, p. 58; Rodgers, 1952, p. 42	
		Monazite.....								4 650	Do.	
	Franklin-Sylva district: Jackson County: Gay prospect.	Muscovite.....							348±13		Eckelmann and Kulp, 1957, p. 1125.	
		Macon County: Grindstaff mine.....	Biotite.....					256±14			Long and others, 1959, p. 594.	
			Muscovite.....					508±27			Deuser and Herzog, 1962, p. 1999.	
		Iotla mine.....	Biotite.....					293±15			Do.	
			Muscovite.....					512±28			Do.	
		Swain County: Deep Creek No. 1, Bryson City district.	Feldspar.....							287		Carr and Kulp, 1957, p. 776.
Feldspar.....								296		Do.		
Muscovite.....								340±13		Long and others, 1959, p. 594.		
Whiteside Granite	Jackson County: 3¼ miles west of Cashiers.	Zircon.....							689		Jaffe and others, 1959, p. 115-116.	
		Monazite.....							358		Do.	
	Macon County: On U.S. Highway 64, north edge of Highlands.	Monazite.....								368	Do.	
		Monazite.....								413	Do.	
		Monazite.....								437	Do.	
5 miles west of Highlands.	Zircon.....							708	Do.			
Rocks of Murphy marble belt (Valleytown Formation)	Cherokee County: Andrews.	Biotite.....						373		Kulp and Eckelmann, 1961, p. 409.		
Ocoee Group	Swain County: 5.6 miles southeast of Newfound Gap.	Biotite.....						382		Kulp and Eckelmann, 1961, p. 409.		
	Tennessee	Polk County: Route 64 near Ducktown. Ducktown.....	Biotite.....				329±13	434±15			Long and others, 1959, p. 595.	
	Muscovite.....						327			Kulp and Eckelmann, 1961, p. 409.		
Metadiabase (Bakersville Gabbro?)	North Carolina Mitchell County: Red Hill.	Biotite.....						433±15		Long and others, 1959, p. 594.		
		Biotite.....						457±21		Do.		
Granite and nonlayered granitic gneiss	Max Patch Granite	Madison County: Southeastern Great Smoky Mountains (Max Patch Mountain).	Zircon.....						880		Carroll and others, 1957, p. 187.	
	Granitoid gneiss	Haywood County: Dellwood quadrangle.	Zircon.....						535		Hadley and Goldsmith, 1963, p. B24.	
	Beech Granite	Tennessee Carter County: Route 19E near Hopson. Roan Mountain.....	Biotite.....					439±17	418±16			Long and others, 1959, p. 594, 587.
			Feldspar.....					572±29			Do.	
			Zircon.....	555	585	700	425				Tilton and others, 1959, p. 174.	
	Nonlayered granitic gneiss	North Carolina Avery County: Old quarry by road west of Crossnore.	Biotite.....					420	380		Do.	
			Zircon.....	700	725	800±50	680				Davis and others, 1962, p. 1991.	
	Augen gneiss	Watauga County: Roadcut, U.S. 321 bypass, north side of Bowling Rock.	Hornblende.....						840±25		Hart, 1961, p. 2999.	
			Zircon.....	990	1,010	1,055	1,000				Davis and others, 1962, p. 1991.	
			Zircon.....	800	860	1,020	670				Do.	
Quartz monzonite gneiss	Caldwell County, quarry near Mortimer.	Biotite.....						350		Do.		

See footnotes at end of table.

TABLE 1.—Age determinations on various minerals from the Blue Ridge of North Carolina and Tennessee—Continued

Source rock	Location	Mineral	Age of mineral, in millions of years							Reference		
			U <sup>238</sup> / Pb <sup>206</sup>	U <sup>235</sup> / Pb <sup>207</sup>	Pb <sup>207</sup> / Pb <sup>206</sup>	Th <sup>232</sup> / Pb <sup>208</sup>	Rb <sup>87</sup> / Sr <sup>87</sup>	K <sup>40</sup> / Ar <sup>40</sup>	Lead- alpha		U/Pb chemical	
Layered granitic gneiss (Cranberry Gneiss)	<i>Tennessee</i>											
	Carter County: Roan Mountain	Biotite							357±13		Long and others, 1959, p. 594, 587.	
	Route 19E, near Hopson.	Biotite							527±18		Do.	
	Route 19E, near Hampton.	Biotite					719±25	640±22			Do.	
	Pardee Point	Biotite							648±22		Do.	
		Biotite							674±22		Do.	
	<i>North Carolina</i>											
	Madison County: 2.2 miles southwest of White Rock.	Biotite							695±23		Do.	
	<i>Tennessee</i>											
	Carter County: Pardee Point.	Biotite						892±30	800±27			Do.
		Zircon	670	735	940±50	360						Tilton and others, 1959, p. 174; Davis and others, 1962, p. 1991.
		Biotite					890	770				Do.
Zircon		980	1,060	1,230	1,080						Do.	
	Biotite					880					Do.	
Laurel Gap, rare-earth vein cutting gneiss.	Zircon	585	640	820	360						Davis and others, 1962, p. 1991.	
<i>North Carolina</i>												
Mitchell County: Dayton Bend.	Zircon	1,080	1,140	1,270	950						Tilton and others, 1959, p. 174.	
	Biotite					350	320				Do.	
Avery County: Roadcut on Dark Ridge Creek.						810	660				Davis and others, 1962, p. 1991.	
Mica gneiss and schist (Carolina Gneiss of Keith)	Ashe County: Ore zone, Ore Knob mine.							1,130			Thomas, 1963, p. 110.	
		Mica					320	465			Do.	
	Mitchell County: Gneiss, McKinney mine.	Muscovite and Biotite.							341±13		Long and others, 1959, p. 594.	
	Buncombe County: Gneiss, Stocksville.	Biotite					330±13	357±13			Do.	
	Jackson County: Gneiss, near Gay.	Biotite					333±15	438±14			Do.	
	Haywood County, Waynesville.	Muscovite						344			Kulp and Eckelmann, 1961, p. 409.	
	4 miles west of Soco Gap.	Biotite						359			Do.	
	Macon County: Franklin.	Biotite						307			Do.	
	Biotite schist, 6.3 miles east of Franklin.	Zircon							620			Jaffe and others, 1959, p. 118.
		Zircon							590			Do.

<sup>1</sup> Before leaching with HCl. <sup>2</sup> After leaching with HCl. <sup>3</sup> Determinations made on three layers of a single crystal. <sup>4</sup> Same material used by Marble, Lane, and Eckelmann and Kulp.

#### MUSCOVITE GRANODIORITE OF SPRUCE PINE DISTRICT

The granitic intrusives of the Spruce Pine district are important sources of feldspar, scrap mica, and clay, and as such, they have been studied extensively in recent years (Hunter, 1940; Olson, 1944; Parker, 1946, 1952; Brobst, 1962; Bryant, 1962). These intrusives

were called granite by Keith (1905b) and Watts (1913, p. 106) and alaskite by Hunter (1940, p. 98), Olson (1944, p. 22), and Brobst (1962, p. A10). Parker (1952, p. 9) used the term "leucogranodiorite, fine-grained pegmatite," and Bryant (1962, p. D18) used "granodiorite." The term "muscovite granodiorite" is used

here because the plagioclase content of these rocks is generally greater than the microcline content, but muscovite is present rather than the biotite or hornblende of a normal granodiorite. Locally, where the microcline content is larger, the rock may approach the composition of a quartz monzonite.

According to Brobst (1962, p. A10), the average mineral content of the granodiorite is oligoclase (40 percent), quartz (25 percent), perthitic-microcline (20 percent), and muscovite (15 percent). Accessory minerals that make up less than 5 percent of the rock include biotite, garnet, apatite, allanite, epidote, thulite, pyrite, and pyrrhotite. Grain size ranges from  $\frac{1}{8}$  to 1 inch and averages more than  $\frac{1}{2}$  inch. Locally, large crystals of perthite may be 1 foot or more in length. Much of the rock is sufficiently coarse grained to be called a fine-grained pegmatite (Olson, 1944, p. 22; Parker, 1952, p. 9), and all gradations between coarse-grained light-colored granodiorite and pegmatite occur (Bryant, 1962, p. D18).

The granodiorite is intruded into the mica and hornblende gneiss units as sills, dikes, and irregular masses in several parts of Avery, Mitchell, and Yancey Counties (pl. 1). The largest mass is near Spruce Pine and is at least 4,000 feet wide and 2 miles long (Brobst, 1962, p. A10). Numerous gneiss and schist inclusions are present in all the granodiorite bodies, especially near the margins. Parts of the larger bodies are massive, but most have a crude foliation or layered structure produced by parallel mica flakes and streaks of quartz, feldspar, and garnet. The foliation is generally parallel with the regional trends of the gneiss and schist.

#### PEGMATITE

Mica-bearing pegmatites occur throughout the eastern half of the Blue Ridge province in North Carolina (fig. 1 and pl. 1), but they are concentrated in the Spruce Pine and Franklin-Sylva districts. Pegmatites are restricted in general to the mica and hornblende gneiss units of the basement complex and, locally, to areas of the Ocoee Series where such rocks have been regionally metamorphosed to at least the kyanite-muscovite subfacies of the amphibolite facies. Some also occur in granite and granodiorite. The region probably contains many more pegmatite bodies than are shown on plate 1, but these bodies are apt to be small or mica poor.

The pegmatites throughout the region are generally similar, but there are minor differences within and between districts. The principal variations are in color of muscovite, kinds and amounts of accessory minerals, and degree of conformity to the structure of the wallrock. More detailed descriptions of the characteristics

of the pegmatites in each district are given in the sections on the individual districts.

In the Blue Ridge as a whole, the mica-bearing pegmatites are tabular (65 percent), lenticular (25 percent), or irregular (10 percent). They range in size from thin seams a few inches thick to large masses several hundred feet thick and more than 1,000 feet long. About half of the deposits are discordant with the foliation of the enclosing country rock, but the pegmatites in the northeastern part tend to be concordant, and those in the southwest discordant. The mineralogy is similar throughout the area; plagioclase, quartz, perthitic microcline, and muscovite are the principal minerals. Biotite and garnet are common accessory minerals, and apatite, beryl, pyrite, and tourmaline are less common. Other accessory minerals are sparse but Sterrett (1923, p. 171) listed 65 different minerals associated with the pegmatites. The Spruce Pine district may have a greater variety of accessory minerals than the other districts. The occurrence and origin of some of the accessory minerals are described by Hall (1933; 1934), Ross (1937), and Heinrich (1950).

Grain size throughout the area ranges from fine (less than 1 in.) to very coarse (more than 1 ft) in many individual deposits. Perthite crystals are commonly 1 foot across and rarely as large as 4 or 5 feet across. Muscovite crystals are generally less than 1 foot across, but some are larger than 3 feet across. Plagioclase masses are rarely greater than 1 foot across, and quartz grains are generally less than 1 inch. Other minerals are generally in masses or crystals that are at most a few inches across.

The internal structure of the Blue Ridge pegmatites is simple. Many have a homogeneous distribution of minerals throughout, but some zoning of minerals and texture has been reported in about 40 percent of the deposits and zoning may be present in more. The most common zones are a thin border zone of fine-grained pegmatite, a wall zone of fine- to coarse-grained feldspar, quartz, and muscovite, and a quartz or quartz-perthite core. Intermediate zones with blocky plagioclase or perthite are found in a few deposits.

Poorly zoned deposits contain mica scattered throughout their widths or may contain mica-rich shoots. Zoned deposits generally have sheet mica concentrated in wall zones or along the margins of the core in intermediate zones. Many such deposits have mica-rich shoots, commonly in bulges or rolls in the pegmatite-wallrock contacts. Such shoots generally plunge parallel to the plunge of minor structures in the wallrock. Most deposits that have been mined at a profit contain mica-rich zones or mica-rich shoots. All parts of a zone may not be equally rich; the mica-rich rock may be

only along the hanging-wall side of the pegmatite or, rarely, along the footwall side.

All the mica-bearing pegmatites in the Blue Ridge probably have a similar mode of origin. The pegmatites are similar in composition and probably in age. They occur in similar structural relationships in a variety of wallrocks throughout the area. Composition of the wallrock has only minor influence on composition of pegmatite: pegmatites in metamorphic rocks—especially hornblende gneiss—have somewhat more iron and calcium and slightly less potassium than do pegmatites in granodiorite (Olson, 1944, p. 36). The same sequence of mineral zones in all zoned deposits and the general increase in grain size from the walls inward in both zoned and unzoned deposits are typical of granitic pegmatites in general (Cameron and others, 1949) and are a part of the evidence for magmatic crystallization. The fluid from which the pegmatites crystallized was clearly intruded into the country rock to form both the concordant and the discordant bodies. The discordant bodies occupy fractures, joints, or faults, and a slight alteration and contortion of country rocks along foliation planes beyond the ends of some concordant bodies mark possible channelways for the movement of magma. Some of these foliation planes probably are sites of "bedding plane" faulting.

Crystallization probably took place in virtually a closed system with little addition or loss of material to or from the wallrocks, except for water and other volatiles. Plagioclase, plagioclase-quartz, or plagioclase-quartz-muscovite crystallized first in the fine-grained selvage or border zone. Larger book muscovite continued to crystallize with plagioclase and quartz to form the wall zone of a zoned pegmatite or all of a simple unzoned pegmatite. Microcline began to crystallize later than muscovite, and in many pegmatites the bulk of the interior consists of plagioclase-microcline-quartz-muscovite rock. In some deposits the greater part of the microcline crystallized after the other minerals and forms a nearly pure perthite core or intermediate zone. Quartz ordinarily continued to form until last and is the core in most zoned deposits. Most of the few late fracture fillings consist mainly of quartz.

The source of the pegmatitic fluid is not well established in the Blue Ridge. In the Spruce Pine district many bodies of pegmatite are clearly related to the granodiorite intrusives. Pegmatites in the Cashiers district (Olson, 1952) have a close spacial and probable genetic relationship to the Whiteside Granite, and those in the Franklin-Sylva area also may be related to that granite (Olson and others, 1946, p. 13).

It is quite possible that most of the simple mica-bearing pegmatites in the Blue Ridge are related to a regional metamorphism of Paleozoic age and are not

the end products of crystallization-differentiation of a large granitic batholith at depth. Their simple mineralogic composition falls in the low temperature part of the albite-orthoclase-quartz system, as determined by Tuttle and Bowen (1958, p. 55), and they generally lack minerals containing such rare elements as boron, beryllium, cesium, fluorine, lithium, niobium, and tantalum that might be expected in the late differentiates of a large granitic intrusion. The occurrence of pegmatites only in areas where the metamorphic grade has reached at least the kyanite-muscovite subfacies of the almandine amphibolite facies of regional metamorphism suggests that high pressure and temperature conditions in the environment were an important control in the localization of the pegmatites. The pegmatites may well have formed by local melting of constituents of the metamorphic rocks at still greater depth. Their crystallization, however, was also under deep-seated conditions, for mica-bearing pegmatites are absent in the layered granitic gneiss where it was metamorphosed only to the biotite-albite grade near the Grandfather Mountain area (Bryant, 1962, p. D21-D22), the muscovite-chlorite or biotite-chlorite grade along the Watauga River (Hamilton, 1960, p. 24), or to similar low grades in parts of the eastern Great Smoky Mountains (Hadley and Goldsmith, 1963, p. B104-B106).

Possibly the larger intrusives of the Spruce Pine and Cashiers districts were also the result of local melting and migration of small masses of granitic magma in an area of high-grade regional metamorphism, and owe their size to greater heat and pressure that gave rise to larger masses of magma. Pegmatites associated with these intrusives contain a greater variety and abundance of rare elements than the average pegmatite in the Blue Ridge area—a result of some differentiation in a magmatic source.

All the pegmatites in the Blue Ridge have undergone some deformation after crystallization. Brecciated and rounded feldspar porphyroclasts, granulated quartz masses, and sheared muscovite books in a matrix of recrystallized fine-grained feldspar, quartz, and sericite are common in many deposits. Some deposits have a distinct foliation formed by layers of the finer grained minerals wrapped around larger crystals; other deposits have a brecciated texture. Sheared books of muscovite are bent, ruled, and cracked, and the edges of some books are coated with crushed mica. Shear planes in the pegmatites in the Spruce Pine district commonly have grooves, slickensides, or aligned mica flakes that trend northwest parallel to a regional northwest-trending *a* lineation in the country rock. The outer parts of the muscovite granodiorite intrusives in the Spruce Pine district also are crudely foliated

and sheared, and contain a similar northwest-trending lineation. Maurice (1940, p. 63) also recognized this deformation and described five varieties of cataclastic texture in Spruce Pine pegmatites.

The amount of shearing in an individual pegmatite is apparently controlled partly by structural attitude and partly by wallrock lithology. Simple tabular pegmatites are generally not so strongly deformed as contorted S-shaped ones. Pegmatites enclosed by thick masses of coarse mica schist are less deformed than those enclosed in mica or hornblende gneiss.

Pegmatite bodies along the margin of the Spruce Pine district, especially those near the contact between interlayered mica and hornblende gneiss with layered granitic gneiss, are more intensely sheared than pegmatites near the center of the district.

Similar cataclastic structures are common in the pegmatites in the other districts of the Blue Ridge province but have not been studied in detail. In general, however, deformed mica books are more abundant in pegmatites throughout the Blue Ridge than they are in similar pegmatites in the Piedmont province (Jahns and others, 1952-53, p. 50).

The age of the deformation is not well known. Some deformation may have occurred during the formation of the pegmatites; some is clearly related to local faulting; however, much of it may be related to the period of regional deformation that followed the main period of regional metamorphism as outlined by Hadley and Goldsmith (1963, p. B107).

#### STRUCTURE

The structural features of the Blue Ridge are complex and only partly known. Detailed mapping along the western edge in the areas of Ocoee and younger rocks has outlined numerous folds, thrust faults, and windows (pl. 1). The rocks of the basement complex, however, have not been studied in as much detail. The gneisses and schists throughout much of the basement have been deformed and metamorphosed several times. Keith (1904, p. 3) recognized two periods of deformation of these rocks: one produced the foliation, and the other folded and crushed the earlier structures. Hamilton (1960, p. 22) recognized three episodes of deformation and metamorphism in the granitic gneisses in the basement complex along the Watauga River in Watauga and Avery Counties and two episodes of metamorphism near Old Fort, McDowell County (Hamilton, 1957). Bryant and Reed (1962, p. 171) found evidence for four periods of metamorphism in the rocks of the Grandfather Mountain area. A similar complex history is described for the basement rocks in the eastern part of the Great Smoky Mountains (Hadley and Goldsmith, 1963, p. B107).

#### FOLDS

On the basis of reconnaissance mapping, Keith (1903, 1904, 1905b, 1907a-c) described broad anticlinal and synclinal areas in the basement complex but was unable to delineate large folds because of the lack of key beds in the mica and hornblende gneisses. As a result of recent mapping, Brobst (1962, p. A12) has interpreted the Spruce Pine district as a complex southwest-plunging asymmetrical synclinorium with steeply dipping isoclinal folds on the northwest side and gently dipping more open folds on the southeast. Bryant (1962, p. D25) and Reed (1964b) have found a set of late northeast-trending gentle folds superposed on earlier northwest-trending isoclinal folds in rocks to the northeast of the Spruce Pine district. The mica and hornblende gneiss and schist have been domed near large granodiorite intrusives in the Spruce Pine district (Olson, 1944, p. 32) and around large masses of White-side Granite in the Cashiers district (Keith, 1907b, p. 4). Smaller scale folds, both open and isoclinal, are visible in outcrops and roadcuts in many parts of the Blue Ridge. Such folds in the Bryson City area are described by Cameron (1951, p. 17-18) as second-order folds, and are found both in the metasedimentary rocks of the Ocoee Series and in the basement complex. Similar second-generation folds in the basement complex are also described by Hadley and Goldsmith (1963, p. B74-B95) for the eastern Great Smoky Mountains; they were able to map and distinguish several ages of folding in the less metamorphosed rocks of the Ocoee Series.

#### FAULTS

Large thrust faults have been mapped along the western edge of the basement complex (Keith, 1907a; Hadley and Goldsmith, 1963; Oriel, 1950; Rodgers, 1953; King and Ferguson, 1960) and around the Grandfather Mountain window (Bryant and Reed, 1962), but none have been shown within the basement complex. A shear zone in the Spruce Pine district extends from Penland to a few miles east of Little Switzerland in Mitchell County, but the amount of movement, if any, is unknown (Brobst, 1962, p. A13). Small faults of diverse attitudes are reported in the Spruce Pine district (Parker, 1952, p. 16) and the Franklin-Sylva district (Olsen and others, 1946, p. 6-7). Mylonite that may represent large faults is present in several areas west and south of Franklin in Macon County, and Hamilton (1960, p. 26) reports mylonite and phyllonite along faults in the basement rocks in northeastern Tennessee. The small, but widely distributed, faults are of several ages; some are older and some younger than the pegmatites. In the Franklin-Sylva area many pegmatites are discordant bodies emplaced

in fractures and faults, and even in the Spruce Pine district, pegmatites in fault zones are probably common (Amos, 1959, p. 34). Pegmatites cut by small faults are common in all the districts of the Blue Ridge.

The larger Greenbrier fault mapped in parts of the Great Smoky Mountains is earlier than the main Paleozoic regional metamorphism (Hadley and Goldsmith, 1963, p. B96), but its relation to the structures and the pegmatites in the Blue Ridge belt is not known.

#### BLUE RIDGE THRUST SHEET

The recent mapping of the Grandfather Mountain window (Bryant, 1962; Bryant and Reed, 1962; Bryant, 1963; Reed, 1964 a, b; Reed and Bryant, 1964) indicates that the basement complex in the Spruce Pine district west of the window is part of an overthrust mass that has moved to the northwest at least 30 miles (Bryant and Reed, 1962, p. 162). No large structural break is known or apparent from Keith's reconnaissance mapping of the basement complex between the Spruce Pine and the Franklin-Sylva districts (Keith, 1904, 1905b, 1907b), and it is quite probable that all the basement complex in the Blue Ridge of North Carolina west of the Brevard belt is part of a large thrust sheet. The amount of movement of this thrust sheet may not be the same everywhere along it, and it is not known which, if any, of the thrust faults exposed along the western edge of the Blue Ridge is the principal fault along which movement took place. Depth to the fault below most of the Blue Ridge is unknown. In the area between the Grandfather Mountain window and the Mountain City window, Bryant and Reed (1962, p. 167) estimate a depth of 5,000 feet, and they suggest a depth of 10,000 feet or more in the Spruce Pine district. The major thrust movement is inferred to be late Paleozoic (Bryant and Reed, 1962, p. 167). If so, it is younger than the mica pegmatites, and part of the deformation of the pegmatites may be related to this period of faulting.

#### METAMORPHISM

The basement complex in the Blue Ridge has been metamorphosed several times, and the effects of older periods of metamorphism are partly obscured by later events. The following metamorphic and structural events, however, are recorded in the Blue Ridge belt: (1) a plutonic episode in Precambrian time about 1,000–1,100 million years ago; (2) a period of folding and faulting in the early Paleozoic; (3) a second period of dynamothermal metamorphism reaching a thermal maximum in the early or middle Paleozoic; (4) another period of regional deformation accompanied by fewer thermal effects, probably in mid-Paleozoic time; and (5) a late Paleozoic deformation that culminated in large scale

thrust faulting. Details of the metamorphic history of the basement complex in northeast Tennessee are described by Hamilton (1960), in the Grandfather Mountain area by Bryant (1962), Bryant and Reed (1962), and Reed (1964b), and in the eastern Great Smoky Mountains by Hadley and Goldsmith (1963). A summary of the metamorphic history of the Spruce Pine district has been made by Kulp and Poldervaart (1956), and a chronology of the major metamorphic events of the Blue Ridge is given by Long, Kulp, and Eckelmann (1959) and Kulp and Eckelmann (1964).

The oldest metamorphism recognized is a plutonic episode of Precambrian age during which a thick sequence of sedimentary rocks was metamorphosed to gneiss and schist (Bryant, 1962, p. D20; Hadley and Goldsmith, 1963, p. B23). Along the northwestern edge and in the deeper parts of the section these rocks were transformed progressively into a more nearly granitic rock forming a series of layered granitic gneisses intruded by bodies of nonlayered granite and granodiorite. Age determinations on zircons from both the layered and nonlayered granitic gneiss (table 1) give discordant isotopic ages, and have been interpreted to mean that the plutonic episode took place about 1,000–1,100 million years ago (Tilton and others, 1959, p. 175). Age determinations on micas from the layered granitic gneiss and the mica gneiss units yield younger ages and indicate the effects of later metamorphic events.

This Precambrian metamorphism was followed by the deposition of the late(?) Precambrian Ocoee Series and then a period of early Paleozoic folding and faulting in the Great Smoky area (Hadley and Goldsmith, 1963, p. B107). A second period of dynamothermal metamorphism then took place, probably during the early or middle Paleozoic. In the Great Smoky region, sedimentary rocks of the Ocoee Series were metamorphosed to the chlorite grade in the west and to higher grades in the southeast. Along the western edge of the Blue Ridge belt the basement rocks were retrograded at this time where the grade of the new metamorphic environment was less than that of the Precambrian plutonic metamorphism (Hamilton, 1960, p. 22; Hadley and Goldsmith, 1963, p. B96–B107). In the central part of the Blue Ridge belt, where metamorphism reached the kyanite-staurolite sub-facies of the amphibolite facies, the basement rocks were recrystallized and the Ocoee rocks were altered to coarse schist and feldspathic gneiss. During this period of early or middle Paleozoic metamorphism the mica pegmatites were intruded in areas that reached kyanite grade. Age determinations on a variety of minerals from these pegmatites (table 1) yield mostly discordant dates that range from 170 to 420 million years. Because all the pegmatites contain evidence of

some postcrystallization deformation, these ages are probably minimal, and the true age of the Blue Ridge pegmatites may be 400–450 million years. Micas from gneiss near or in the pegmatite districts also give discordant K/Ar and Rb/Sr ages that range from 330 to 438 million years.

According to Hadley and Goldsmith (1963, p. B106), a period of regional deformation followed the thermal maximum of the Paleozoic metamorphism in the Great Smoky area. They found evidence for the development of slip cleavage, second generation folds, and some shearing and recrystallization but no important mineralogic changes. A broad region involving Paleozoic and older rocks in the Grandfather Mountain window and parts of the Blue Ridge thrust block northwest and north of the window was also metamorphosed to a rather uniform biotite-albite grade after the thermal maximum had been reached in the basement complex in the Spruce Pine district to the southwest (Bryant and Reed, 1962, p. 174–175). Because of the possible overlapping of metamorphic zones due to the late Paleozoic thrust faulting, the age of this low-rank metamorphism is not fully established. Some of the observed effects may be related to a late stage of the main Paleozoic metamorphism, and some may be related to the period of thrusting. Deformation of the pegmatites in the Blue Ridge probably is related to this late deformation and may be the metamorphic episode of 350 million years ago, recognized by Kulp and Eckelmann (1964).

Little metamorphism accompanied the last major period of deformation that culminated in the late Paleozoic faulting and formation of the Blue Ridge thrust sheet. In the Great Smoky area, faulting during the late Paleozoic is characterized by unrecrystallized gouge and no obvious metamorphism (Hadley and Goldsmith, 1963, p. B107). A similar lack of recrystallization is noted along faults and mylonite of this age in northeast Tennessee (Hamilton, 1960, p. 26). In the Grandfather Mountain area some recrystallization to biotite-albite grade seems to be related to the period of faulting (Bryant and Reed, 1962, p. 175). Some of the faulting seen in pegmatites throughout the Blue Ridge may be related to the late Paleozoic deformation.

As noted by Bryant and Reed (1962, p. 175), the retrogressive metamorphism of rocks along the Brevard fault constitutes a later metamorphic episode that followed the thrusting and preceded the emplacement of diabase dikes of Triassic(?) age.

#### ECONOMIC ASPECTS OF PEGMATITE MINERALS

##### MICA

The principal mica minerals are muscovite (white), biotite (black), and phlogopite (amber). All have a

perfect basal cleavage and form crystals that can be split into thin sheets having various degrees of transparency, toughness, flexibility, and elasticity. The micas are common minerals, but only muscovite is of commercial importance in North Carolina.

Two types of mica are sold: sheet mica, which must be relatively flat, free from most defects, and be large enough so that it can be cut into specified sizes; and scrap mica, which is all mica that does not meet sheet mica specifications and is generally ground to a powder. Small sheets of untrimmed mica of poorer quality that can be punched or trimmed into disks 1 inch or larger in diameter are classified as punch mica and are included in the general term "sheet mica." Sheet muscovite is an important insulating material in the electronic and electrical industries. Built-up mica made from very thin sheets and reconstituted mica made from scrap can be substituted for larger sheet mica for some uses (Skow, 1962, p. 11). Scrap mica is used in the roofing, wall-paper, rubber, paint, and other industries.

##### SHEET MICA

Sheet-quality muscovite is obtained from the large crystals or books scattered throughout unzoned pegmatites or concentrated in certain units of zoned pegmatites. The value of sheet mica depends on the color, size, and quality of the natural crystals. The manner in which the crystals are obtained by mining and the care and skill of preparation are also important factors affecting the value.

About 30 percent of the deposits in the Blue Ridge contain reddish-brown (ruby) muscovite, 24 percent contain brown (rum), and 34 percent green; the remainder contain both ruby and green varieties. The green mica is more likely to be associated with quartz cores and the reddish brown or brown with plagioclase-rich rock. Deposits near or in granitic bodies tend to have green or greenish-brown mica, and those that are farther away tend to have brown or reddish brown. Areal distribution of mica according to color has been shown by Olson (1944, pl. 2) for the Spruce Pine district.

Crude books of mica must be at least 2 inches across to yield trimmed sheet mica. The average commercial book is about 5 inches across and about one-fifth to one-half as thick as it is wide. Blocks measuring 8–12 inches across are common. A few larger blocks that weigh 50–300 pounds are found. The largest block of muscovite reported from the Spruce Pine district was a book of "A" mica weighing 4,320 pounds from the Fannie Gouge mine in Yancey County. It was 36 by 42 inches across and 32 inches thick (Urban, 1932, p. 4). Another large block of mica weighing more than 4,000 pounds was found in 1907 at the Iotla Bridge mine in Macon County. It measured 29 by 36 inches across and 48 inches thick (Sterrett, 1923, p. 235).

The quality of sheet mica is determined by the amount and kind of staining and the degree of structural imperfections. Quality of sheet mica varies widely within and between mica districts and even within a single deposit or mica-rich shoot. Detailed discussions of the quality and classification of mica have been written by Jahns and Lancaster (1950) and Skow (1962), and only a brief summary is given here.

The best sheet mica is clear, flat, and free of gas bubbles and mineral inclusions. Mica that contains primary or secondary inclusions or impurities is called stained mica. The primary impurities include air bubbles, mottling, and mineral intergrowths and inclusions; the secondary impurities include air creep; clay, iron, and manganese oxide inclusions; and organic or vegetable stain (Jahns and Lancaster, 1950, p. 12). Specks, spots, and streaks of magnetite, hematite, and pyrite occur sparsely or in dense concentrations between sheets of stained mica in unweathered deposits. Films of clay, limonite, or manganese oxides coat the sheets of mica in some weathered deposits. Various kinds of staining occur in each district, and some individual deposits contain both stained and clear mica. Green mica is more commonly stained than reddish-brown mica. Pegmatites that contain biotite tend to have reddish-brown or brown muscovite that is free of stain. Mineral stain occurs in about half the mines in the Blue Ridge.

Some muscovite crystals contain small intergrowths or inclusions of other minerals, such as biotite, quartz, plagioclase, garnet, apatite, thulite, zoisite, epidote, tourmaline, and kyanite. Muscovite and biotite are generally intergrown with their cleavages parallel, and about 15 percent of the deposits in the Blue Ridge contain such intergrowths. Quartz and plagioclase occur interlayered with muscovite, and garnet occurs as flattened crystals or, more rarely, as euhedral inclusions between sheets of mica. The other minerals are generally flattened parallel to the mica cleavage, but they penetrate the mica. All such mineral inclusions make splitting the mica into sheets difficult and produce holes in the sheets. Mica that contains mineral inclusions that make splitting difficult is generally said to be "tied."

Structural defects of the mica crystals are also of primary and secondary origin. The most common primary defects are reeves and wedge structure. Reeves are lines, striations, or shallow corrugations that lie in the plane of the cleavage. They represent the edges of discontinuous sheets of mica, wrinkles in other sheets that are alongside them, and the edges of individuals in twinned crystals. Reeves are oriented perpendicular to the traces of the prismatic and clinopinacoidal faces on the basal surfaces of the mica crystals. Where two sets

of reeves intersect at an angle of nearly 60°, the resulting mica is said to have "A" structure. "Herringbone" structure, which resembles a feather or fish skeleton, is formed by two sets of reeves intersecting at an angle of about 120° and characteristically flanking a central line of reeves that is perpendicular to the trace of clinopinacoidal faces (Jahns and Lancaster, 1950, p. 9). Wedge structure is caused by interlayering of sheets of unequal size. Wedge structure is commonly associated with "A" and "herringbone" structure.

Some muscovite books do not split freely and are termed "locky," "tangled," or "tacky" (Jahns and Lancaster, 1950, p. 7). Such books generally have discontinuous sheets, partial intergrowth of sheets, or internal distortions, and are largely of scrap value only.

Secondary structural defects include bending, cracking, twisting, and ruling, all caused by deformation of the mica during or after crystallization. Bending ranges from slight waves to right angle or S-shaped bends. Ruling is a secondary cleavage that cuts the basal cleavage at an angle of nearly 67°. Deformation of the mica in pegmatites of the Blue Ridge is common and widespread. At least 40 percent of the deposits have some bent mica, and a third or more contain some ruled mica.

In profitably mined pegmatites the book mica generally constitutes 2-6 percent of the rock mined. Locally, rich shoots or pockets may have as much as 40 percent muscovite, but large volumes of pegmatite have 2 percent or less. The recovery of good sheet mica from the crude book mica varies with the type and quality of the mica and the standards of mining, preparation, and grading. Complete quantitative data are not available, but estimates of recovery of good trimmed mica from crude mica range from 2 to 8 percent for the average mine and are as much as 19 percent from good quality crude mica in a few mines.

Prices of sheet mica depend on the size and quality of the sheet. In 1963 they ranged from 7 cents a pound for sheets 1½ inches across to \$8 a pound for sheets 8 inches or more across. During World War II the Government support prices for all sheets 1½ inches by 2 inches and larger ranged from \$1.10 to \$8 a pound. From 1952 to 1962 the Government prices ranged from \$15 to \$17.70 a pound for sheets 1-2 square inches of ruby mica classified as good stained or better. Sheets 3-6 square inches brought \$40 a pound, and sheets 10 square inches and larger brought the top price of \$70 a pound. Similar sized sheets of stained mica ranged from \$5 to \$7.55, \$8 to \$18.25, and \$18 to \$31.90; heavy stained mica ranged from \$3 to \$4, \$6 to \$6.85, and \$13 to \$14.80. Nonruby of equivalent quality generally sold for less. The somewhat erratic nature and small size of most mica concentrations,

the great range of quality of material, the expense of mining, and the large amount of hand labor needed for preparation limit sheet-mica mining to periods of very high prices. Since the end of the Government purchasing program in June 1962, little sheet mica has been mined in North Carolina.

Reserves of sheet mica cannot be calculated from the data available for no development work has preceded mining, and no mica-bearing rock is blocked out. An appraisal of the probable amount of mica remaining in the ground, based on the premise that the abundance of pegmatite bodies at depth is almost certain to be virtually the same as at the surface, indicates that at least as much mica remains as has been mined. The finding and mining of this mica will depend largely on such economic factors as domestic market and prices, which influence the amount of prospecting.

During the last period of Government mica buying, 1952-62, most of the larger producing mines were those that had been big producers in the past, and many were worked out or left in a condition that will make further mining difficult. The rate of new discoveries was small during both World War II and the 1950's, even though exploration was encouraged by the Federal Government through financial assistance. Deposits exposed at the surface have generally been prospected, and the difficulty and cost of finding unexposed deposits are great. Detailed geologic studies of structural control, country-rock alteration, and geochemistry and geophysics may help locate areas of additional pegmatite.

Pegmatites do, however, have characteristics that can be of aid in prospecting.

1. Large mica-bearing pegmatites tend to occur in groups; in the Spruce Pine district, for example, several very large mines are clustered together in the Bandana area. It is therefore logical to look for additional pegmatites near large mines. Careful geologic mapping will help establish in many places a pattern in the localization of large deposits, for some seem to occur en echelon or in a belt like a string of beads, and others are related to the axes of folds in the country rock or to faults.
2. Pegmatites that are concordant or partly concordant to the foliation of the wallrock are apt to plunge parallel to the plunge of minor structures in the wallrock. Elongate mica concentrations, generally called shoots or streaks, also tend to plunge parallel to the plunge of the pegmatite. A repetition of structural features may have produced additional shoots or extensions of known deposits down plunge.
3. The shape of the pegmatite body may influence the location of mica concentrations. In pegmatites

that pinch and swell, mica may be more abundant either near the constrictions or in the swells. Mica is generally more abundant near sharp bends or rolls in the wallrock or along the crests of pipe-like or tongue-like bodies. Mica may also be concentrated along the hanging wall or the underside of a wallrock inclusion.

4. The size of the pegmatite body is also an important factor. Unzoned pegmatites 3-10 feet thick and 100-200 feet long have been mined successfully by removing all the pegmatite, but where sheet muscovite is sparsely scattered throughout an unzoned body more than 20 feet thick, so much barren rock has to be removed that mining for mica alone is unlikely to be profitable. In zoned deposits, mining can be restricted to the mica-rich zones, and the rest of the pegmatite need not be mined. Thin tabular pegmatites less than 100 feet long are commonly too small to justify the expense of exploration.
5. Determination of the mineralogy and zoning of the pegmatite is important. Sheet mica generally occurs in oligoclase- and quartz-rich rock and not in perthite-rich rock. A perthite-rich pegmatite, however, may have a wall zone of plagioclase-quartz-mica that contains sheet mica. Pegmatite with a quartz core may have sheet mica along the core margin and also in the outer part of the wall zone. The presence of quartz float may indicate a zoned pegmatite. A lack of evidence for zoning in surface exposures, however, does not necessarily mean that the deposit is not zoned at depth. Diamond drilling is an aid in determining the presence, size, and location of different zones. By demonstrating the continuation of pegmatite along the trend of a persistent shoot, such drilling can indirectly indicate size of mica deposits.
6. The quality of mica at the surface may indicate the quality at depth. Mica that has clay or "vegetable" stain may be clear below the depth of weathering. Pegmatites that contain mica with primary stain at the surface probably have stained mica at depth unless clear mica and stained mica form separate shoots. Pegmatites that contain some biotite probably have reddish-brown or brown muscovite relatively free from stain, but where biotite is very common, there is generally not much sheet muscovite. In many deposits the quality and quantity of mica are better along the hanging wall than along the footwall. Mica along the margin of a quartz core tends to be reeved or "A" and greener than mica in a wall zone.
7. Pegmatites that have been greatly sheared or faulted contain deformed mica. If the deformed mica

occurs in thick chubby books or in very large books, some sheets may be produced with careful trimming.

8. When a pegmatite body containing sheet mica has been found, the only way to appraise the deposit is to expose it in surface trenches or underground workings. Diamond drilling will aid in determining the presence or absence of pegmatite or of pegmatite zones but will supply little direct information concerning the quantity or quality of the mica.

#### SCRAP MICA

Many pegmatite deposits contain only scrap mica, and a large amount of scrap is produced during the mining, trimming, and fabricating of sheet mica. Most scrap mica, however, is produced from weathered granodiorite bodies and as a byproduct from the mining of feldspar and kaolin. From 1943 to 1962 North Carolina produced more than 930,000 tons of scrap mica, or about 63 percent of the total United States production. The annual production in the State ranged from 25,000 tons worth \$516,367 in 1943 to nearly 62,000 tons worth \$1,384,280 in 1962. More than three-fourths of the North Carolina production was from the Spruce Pine and Franklin-Sylva districts. The geology, mining, and milling of scrap-mica deposits in these and other districts are described in detail by Broadhurst and Hash (1953). They estimate that the reserves of scrap mica in weathered granodiorite of the Spruce Pine district, exclusive of kaolin deposits, are in excess of 25 million tons of material containing 12–18 percent mica (Broadhurst and Hash, 1953, p. 15). In addition, reserves of scrap mica in kaolin deposits have been estimated to be 7.5 million tons, and the amount of scrap mica that can be recovered as a byproduct from feldspar flotation is in excess of 38 million tons (Brobst, 1962, p. A15–A16).

In 1962 scrap mica was produced from 2 mines in Avery County, 2 in Macon County, 14 in Mitchell County, and 8 in Yancey County. In the same year 11 grinding mills were active in the Blue Ridge (Beck and others, 1963). In 1963 scrap mica was valued at the mine at \$20–\$30 per short ton. The price paid depends on the color and the freedom from such impurities as clay and quartz. Mica that is very pale in color appears white when ground and is more desirable. Scrap mica produced from the rifting and trimming of sheet mica is high quality because of its relative freedom from quartz, feldspar, and clay.

#### FELDSPAR

Feldspar is the general name for a group of aluminum silicate minerals that contain varying amounts of potassium, sodium, and calcium. The principal potassium feldspars are orthoclase and microcline, which

have the same chemical composition ( $\text{KAlSi}_3\text{O}_8$ ) but different crystal form. The sodium-calcium feldspars, called plagioclase, form a series of minerals that range in all proportions from pure  $\text{NaAlSi}_3\text{O}_8$  (albite) to pure  $\text{CaAl}_2\text{Si}_2\text{O}_8$  (anorthite). Natural orthoclase and microcline generally contain 10–25 percent  $\text{NaAlSi}_3\text{O}_8$ , and plagioclase generally contains 5–15 percent  $\text{KAlSi}_3\text{O}_8$ . Intergrowths of orthoclase or microcline with albite are called perthite. Perthitic microcline (potash spar), albite (soda spar), and oligoclase (soda limespar) are the feldspars in the pegmatites of the Blue Ridge.

Feldspar mining in North Carolina began in Mitchell County in 1911 (Watts, 1913, p. 100) and within a few years became an important industry. For many years the State has produced half or more of the feldspar produced in the United States, and since 1953 the State production has averaged about 250,000 tons annually. Until recently, much of the feldspar was perthite and oligoclase hand cobbled from large crystals in zoned pegmatites. Since 1951 finer grained pegmatite and granodiorite have been mined in bulk, and a mixture of potassium and sodium feldspar has been recovered by milling and flotation. In 1953 about 35 percent of the feldspar produced in the State was obtained by flotation (Gunsallus and Uswald, 1956, p. 442); in 1962 about 90 percent was from flotation concentrates and 10 percent from hand sorting, (Beck and others, 1963, p. 778).

The Spruce Pine district is the principal source of feldspar recovered by flotation methods. In 1962 six operators produced feldspar in this manner from nine mines in Mitchell County, and two operators produced it from two mines in Yancey County (Beck and others, 1963, p. 790, 793). Some hand-cobbled feldspar was produced in Mitchell, Swain, and Yancey Counties.

The average price of crude feldspar was \$10.31 per long ton in 1962 and \$9.51 in 1960 (de Polo and Tucker, 1963, p. 537). The average price of ground feldspar was \$12.71 per short ton in 1962 and \$13.40 in 1960. From 1956 to 1960 about 55 percent of the feldspar sold in the United States was used in glass, 32 percent in pottery, 5 percent in enamel, and 8 percent in other ceramic uses, scouring soaps, and abrasives. There is an increasing shortage of high-grade potassium feldspar, but there is also an increase in the use of lower grade and finer grained materials recovered through milling and flotation. Reserves of feldspar in granodiorite within 50 feet of the surface in the Spruce Pine district are estimated by Brobst (1962, p. A15) to be in excess of 200 million tons.

#### KAOLIN

Modern mining of kaolin for high-quality ceramic products was started at Webster in Jackson County

in 1888, but the Cherokees had apparently mined clay and sold it to English traders as early as the 17th century (Kerr, 1880, p. 462; Watts, 1913, p. 9-10). In 1767, Josiah Wedgwood sent T. Griffiths to get clay from the Cherokees at Cowee Town on the Little Tennessee River about 5 miles northwest of present-day Franklin in Macon County. Griffiths cleaned out an old clay pit, mined 12-15 tons of clay, and transported about 5 tons to Charleston, S.C., for shipment to England (Griffiths, 1929). Discovery of good quality clay in Cornwall in 1768 stopped further mining in North Carolina.

The Webster deposits were the main center of production in North Carolina for about 30 years, but clay mines were opened in Mitchell County in 1904, in Macon County in 1905, and in Swain County shortly after that. The last to be developed were those in Avery County in 1937. The deposits in Jackson, Macon, and Swain Counties were exhausted in the early 1920's, and the only deposits that were being worked in 1963, were those of the Harris Clay Co. in Avery County.

The kaolin deposits in the Blue Ridge are residual deposits formed by the weathering of feldspar in pegmatite and granodiorite. Most of the pegmatitic deposits are described by Watts (1913), Ries and others (1922), Bayley (1925) and Hunter and Hash (1949). The larger deposits in granodiorite are described by Hunter (1940) and Parker (1946). The clay is generally a mixture of two clay minerals: hydrated halloysite and kaolinite. The ratio of halloysite to kaolinite ranges from 30:1 to 1:1 and averages 10:1 (Sand, 1956, p. 33). Depth of weathering in individual deposits in the Spruce Pine district ranges from 10 to 135 feet and averages about 40 feet (Parker, 1946, p. 22). According to Bayley (1925, p. 63), a deposit near Webster was worked to a depth of 125 feet. With depth the kaolin grades into partly weathered feldspar, and throughout most deposits some unweathered feldspar remains. The recovery of clay from deposits in pegmatite is as high as 40 percent, but the recovery of clay in deposits in granodiorite ranges from 8 to 22 percent (Parker, 1946, p. 24).

The pegmatitic kaolin deposits consist of relatively pure clay that formed from feldspar-rich zones. Some of this clay is of high quality, free of impurities, but of small volume. In the early days of mining, kaolin from such deposits was mined, dried, and shipped directly. Less pure kaolin was washed to eliminate quartz and mica. The large deposits in granodiorite are mined today by power equipment in large opencuts. The kaolin is separated from impurities by a complex process of grinding, washing, screening, settling, and flotation (Parker, 1946, p. 25).

Total production of kaolin from the Blue Ridge is not known, but annual production from 1921 to 1940 ranged from 6,000 to 25,000 short tons and averaged 13,000 short tons. The amount of washed kaolin available in four groups of deposits near Spruce Pine was estimated by Parker (1946, p. 26-41) to range from 3 to 7 million short tons. Hunter (1940, p. 102) estimated reserves of crude kaolin in Avery, Mitchell, and Yancey Counties at 51 million tons from which about 4½ million tons of finished kaolin might be recovered.

#### QUARTZ

Some high-grade quartz has been produced from pegmatites in the Blue Ridge. Many zoned pegmatites contain cores or large pods of massive gray, smoky, or white quartz. Quartz from the Chestnut Flat mine in Mitchell County was used for glass in the 200-inch telescope for the Mount Palomar Observatory in California (Olson, 1944, p. 59). In recent years there has been a small production of white quartz for special aggregate in prestressed concrete. Quartz that was clean and free from iron stain sold for \$8.50 a ton at Spruce Pine in 1960. Byproduct quartz is recovered from the feldspar and clay flotation plants for use as sand.

#### BERYL

Beryl is so rare a constituent of Blue Ridge pegmatites that no regular production of beryllium ore is possible. A total of a few tons of beryl may have been recovered from pegmatites mined for mica in the Spruce Pine district, but no accurate production figures are available.

Gem beryl has been mined at several localities in Mitchell County and one in Yancey County. More detailed information on gem occurrences is given by Kunz (1907).

#### NIOBIUM-TANTALUM MINERALS

Columbite-tantalite and samarskite occur in small quantities at a few mines in the Spruce Pine district. Several hundred pounds of both minerals have been produced as byproducts of feldspar or mica mining, but resources appear to be small.

#### URANIUM AND RARE-EARTH MINERALS

Uraninite, uranophane, gummite, autunite, clarkeite, and torbernite occur in exceedingly small amounts in a few pegmatites generally in or near granodiorite in the Spruce Pine district and, more rarely, in pegmatites in the other districts. The total amount in any one deposit is small, and only rarely are specimens found.

Allanite, which contains cerium and other rare earths, is a common accessory mineral in the Spruce Pine district and less common in the other districts. Only a few small crystals are found in any one deposit, and

there has been no commercial production. Many specimens of monazite, a rare-earth phosphate, have been found in the Gusher Knob feldspar mines, Avery County, in the Crabtree Creek area, Mitchell County, and also near Mars Hill, Madison County, but the total amount may be less than 100 pounds.

**PEGMATITE DISTRICTS**

The mica-bearing pegmatites of the Blue Ridge are grouped into districts for convenience in describing them in this report. The mines and prospects in each district are listed alphabetically in table 4, starting at the north with the Jefferson-Boone district. The locations of the mines are shown on plates 2-6. The table and figures do not include the mica mines of the Cashiers district described by Olson (1952), nor the feldspar deposits of the Bryson City district described by Cameron (1951).

**JEFFERSON-BOONE DISTRICT**

The Jefferson-Boone district in Ashe and Watauga Counties contains more than 70 mica mines and prospects (pl. 2). Mica mining probably began in Ashe County at the Hamilton and Tarkington mines as early as 1867 and at the Little Phoenix and North Hardin mines in 1880. Some prehistoric mining was apparently done by Indians at the Little Phoenix and Walnut Knob mines (Sterrett, 1923, p. 172). More than 45 mines and prospects were opened or reopened during World War II, when production from 27 mines amounted to 11,500 pounds of mica valued at \$36,400. About 20 mines were active at various times between 1951 and 1962, and production for the district amounted to nearly 80,000 pounds of sheet and punch worth about \$315,000. Five mines were explored during this period with the aid of DMEA loans. None of the mines were being worked in April 1962, and many of the older mines are difficult to find. The total production of the district from 1867 to 1962 is estimated to be more than 200,000 pounds of sheet and punch but probably less than 300,000 pounds. There are no detailed production records before 1941 for this district, but few of the mines have produced much more than 10,000 pounds of full-trimmed sheet mica. Although none of the deposits is known to be mined out, many of the workings are in such poor condition that mining could be resumed only with difficulty.

The pegmatites in the Jefferson-Boone district are chiefly tabular or lenticular bodies. About two-thirds are concordant to the foliation of the country rock. They range in thickness from 1 to 70 feet and average less than 10 feet. In length they range from less than 50 to more than 350 feet.

The pegmatites are medium to coarse grained. The principal minerals in order of abundance are plagioclase, quartz, perthite, and muscovite. Garnet, biotite, apatite, and beryl are common accessory minerals; vermiculite, pyrite, magnetite, hematite, and uraninite are rare. About one-third of the pegmatites have a plagioclase-quartz-muscovite wall zone and a quartz core; a few have a perthite-quartz core and several have a perthite core. In general, the quality and quantity of the muscovite are only fair. The books tend to be small, many are deformed, and concentrations are small. Most of the muscovite is reddish brown or ruby; some is green.

Because the pegmatites of the Wilkes district are generally weathered and poorly exposed, few of the deposits have been mapped in detail. In general, the pegmatite bodies seem to be tabular or lenticular. Most are less than 5 feet thick, but a few are 25 feet or more thick. Some of them are as much as 200 feet long. More than half are probably concordant to the foliation of the enclosing country rock, which is generally mica schist. The pegmatite is medium to coarse grained and contains as the dominant minerals plagioclase, quartz, and muscovite. Perthite is found in a few deposits. Garnet, biotite, magnetite, and tourmaline are reported as accessory minerals from some of the mines. A few pegmatites have a plagioclase-quartz-muscovite wall zone and a quartz core, but most seem to be poorly zoned.

The muscovite is mostly green, yellowish green, or brownish green. Some reddish-brown or ruby mica is found in the western part of the district. Much of the mica is bent or reeved. The average quality is only fair.

**WILKES DISTRICT**

The Wilkes district is along the Blue Ridge Front in the western part of Wilkes County and the adjoining eastern edges of Ashe, Caldwell, and Watauga Counties (pl. 2). Mining at 45 or more mines and prospects has been intermittent since 1895. During World War II about 30 deposits were mined or prospected, and production was about 5,000 pounds of sheet muscovite worth \$22,000. Between 1951 and 1962, production from 15 mines was less than 3,000 pounds valued at less than \$6,000. Total production for the district is unknown, but it probably does not exceed 50,000 pounds of sheet muscovite. A few of the mines have been operated for scrap mica.

The muscovite is mostly green, yellowish green, or brownish green. Some reddish-brown or ruby mica is found in the western part of the district. Much of the mica is bent or reeved. The average quality is only fair.

**SPRUCE PINE DISTRICT**

The Spruce Pine district covers about 300 square miles in Avery, McDowell, Mitchell, and Yancey Counties, N.C. (pl. 3). The district has been active for many years and has consistently been the principal producer of mica and feldspar in North Carolina. Mica was mined by the Indians in prehistoric times; traces

of their pits and trenches found by the first white settlers were considered to be the workings of old Spanish silver mines (Kerr, 1875, 1881; Phillips, 1888; Simonds, 1896). In 1868, T. L. Clingman prospected the Sinkhole mine, in Mitchell County, which had been the site of extensive prehistoric diggings. Clingman sank shafts and drove tunnels showing an abundance of mica in an area where the Indians had dug a series of trenches 20 feet deep and 1,800 feet along strike (Phillips, 1888; Simonds, 1896). The prospect was abandoned, but the following year work was begun at the mine by the firm of Heap and Clapp of Knoxville, Tenn. Shortly thereafter the Ray mine was opened in Yancey County by G. D. Ray (Sterrett, 1923, p. 168), and within a few years there were more than a score of active mines, many of which were operated by Heap and Clapp.

Some information is available concerning 714 mines and prospects in the Spruce Pine district (table 4), but probably there are as many more prospects and small mines about which little is known. Production data for the district are poor for the period before World War I. Kesler and Olson (1942) gave incomplete production records for 130 mines for the period 1917-40, and records were kept by the Colonial Mica Corp. for the production from 708 mines and prospects for the period June 1942 through 1945. More than 100 mines had a significant production during the period 1953 through 1962. Most mines operated for sheet mica only, however, were closed in June 1962 when the Government buying program ended.

Within the Spruce Pine district there are 67 mines that have a recorded individual production greater than 10,000 pounds of sheet mica and 146 mines that have an individual production greater than 500 pounds but less than 10,000 pounds of sheet mica. Most of the production of the district has come from a few very large mines, as shown in table 2.

During the period 1951-62 the Spruce Pine district was actively explored, and much of this exploration was aided by the Defense Minerals Exploration Administration. A total of 322 applications for aid were received on 269 different pegmatite bodies. Of the 147 contracts granted, 22 were in Avery County, 80 in Mitchell County, and 45 in Yancey County. Thirty-five exploration projects were certified as discoveries, and three of these, the Cattail, Sinkhole, and R. B. Phillips mines, were among the large producers of the 1950's.

The general geology of the Spruce Pine district has recently been mapped and described by Olson (1944), Parker (1952), Kulp and Brobst (1956), and Brobst (1962). The pegmatites are described by Sterrett (1923), Maurice (1940), Kesler and Olson (1942), Olson (1944), Parker (1952), and Brobst (1962). Recent mapping along the eastern edge of the district

TABLE 2.—Recorded production of sheet-and-punch mica from the Spruce Pine district, North Carolina

	Sheet and punch (pounds)	Percent
1917-40: <sup>1</sup>		
20 largest mines .....	2, 482, 006	80
110 other mines and prospects .....	622, 211	20
Total (130) .....	3, 104, 217	100
1942-45: <sup>2</sup>		
20 largest mines .....	456, 456	58
688 other mines and prospects .....	331, 639	42
Total (708) .....	788, 095	100
1953-62: <sup>3</sup>		
10 largest mines .....	4 946, 000	44
>200 other mines and prospects .....	1, 209, 000	56
Total (>200) .....	2, 155, 000	100

<sup>1</sup> Data from Kesler and Olson (1942, table 2).

<sup>2</sup> Data from Colonial Mica Corp.

<sup>3</sup> Data from U.S. Bureau of Mines and Defense Minerals Exploration Administration.

<sup>4</sup> Estimate.

has added details concerning regional structure and metamorphism (Bryant, 1962; Reed, 1964a, b). In table 4 the district has been divided arbitrarily into areas for convenience in listing the mines and prospects. Deposits in any one area are in general similar, but there are minor differences between areas.

Several thousand pegmatites are exposed in the Spruce Pine district, but only a small fraction contain minable deposits of sheet mica. The known pegmatites are distributed unevenly throughout much of the district (Brobst, 1962, pl. 1), and there are some areas containing few or no pegmatites, such as Simmons Knob northeast of Newdale, Yancey County, and Big Bald Mountain on the Avery-Mitchell County line. The pegmatites range from small pods and thin seams to large masses hundreds of feet thick and thousands of feet long. Some of the largest bodies are mined for feldspar and a few for both feldspar and mica. Some large deposits are mined only for sheet mica, and many small bodies a few feet thick and less than 100 feet long have been mined successfully. The large masses of fine-grained pegmatite or granodiorite are mined for feldspar and scrap mica. The deeply weathered granodiorite deposits are mined for clay and scrap mica.

Wallrock for about half of the deposits is mica gneiss and for about one-fourth, interlayered mica and hornblende gneiss. About 10 percent of the deposits are enclosed in hornblende gneiss and about 10 percent cut the larger bodies of fine-grained pegmatite or granodiorite. Throughout the district about 70 percent of the deposits are concordant to the foliation of the enclosing country rock. Some tabular bodies are contorted and follow folds. Discordant bodies follow joints

or faults. Many large pegmatites which appear concordant to the regional structure are discordant in detail and probably are in shear zones. Elongate bodies and minor bulges or rolls in the pegmatites plunge obliquely downdip parallel to the plunge of minor structures in the country rock.

Contacts between pegmatite and country rock are generally sharp. Mica gneiss and schist have been little altered along contacts, but hornblende gneiss in contact with pegmatite has been altered to biotite schist for a few inches to a foot or more. Contacts of pegmatite and granodiorite are generally obscured by similarity in grain size and mineralogy.

The pegmatites are tabular (57 percent), lenticular (29 percent) or irregular (14 percent). Many of the tabular bodies are probably elongate lenses that have three unequal axes. Some tabular bodies pinch and swell either along strike or downdip, or both; where this characteristic is most pronounced, a series of lenses follow a narrow zone in the metamorphic country rocks. Most lenticular bodies are discoidal with one axis shorter than the other two; but some have one very long axis and two short ones, and they are best described as tonguelike or pipelike.

The sheet-mica-bearing pegmatites are generally not large; few are thicker than 100 feet or longer than 1,000 feet. Half of the deposits are 10 feet or less thick, and only 20 percent are more than 20 feet thick. About 40 percent may be more than 200 feet long, but 45 percent are probably less than 100 feet long. Some of the largest deposits have been mined downdip 300–400 feet, but many bodies pinch out in less than 100 feet in depth.

The internal structure of Spruce Pine pegmatites is relatively simple (Cameron and others, 1949, p. 62–64). Nearly 75 percent of the deposits have no apparent internal zoning of contrasting mineral composition or texture. Of the 25 percent that are zoned, two-thirds have a wall zone of feldspar, quartz, and mica and a core of massive quartz. The remainder have perthite-plagioclase-quartz, perthite-plagioclase, perthite-quartz, or perthite cores. About 20 percent of the zoned bodies have one or more intermediate zones of various proportions of feldspar, quartz, and mica. A few deposits have secondary units of fine-grained pegmatite or quartz cutting the earlier zones, and some have small replacement units of fine-grained plagioclase replacing microcline and quartz.

Mineralogy of the pegmatites is also simple. The most abundant minerals are plagioclase, quartz, perthitic microcline, and muscovite. The type of feldspar was recorded for about 80 percent of the deposits. About 30 percent of them contain only plagioclase; 15 percent have abundant plagioclase and minor perthite; 30 per-

cent contain a little more plagioclase than perthite; 20 percent contain a little more perthite than plagioclase; 4 percent contain much more perthite than plagioclase; and only 1 percent contain perthite alone.

Plagioclase is generally white; but some is clear and glassy, and some is light pink or green where altered to thulite or epidote. Some clear and untwinned oligoclase of gem quality is present in a few deposits. Grain size ranges from less than an inch to masses several feet across; dimensions of several inches are common. Plagioclase is most abundant in wall zones and outer intermediate zones. Most of the muscovite of commercial size and quantity is found in plagioclase-rich pegmatite.

The plagioclase ranges from albite to calcic oligoclase. Maurice (1940, p. 173–178) found that a belt of pegmatites with the more calcic plagioclase extends northeast from Micaville to Bakersville and is flanked by pegmatites containing the more sodic plagioclase. From Maurice's data, Olson (1944, p. 28) concluded that the more sodic plagioclase is in pegmatite in or near granodiorite, in migmatite related to granodiorite, or in very large pegmatites. The more calcic plagioclase is in pegmatite farther from granodiorite.

Most of the pegmatites contain about 25 percent quartz as small- to medium-sized grains mixed with feldspar, as graphic intergrowths in feldspar, or as massive cores in some zoned deposits. The quartz is generally gray, white or smoky; little is transparent. Euhedral and even subhedral crystals are rare.

Microcline is widespread and abundant in many of the pegmatites. Practically all of it is perthitic, and much of it has a graphic texture. The microcline is white to light-cream or pink. Grain size is medium to very coarse. Most of the microcline is in intermediate zones or cores.

Muscovite is present in all the pegmatites. It ranges from the fine-grained scaly form called sericite to large books several feet across. Total muscovite content may be as much as 15 percent in the granodiorite and pegmatite (Brobst, 1962, p. A10), but sheet muscovite probably forms from 2 percent to no more than 8 percent of any one deposit. Much of the sericite formed late as an alteration product either from residual solutions during crystallization or from metamorphic effects of subsequent deformation.

The color, quality, and size of the sheet-mica crystals vary widely in different parts of the district. Color ranges from light reddish brown (ruby) through light brown (rum) to light brownish green, light green, and dark green. Some sheets are mottled by irregular color variations, and some have alternating color bands generally hexagonal or rhombic in plan. Reddish-brown mica is found in 23 percent of the deposits, brown in 20

percent, and various shade of green in 55 percent. The remaining 2 percent of the deposits have both green and brown mica. In areas of gneiss, reddish-brown and brown mica predominate, and in areas in or near the granite masses brownish green and green mica predominate. This areal distribution of mica according to color in the Spruce Pine district has been shown by Olson (1944, pl. 2).

Much good quality mica has been mined in the district, but large amounts of the sheet mica contain various defects. The principal defects are staining, mineral inclusions and intergrowths, "A" structure and reeving, bending, cracking, and ruling. Some form of staining, such as specks, spots, and streaks of magnetite, hematite, pyrite, limonite, and clay, is found in at least occasional pieces of mica from 54 percent of the deposits, and intergrowths of muscovite with biotite or other minerals are found in 15 percent of the deposits.

"A" structure and reeving are common defects in deposits of green mica, especially where the green mica is associated with large masses of quartz. Deformation of the mica crystals after formation has produced bending in 40 percent of the deposits and cracking and ruling in 34 percent. The degree of deformation varies within the district. Near the center of the district around Spruce Pine only 20 percent of the deposits contain some bent mica, but to the northeast near Plumtree, 53 percent contain some bent mica and near Black Mountain, 67 percent.

A more detailed discussion of the properties of mica and lists of some characteristics of the mica from many of the Spruce Pine deposits are given by Jahns and Lancaster (1950).

The Spruce Pine pegmatites contain less than 5 percent accessory minerals. In 625 pegmatites for which data are available the most common accessory minerals are garnet in 60 percent of the deposits and biotite in 40 percent. Apatite (12 percent), pyrite (9 percent), vermiculite (7 percent), allanite and thulite (6 percent) are also widespread. Beryl has been reported in 28 of the 625 deposits, epidote and tourmaline in 32, pyrrhotite in 12, and columbite in 10. The following minerals have been reported from less than 10 deposits: autunite, calcite, chalcopyrite, chlorite, clarkeite, cleavelandite, covellite, cyrtolite, gahnite, gummite, hyalite, kyanite, lepidolite, magetite, monazite, samarskite, siderite, sphalerite, spodumene, torbernite, uraninite, uranophane, zircon, and zoisite.

#### BUNCOMBE DISTRICT

The Buncombe district is an area of widely scattered pegmatites between the Spruce Pine district to the northeast and the Franklin-Sylva district to the southwest. The district is about 24 miles wide and 30 miles

long in Buncombe, McDowell, Madison, and Yancey Counties (pl. 4). Ninety mines and prospects are known, but there may be many more small prospects that are lost and forgotten. Sterrett (1923, p. 184-188) describes briefly 11 deposits in Buncombe County. According to the Colonial Mica Corp. records, about 50 deposits had a total production from 1942 to 1945 of nearly 13,000 pounds of sheet and punch mica worth \$39,000. At least 20 mines were active at various times from 1952 to 1962, and 3 mines were explored with DMEA financial assistance. Total production from 1952 through 1962 was 9,975 pounds of sheet and punch worth more than \$59,000. Complete production records are not available, but probably no mine has an individual production greater than 10,000 pounds of sheet-and-punch mica. Most of the mines have produced less than 500 pounds. Total production for the district may be no more than 50,000 pounds.

The pegmatites in the Buncombe district are similar to those in adjacent areas. Most of the deposits are weathered, tabular (65 percent) or lenticular (27 percent) bodies in mica gneiss or schist. Three deposits are in hornblende gneiss and three cut dunite. Nearly three-quarters of the deposits are less than 10 feet thick, and only 5 percent are greater than 20 feet thick. About 60 percent are concordant to the foliation of the country rock. One-third of the pegmatites have a feldspar-quartz-mica wall zone and a quartz core; the remainder have no apparent zoning. Three of the zoned deposits have a perthite intermediate zone. Plagioclase is the principal feldspar, but perthite is present in some deposits. Biotite is present in at least 40 percent of the deposits and may be the principal mica in some. Garnet is common, and allanite, apatite, beryl, sulfide minerals, tourmaline, and vermiculite are rare accessory minerals.

The muscovite is reddish brown (75 percent), brown (10 percent), and green (15 percent). In general, the quality and quantity are only fair. At least 30 percent of the deposits have mica that is bent, cracked, ruled, or stained. The average size of the sheet mica is small.

#### WOODLAWN DISTRICT

The Woodlawn district in McDowell County, contains at least 12 small mines and prospects in an area about 10 miles long and several wide that is separated from the Spruce Pine district by an area 1-3 miles wide that contains few or no pegmatites (pl. 4). Very little is known about the deposits in McDowell County. Sterrett (1923, p. 224) mentions only two deposits, although the principal mining activity was apparently from 1894 to 1918. According to records of the Colonial Mica Corp., production from 1942 to 1945 came from 18 mines in McDowell County, at least some of which

were in the Woodlawn district, and amounted to less than 2,000 pounds of sheet-and-punch mica worth about \$7,350. About 15 mines and prospects have been worked since 1952 in McDowell County, but their locations are unrecorded. Total production was 600 pounds of sheet mica valued at nearly \$4,500.

The pegmatites are generally deeply weathered, small, tabular or lenticular bodies 1-10 feet thick in mica gneiss or schist. Plagioclase is the principal feldspar, but perthite is present in some of the deposits. Biotite and garnet are the principal accessory minerals.

The mica is generally green or greenish brown. Reddish-brown mica is present in at least two of the deposits. The quality of the sheet mica is poor and the quantity is small. Much of the mica is stained.

**FRANKLIN-SYLVA DISTRICT**

The Franklin-Sylva district is second among southern Appalachian mica districts in number of mines and in total production. The district covers an area about 12 miles wide and 50 long in Haywood, Jackson, and Macon Counties and extends a short distance into Clay County (pls. 5, 6). Most of the mica mines are centered about Franklin in Macon County and Sylva in Jackson County. Although the number of mines and pegmatites decreases sharply away from the center of the district, the largest single producer is the Big Ridge mine in Haywood County, well outside the center of the district. This mine was opened in 1867 and was one of the first mica mines to be operated in North Carolina in modern times. As in the districts to the northeast, several of the large mines were originally worked by Indians for mica (Smith, 1877, p. 441-443) and clay (Watts, 1913, p. 10; Griffiths, 1929). Modern clay mining in the district was started in 1888 near Webster (Watts, 1913, p. 10), but little clay has been mined in the district since the 1920's. Some feldspar has been mined sporadically, generally as a byproduct of mica mining.

Information has been assembled on 433 mica deposits in the district (table 4), but there are probably a total of 500-700 mines and prospects. Sterrett (1923) described more than 100 deposits in Haywood, Jackson, and Macon Counties. Some of these deposits are in the Cashiers district east of the Franklin-Sylva district and are not included in the table. Records of the Colonial Mica Corp. show that from 1942 to 1945 some mining was done at 24 mines in Haywood County, 189 in Jackson County, and 157 in Macon County. Olson and others (1946) show the locations of 326 mines and describe in detail 20 mines worked during World War II. More than 150 mines were active in the district from 1952 to 1962. In Haywood County, 8 deposits were

explored with DMEA financial assistance; in Jackson County, 13, and in Macon County, 46. Nineteen deposits were certified as discoveries, and several of those in Macon County became significant producers.

Production records for the district are not complete. The available data are summarized in table 3. During each period of production about 10 percent of the mines have produced 65-85 percent of the sheet-and-punch mica.

TABLE 3.—Recorded production of sheet-and-punch mica from the Franklin-Sylva district, North Carolina

County	1922-1942 <sup>1</sup>		1942-1945 <sup>2</sup>		1953-1962 <sup>3</sup>	
	Number of mines	Pounds sheet and punch	Number of mines	Pounds sheet and punch	Number of mines	Pounds sheet and punch
Haywood.....	1 2	1,184,672 3,923	1 23	85,716 4,540	----- -----	----- -----
Total.....	3	1,188,595	24	90,256	5	1,118
Jackson.....	6 48	287,099 149,960	8 181	55,938 30,289	5 49	27,354 19,838
Total.....	54	437,059	189	86,227	54	47,192
Macon.....	7 54	532,283 138,757	15 142	117,330 30,774	7 84	267,087 133,261
Total.....	61	671,040	157	148,104	91	400,348
District total.	118	2,296,694	370	324,587	150	448,658

<sup>1</sup> Data from Olson (1946) and records of Asheville Mica Co.  
<sup>2</sup> Data from Colonial Mica Corp.  
<sup>3</sup> Data from U.S. Bureau of Mines.

Individual pegmatite bodies range from thin stringers an inch or less thick to large masses 150-350 feet thick. About 70 percent of the mica-bearing deposits are 10 feet or less thick. Most of the deposits are less than 200 feet long, but some elongate bodies are 500-1,400 feet long. Although a few of them have been mined to depths of 300 feet, most are not known to go deeper than 100 feet. Nearly all the deposits are weathered to depths ranging from 10 to 100 feet.

More than half of the deposits are tabular, about 20 percent are lenticular, and 22 percent are irregularly shaped. About 80 percent are discordant bodies. The wallrock is mica gneiss (92 percent), interlayered mica and hornblende gneiss (6 percent), or hornblende gneiss (2 percent). Numerous thin dikes south and west of Franklin strike north or north-northeast and are vertical. In the district as a whole, however, strike and dip are not uniform. The crests, keels, rolls, and minor structures in the pegmatites generally plunge steeply and may be parallel to the plunge of minor structures in the country rock.

The pegmatites have a simple internal structure. About two-thirds are zoned; 92 percent of these have quartz cores, and the remainder have plagioclase-perthite-quartz, perthite-quartz, or perthite cores. Wall zones are generally feldspar-quartz-muscovite in 60 percent of the deposits, plagioclase-quartz-muscovite in

20 percent, or plagioclase-perthite-quartz-muscovite in 20 percent. About 10 percent of the deposits have one or more intermediate zones of plagioclase-perthite-quartz, perthite-quartz, or perthite. A thin border zone of feldspar-quartz-mica or quartz-mica pegmatite is present in some of the deposits. Late-stage fracture fillings or replacement units are rare. A few deposits contain cores that are sheared and have thin strips of biotite along fractures. Some deposits have veinlets

of quartz, quartz-muscovite, or plagioclase-muscovite that cut outer zones. Perthite is partly altered to plagioclase and muscovite along shears in a few deposits.

The principal minerals are quartz, oligoclase, perthitic microcline, and muscovite. The chief accessory minerals are biotite and garnet. Pyrite, pyrrhotite, and apatite are present in a few deposits, and allanite, ankerite, beryl, chalcopyrite, epidote, hedenbergite, kyanite, and tourmaline are reported from less than 2 percent of the

TABLE 4.—Summary description of mica mines and

Source of information:

- Unpublished data in files of—
- CMC, Colonial Mica Corp.
- DMEA, Defense Minerals Exploration Administration
- OME, Office of Minerals Exploration
- USGS, U.S. Geological Survey

Also—

OF, U.S. Geological Survey open-file map, which may be examined at the U.S. Geological Survey Library, Washington, D.C.; at the office of the U.S. Geological Survey, Knoxville, Tenn.; and at the office of the State Geologist, Raleigh, N.C.

Local-ity No. on pl. 2	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>JEFFERSON-BOONE DISTRICT</b>						
<b>Ashe County</b>						
20	Beaver Creek mine.....	CMC.....	WWII.....		Moderate stain.....	Small.....
12	Buck Mountain mine.....	USGS, CMC.....	1913, 1930, WWII.....	Shaft 55, drift 80; shaft 60, drift 10; shaft 20; cut 40, adit 40.	Ruby, moderate "A" structure, biotite intergrowths, small concentrations near walls and core.	Moderate sheet.....
25	Conner prospect.....	CMC.....	1927, WWII, 1953.....	Small cut 50 long, 2 shafts 15 deep.	Reddish brown, hard, clear, cracked, small, bent, ruled.	Small sheet.....
21	Coon Den mine.....	CMC.....	1920, WWII.....	2 cuts, short incline.....	Reddish brown, hard, clear, cracked; minor "A" structure, small.	do.....
7	Councill prospect.....	CMC.....	WWII.....	Shaft 20.....	Reddish brown, hardly small.....	do.....
19	Duncan (Harris) mine.....	USGS, Sterrett (1923, p. 176).	1885-88, 1906-7, 1918, WWII.....	Cut 115, 2 shafts 60 and 108, 2 adits and numerous stopes.	Pinkish buff, moderately ruled, cracked, mineral inclusions, tied.	Moderate sheet (WWII).
17	Duncan prospect.....	CMC.....	1930, WWII.....	2 pits.....	Small books.....	Small sheet.....
29	Tom Duncan mine.....	USGS.....	WWII.....	Cut 80.....	Reddish brown, flat, small.....	Moderate sheet.....
22	Dugherty (Darty) mine.....	CMC.....	1892, WWII.....	Pit 20 long, 15 deep.....	Reddish brown, hard, ruled, "A" structure, locky, bent, small.	Small sheet.....
1	Foster mine.....	Sterrett (1923, p. 173), USGS.	1897; int.....	Crosscut, extensive stopes.....	Pinkish buff, hard, small.....	Moderate sheet.....
15	Goodman mine.....	Sterrett (1923, p. 176), CMC.	1890-96, WWII.....	Cut 140; 2 shafts, caved.....	Yellowish olive, common stain, ruled, bent, small.	do.....
13	Hamilton mine.....	Sterrett (1923, p. 173), USGS.	1875, 1890-1900, 1907-12, 1950's.	Cuts, 3 adits, shaft, drifts, partly destroyed by cut 150.	Reddish brown, biotite intergrowths, bent, ruled.	do.....
18	Hardin (North Hardin) mine.....	Sterrett (1923, p. 173), USGS.	1880, WWI, 1931, WWII, 1952-57.	Cuts, shafts, adits, stopes, in area 600 long, 100 deep.	Ruby, mottled, minor ruling, hair-cracks, reeved, bent.	Moderate sheet (1943-57).
16	South Hardin mine.....	Sterrett (1923, p. 175).		Cut 75, shaft 30, adit.....	Reddish brown.....	Moderate sheet.....
10	Hodson prospect.....	CMC.....	WWII.....	Small pit.....	do.....	Small sheet.....
28	Houck mine.....	CMC.....	1910, WWII.....	Shaft 40, adit.....	do.....	do.....
26	Byard Houck prospect.....	CMC.....	WWII.....		Reddish brown, small.....	do.....
6	Howell prospect.....	CMC.....	WWII.....		Small, clay stain.....	do.....
17	Rich Howell prospect.....	CMC.....	1935, 1942.....	Cut 25, short adits.....	Clear.....	do.....
32	Johnson mine.....	DMEA.....	1952-56.....	Cut 260, shaft 40.....	Reddish brown, clear; minor cracks, ruling, biotite intergrowths, bent.	Moderate sheet.....
27	Laws prospect.....	CMC.....	WWII.....	Shallow trenches.....	Reddish brown, small.....	Small sheet.....
4	Little prospects: No. 1.....	USGS.....	WWI, WWII.....	6 cuts, 3 shafts 30-60, adit 140, drift 68.	Greenish brown, flat "A" structure, minor stain, ruling, biotite intergrowths, tied.	Moderate sheet.....
4	No. 2.....	USGS.....	WWI, WWII.....	Cut 135.....	Small.....	

deposits. Vermiculite, kaolinite, and limonite, are common secondary minerals in the weathered pegmatites.

The muscovite in the Franklin-Sylva district is generally reddish brown (36 percent) or brown (44 percent). About 30 of the 435 well-known deposits contain both brown and green mica, and 55 deposits have only green mica. The mica ranges widely in quality. Nearly half of the deposits contain some mineral-stained mica, and 12 percent contain muscovite with

biotite intergrowths. Deformation of mica is also widespread in the district, and at least 45 percent of the mines contain some mica that is bent, ruled, or cracked. In a few mines much of the mica is deformed and is only scrap quality. Comparison of production data from Franklin-Sylva (Olson and others, 1946, p. 18) with that of Spruce Pine (Kesler and Olson, 1942, p. 36) suggests that the average size of recoverable sheet mica is slightly smaller in the Franklin-Sylva district.

*prospects in the Blue Ridge of North Carolina*

Principal periods worked: WWI, World War I; WWII, World War II; int, intermittent.  
 Production: Small, <500 lb; moderate, 500-10,000 lb; large, >10,000 lb.  
 Size of pegmatite: D, depth; L, length; T, thickness; avg, average.  
 Internal structure: B, biotite; F, feldspar; M, muscovite; P, perthite; Pl, plagioclase; Q, quartz.

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				
<b>JEFFERSON-BOONE DISTRICT—Continued</b>								
<b>Ashe County—Continued</b>								
Tabular	6-10 T, >200 L, >60 D.	NE	SE		Concordant	Interlayered biotite and hornblende gneiss.	Unweathered	F-Q-M pegmatite.
	4-6 T	NE	Steep		do	Biotite gneiss	Weathered	P1-P-Q-M-B wall zone, medium grained; accessory garnet, apatite; discontinuous Q core. F-Q-M pegmatite; poorly exposed.
		NE	Vertical			Hornblende gneiss.		
		NE	Steep		Concordant	Mica gneiss		P1-Q-P-M pegmatite; accessory vermiculite, garnet, apatite, beryl. 2-12-in. mica-rich zone along northwest wall.
Irregular lens	1.5-8 T, avg 5, 100 D.	NE	SE	40° SW	Partly concordant	Mica gneiss	Unweathered	F-Q-M pegmatite.
		NE	SE				Weathered (100 ft).	P1-P-Q-M pegmatite, medium grained; accessory garnet, apatite, pyrite, sericite, yellow beryl.
Lens	3 T, >80 L	NE	SE		Partly concordant	Interlayered mica schist and hornblende gneiss.		F-Q-M pegmatite.
Pinch and swell	5-10 T, >100 L	NE	SE		do	Hornblende gneiss.	Unweathered	P1-Q-P-M pegmatite; accessory biotite, blue-green to yellow beryl, apatite, garnet.
	12-18 T	N. 55° E	50° SE		Concordant	Hornblende gneiss; biotite alteration.		F-Q-M pegmatite.
Lens		NE	SE		do	Mica gneiss	Weathered	P1-Q-M wall zone, medium grained; accessory biotite, apatite, garnet; P-Q core. Poorly exposed.
	>6 T	N. 10° E	Steep E		Partly concordant	Interlayered hornblende and mica gneiss.	do	P1-Q-P-M-B pegmatite, coarse grained; accessory garnet, apatite, yellow to yellow-green beryl. Perthite concentrated in interior.
Lenses	1.5-10 T, avg 5 >350 L, >100	NE	SE	Steep	Concordant	Biotite gneiss	Weathered (30 ft).	P1-Q-P-M pegmatite, fine to medium grained; accessory apatite, biotite, garnet, yellow beryl, sericite. Some graphic texture P-Q.
	7 T at surface	NE	SE		do	do		F-Q-M pegmatite, fine to coarse grained; accessory yellow to blue-green beryl. Pods and platy masses of quartz near footwall. Muscovite associated with quartz.
Sill	2 T	NW			do	Interlayered hornblende and biotite gneiss.	Weathered	Kaolinized F-Q-M pegmatite.
Tabular	6 T		NW					P1-Q-P-M pegmatite, medium grained; accessory apatite, garnet.
	3 T				Discordant		Weathered	Kaolinized F-Q-M pegmatite.
	4-5 T						do	Kaolinized F-Q-M wall zone, medium grained; Q core.
Lenses	3-4 T, 40 L, largest lens.	NW	SW	S	Concordant	Interlayered biotite and hornblende gneiss.	Saprolite (100 ft).	F-Q-M wall zone, medium to coarse grained; discontinuous Q core. Kaolinized P1-Q-P-M pegmatite, medium to coarse grained; accessory apatite; graphic texture common.
Tabular	>45 T at N. end, >300 L, >60 D.	NE	Vertical		Concordant(?)	Mica gneiss	Weathered	F-Q-M pegmatite; accessory beryl in quartz blocks.
do	>20 T, >135 L	NE	do		do		do	Kaolinized P1-P-Q-M-B wall zone; accessory yellow to yellow-green beryl; garnet; Q core. Kaolinized F-Q-M pegmatite.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 2	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>JEFFERSON-BOONE DISTRICT—Continued</b>						
<b>Ashe County—Continued</b>						
3	Little Phoenix mine.....	Sterrett (1923, p. 172-173).	1880-90.....	3 shafts 70, drifts, cuts.....	Reddish brown, hard, clear, cracked, ruled.	Moderate sheet.....
14	Miller prospect.....	CMC.....	WWII.....	Cut 40.....	Stained, ruled, bent, cracked.....	.....do.....
24	Perkins prospect.....	CMC.....	1932.....	Cut, 15 deep.....	Reddish brown, hard, small.....	Small sheet.....
23	Rash mine.....	USGS.....	1929, WWII.....	Cut, 75.....	Reddish brown, clear, hard, small, cracked.	Moderate sheet.....
11	Reed mine.....	CMC.....	1903, WWII.....	Cut, inclined shaft 25.....	Pinkish buff.....	.....do.....
6	Reeves prospect.....	CMC.....	1892-1900.....	.....	Clay stained, small.....	Small sheet.....
8	Roark prospect.....	CMC.....	WWII.....	Shaft 40, drift 50, adit 130.....	Reddish brown, hard, cracked, clay stain, small.	.....do.....
31	Shaffer (Goodman) mine.....	DMEA.....	Pre-1890, WWII, 1954-56.	Cut 140 long, 25 deep; 3 shafts 25-65 deep, drifts, stope.	Greenish brown, moderately stained, bent, ruled, small.	Small sheet(?).....
9	Sheppard mine.....	CMC.....	1942.....	Small pit.....	Reddish brown, small.....	Small sheet.....
17	Speers mine.....	CMC.....	1900, int to 1942.....	Cuts, shaft, extensive underground workings.	Greenish brown, clear, small.....	.....do.....
2	Tarkington (Witherspoon) mine.....	Sterrett (1923, p. 173), USGS.	1890, int to WWII.....	Cuts, 2 shafts, trench in area 50 by 470.	Reddish brown, moderate clay stain, cracks, waviness, small.	Moderate sheet.....
30	Tucker mine.....	CMC.....	1942-43.....	2 shafts, prospect pits.....	Reddish brown, small.....	do.....
5	Walls (Waugh) mine.....	CMC.....	1943.....	.....	Reddish brown, clear, cracked, small.....	.....do.....
33	Walnut Knob mine.....	Sterrett (1923, p. 176-177).	1895-1905, 1950's.....	Opencuts, 2 shafts, adit 50, irregular stopes, older works partly destroyed by recent opencut.	Yellow brown, clear, bent, ruled.....	Moderate(?) sheet.....
	Walnut Knob prospect:			Incline 30, southwest 300 of main mine.	Yellow brown, clear, small, "A" structure.	Small(?) sheet.....
34	No. 1.....	Sterrett (1923 p. 177).				
34	No. 2.....	Sterrett (1923 p. 177).				
<b>Watauga County</b>						
61	H. E. Brookshire prospect.....	USGS.....	1930's(?).....	Cut 30 long, 15 deep.....	Ruled, bent, soft, moderately stained.....	Small sheet.....
38	Jim Brown prospect.....	USGS.....	1951.....	Trench 50, prospect pits.....	Ruby, clear, hard, bent, ruled, cracked.....	do.....
35	Burnt Ridge prospect.....	USGS.....	1943-44.....	2 small bench cuts, 6-8 long.....	Reddish brown, small.....	do.....
46	Clawson prospect.....	CMC.....	1904.....	Prospect pits.....	Pinkish buff, clear, small.....	do.....
45	Dobbin's (Old Dobbin) mine.....	Sterrett (1923, p. 269), USGS.	1890, 1900, WWI, 1929.	At southwest end 5 adits, 2 shafts, pits. Northeast 750, 3 shafts, 2 adits, small cuts.	Green, "A" structure, concentrated near core; reddish brown, hard, bent, ruled, moderately stained, concentrated in wall zone.	Moderate sheet.....
56	Doe Ridge mine.....	USGS, CMC.....	1915, WWII, 1950's(?).....	Cut 100 long, 10 deep; adit.....	Reddish brown, "A" structure, hard, ruled, bent, cracked, stained.	Small sheet.....
54	Doe Ridge East prospect.....	USGS.....	1890's, WWII.....	Cut 50, prospect pits.....	Ruby, ruled, tied, bent, concentrated near core.	.....do.....
55	Doe Ridge West prospect.....	USGS.....	1950's(?).....	Cut 50 long, 15 deep, adit.....	Brown, hard, ruled, bent.....	.....do.....
47	Dugger (Proffitt) mine.....	CMC.....	1916, WWII.....	Cut 40 long, 15 deep.....	Reddish brown.....	Small sheet.....
51	Arney Foster mines:					
	East.....	Sterrett (1923, p. 270), USGS.	Pre-WWI.....	Cut 60 long, 5-10 deep; 2 caved adits.	Reddish brown, hard, bent, moderately stained.	.....do.....
51	South.....	Sterrett (1923, p. 270), USGS.	Pre-WWI.....	Cut, adit.....	Reddish brown, small.....	.....do.....
51	West.....	Sterrett (1923, p. 270), USGS.	Pre-WWII.....	Cut 35 long, 15 deep; incline(?).....	Reddish brown, biotite intergrowths, ruled, bent.	.....do.....
49	Gerhardt prospect.....	USGS.....	1950's.....	Cut 100 long, 15 deep.....	Brown, soft, bent, ruled.....	.....do.....
49	C. C. Green prospect.....	Sterrett (1923, p. 270).	Pre-WWI.....	Several pits, caved adit.....	Reddish-brown, biotite intergrowths.....	Small sheet.....
58	Hardy prospect.....	CMC.....	1941.....	Prospect pit.....	Reddish-brown, hard, cracked, biotite intergrowths; small.	do.....
52	Hodges prospect.....	USGS.....	1950's.....	Cut 150 long, 10 deep.....	Ruby, biotite intergrowths, lanky, bent, ruled.	.....do.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	3 Dip	Plunge				

**JEFFERSON-BOONE DISTRICT—Continued**

**Ashe County—Continued**

Tabular(?)		NE	SE		Concordant(?)	Interlayered mica and hornblende gneiss.		Pl-Q-P-M wall zone; accessory garnet, beryl. Q core. Muscovite generally along core footwall. First mined by the Indians.
	15-20 T.	N					Weathered	P-P1-Q-M-B wall zone, medium to coarse grained; accessory beryl; Q core.
	8 T.							F-Q-M wall zone; discontinuous Q core. Muscovite along core margins.
	1.5-2 T.	NE	SE		Concordant	Mica gneiss		Pl-Q-P-M pegmatite; accessory garnet.
Lens	5 T.	NE	SE		do	do		Pl-P-Q-M pegmatite.
	6 T.	NE	SE				Weathered	F-Q-M wall zone; Q core.
							do	Kaolinized F-Q-M pegmatite.
Lens	2-17 T, >100 L, >60 D.	NE	SE	SW	Concordant	Mica gneiss	do	Pl-Q-M wall zone, medium grained; accessory biotite, apatite, garnet, uraninite(?); P-Q core, coarse grained.
		NE	SE					F-Q-M wall zone; Q core.
Tubular		NE	SE		Concordant	Interlayered hornblende and mica gneiss.		Pl-Q-P-M pegmatite, medium to coarse grained; accessory garnet, beryl.
	3-8 T.	NE	SE		do	Hornblende gneiss.	Weathered	Pl-Q-P-M wall zone, medium to coarse grained; accessory beryl; Q core.
Lens	6 T at surface, 8-10 T.	NE	SE		Concordant(?)	Mica schist. Hornblende gneiss.	Weathered	F-Q-M pegmatite. Kaolinized F-Q-M pegmatite.
Irregular		NE	SE		Partly concordant.	Mica gneiss		Pl-Q-P-M pegmatite, medium to coarse grained; accessory beryl, garnet. 1-4 ft mica zone along footwall. Small stringers and pods of pegmatite and quartz flank main body. First worked by Indians in opencut.
do		N	E		Concordant(?)	do		Pl-Q-P-M pegmatite. Muscovite concentration along walls. Mica gneiss inclusion near hanging wall.
		NE	SE		do	Biotite gneiss		F-Q-M pegmatite.
								F-Q-M wall zone; Q core.

**Watauga County—Continued**

						Hornblende gneiss.	Weathered	F-Q-M wall zone, fine to medium grained; Q core, discontinuous. Poorly exposed.
Pods. Pinch and swell.	1-4 T.	NE	SE		Concordant	Mica gneiss.		F-Q-M pegmatite.
		NE	SE		do	Interlayered mica and hornblende gneiss.	Weathered	Kaolinized Pl-Q-P-M pegmatite; accessory garnet.
Tabular	Possibly 70 T.	NE	SE		Partly concordant.	Biotite gneiss		No pegmatite exposed.
Pinch and swell, tabular.	Lower body >10 T, upper body 1-7 T.	NW	NE		do	Interlayered biotite and hornblende gneiss.	Weathered	Pl-Q-P-M wall zone, fine to coarse grained; accessory biotite; Q core. 2 similar pegmatites mined.
Tabular		NE	SE		Concordant	Mica gneiss	do	F-Q-M wall zone; Q core.
do	>5 T.	NE	Vertical		do	do	do	F-Q-M-B wall zone; Q core.
do	6-8 T.					Hornblende gneiss.		Pl-Q-P-M pegmatite, medium to coarse grained; accessory garnet, apatite. Gneiss altered to mica schist along contacts.
Tabular		NW			Concordant(?)	Mica gneiss		F-Q-M wall zone; Q core?. Poorly exposed.
Pods, stringers.		NE	NW		Concordant	Biotite gneiss		Pl-Q-M pegmatite; accessory biotite, apatite, garnet, beryl. Poorly exposed.
Tabular	3-8 T.	NW	NE		do	Mica gneiss		Pl-Q-M pegmatite; accessory biotite, apatite, garnet, beryl.
do		N	E		do	do	Weathered	F-Q-M-B pegmatite, graphic texture common.
do		N	Vertical		do	Interlayered biotite and hornblende gneiss.		F-Q-M pegmatite, poorly exposed. Sills and pods of pegmatite common nearby.
								F-Q-M pegmatite.
Pinch and swell.	1-5 T.	N	E		Concordant	Mica schist	Weathered (10 ft).	F-Q-M-B pegmatite, fine to medium grained.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 2	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>JEFFERSON-BOONE DISTRICT—Continued</b>						
<b>Watauga County—Continued</b>						
58	Horton prospect.....	CMC.....	1942.....	Pit.....	Mostly scrap.....	Small sheet.....
60	F. A. Linney (Rich Mountain) mine.....	Sterrett (1923, p. 270), USGS.....	Pre-WWI.....	Cut, 4 pits.....	Reddish brown, hard, clear, mineral inclusions.....	do.....
59	F. A. Linney prospect.....	Sterrett (1923, p. 270), USGS.....	1900.....	Prospect pit.....	Light brown, hard, clear, minor stain.....	do.....
36	Mica Ridge mine.....	DMEA.....	WWII, 1952.....	Cut 38, prospect pits.....	Ruby, clear, hard, tied, ruled, cracked.....	do.....
39	Mica Springs prospect.....	CMC.....	1942.....	Cut, prospect pit.....	Reddish brown.....	do.....
57	M. D. Miller mine.....	USGS.....	1950's.....	Cut 130 long, 15-20 deep; 2 adits.....	Brown, clear, minor "A" structure, biotite intergrowths; moderately bent, ruled.....	Moderate sheet(?).....
50	Martin Moretz mine.....	USGS.....	1955.....	Cut 35.....	Ruby, bent, biotite intergrowths, stained.....	Small sheet.....
42	Pine Orchard mine.....	USGS.....	1905, 1929, 1944.....	Cut 80, trench 150, adit 50.....	Green, clear, hard, cracked; concentrated near hanging wall.....	Small sheet (WWII).....
48	Phillips prospect.....	USGS.....	1954.....	Cut 25.....	Ruby, hard, stained, tied, "A" structure, cracked, bent, small.....	Small sheet.....
53	Stout prospect.....	CMC.....	1942.....	.....	Reddish brown, clear, small.....	do.....
40	Sutherland mine.....	CMC.....	1935-40.....	.....	Clay stained.....	Small sheet, feldspar.....
37	Sutherland prospect.....	CMC.....	1943.....	Small cut.....	Reddish brown, clear, small.....	Small sheet.....
62	Suzie prospect.....	CMC.....	WWII.....	Shaft 25, drift.....	do.....	do.....
44	Todd prospect.....	Sterrett (1923, p. 269).....	1890.....	Pit.....	Reddish and greenish brown.....	do.....
43	Tugman prospect.....	CMC.....	1903, WWII.....	Shaft 25; several pits and cuts.....	Reddish brown, clear.....	Small sheet.....
62	Waterhole prospect.....	CMC.....	WWII.....	Pit.....	Reddish brown, clear, small.....	do.....
41	Woodring prospect.....	CMC.....	WWII.....	Cut 150 long, 15 deep.....	Reddish brown, clear, clay stained, cracked, ruled, small.....	do.....
<b>WILKES DISTRICT</b>						
<b>Ashe County</b>						
66	Benge Gap prospect.....	USGS.....	1956-57.....	Cut 80, adit 20, prospect pits.....	Reddish brown, flat "A" structure, ruled, stained, bent.....	Small sheet.....
65	Greene prospect.....	CMC.....	WWII.....	Pit 25, prospect pit.....	Reddish brown.....	do.....
64	Luther (Joe Louis Bomber) mine.....	CMC.....	1900, WWII.....	Cut.....	Reddish brown, clear, mostly scrap.....	do.....
67	Miller prospect.....	USGS.....	1956.....	Cut 100 long, 15 deep.....	Green, wedge "A" structure, ruled, bent, stained.....	do.....
68	Parsons prospects: No. 1.....	USGS.....	1956.....	Cut 100 long, 10 deep.....	Green, wedge "A" structure, scrap.....	do.....
69	No. 2.....	USGS.....	1956.....	Prospect pit.....	Green, wedge "A" structure, small.....	do.....
69	No. 3.....	USGS.....	1956.....	Cut 30 long, 5 deep.....	Stained, small.....	do.....
63	Yates prospect.....	CMC.....	1943.....	12 small pits on 3 deposits.....	Clear, small.....	Small sheet.....
<b>Caldwell County</b>						
95	Butler mine (Lower).....	USGS, OF.....	WWII.....	2 cuts 30-50, 3 adits 30-240.....	Yellowish green, bent, stained, mineral inclusions, reeved, ruled.....	do.....
94	Butler mine (Upper).....	USGS.....	WWII(?).....	5 adits along line 200.....	Green, bent, ruled, small.....	do.....
96	Cling Daniels mine.....	USGS.....	WWII.....	9 cuts, pits, incline, adits, drifts, in area 100 by 350.....	Yellowish to brownish green, some reddish brown, hard, clear, cracked.....	Moderate sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

JEFFERSON-BOONE DISTRICT—Continued

Watauga County—Continued

Tabular	5 T	NE	SE		Concordant	Mica gneiss	Weathered	Kaolinized F-Q-M pegmatite. F-Q-M pegmatite, accessory apatite
do	Thin	NE	NW		do	Hornblende gneiss		F-Q-M pegmatite.
do	8 T, 300 L	NW	SW		do	do	Weathered	Q-P1-P-M-B pegmatite, medium to coarse grained.
Tabular	10 T	NE	NW		Concordant	Interlayered biotite and hornblende gneiss.	Weathered (30 ft.)	F-Q-M pegmatite, medium grained; accessory garnet, beryl. F-Q-M-B wall zone, medium to coarse grained; some graphic texture; Q core, discontinuous.
do	2-4 T	NW	NE		do	Hornblende gneiss; biotite alteration.		P1-P-Q-M pegmatite; accessory biotite.
Tabular	3-7 T	NE	SE		do	Mica gneiss		P1-Q-P-M pegmatite; accessory garnet.
do	5-6 T	NE	SE		do	Hornblende gneiss		P1-Q-M wall zone; accessory garnet; Q core, 3 ft thick.
do	3-4 T					Interlayered biotite and hornblende gneiss.	Unweathered	F-Q-M pegmatite.
do	25 T							F-Q-M wall zone. Perthite core, coarse grained.
do	2 T	NE			Concordant	Mica gneiss. Hornblende gneiss.	Saprolite. Unweathered	Kaolinized F-Q-M pegmatite. F-Q-M pegmatite; accessory garnet. Poorly exposed. F-Q-M wall zone; Q core.
do								F-Q-M pegmatite.
Tabular	2-4 T	NE	SE		Concordant	Mica schist	Weathered. Unweathered	Kaolinized F-Q-M pegmatite. P1-Q-M wall zone, medium to coarse grained; accessory garnet, beryl, apatite; Q core, discontinuous.

WILKES DISTRICT—Continued

Ashe County—Continued

Tabular	15-27 T, > 110 L.	NW	SW		Concordant	Mica gneiss	Saprolite (20 ft.)	Kaolinized P1-Q-M pegmatite, medium to coarse grained; jointing and slickensides common.
Tabular(?)	4-6 T	NE	SE		Concordant(?)	Granitic gneiss. Mica gneiss		P1-Q-M pegmatite; accessory biotite. F-Q-M pegmatite, coarse grained.
Tabular	28 T	NE	SE		Partly concordant.	Interlayered hornblende and biotite gneiss.	Weathered	P-P1-Q-M pegmatite, medium to coarse grained, graphic texture; accessory tourmaline, garnet.
Pods and lenses.		NE	SE		Concordant	do	do	P-P1-Q-M pegmatite, fine grained, graphic texture; accessory tourmaline, garnet, biotite.
Tabular	8 T	N			do	Mica gneiss	do	P-Q-P1-M pegmatite, graphic texture; accessory garnet, sericite.
do							do	F-Q-M pegmatite.
do		NW						F-Q-M pegmatite, poorly exposed.

Caldwell County—Continued

Irregular	15-25 T, > 100 L.	NE	SE	SW	Partly concordant.	Hornblende gneiss.	Weathered (10 ft.)	P1-Q-M border zone, fine to medium grained; P1-Q wall zone, medium to coarse grained; graphic texture in part; P1-Q-M outer intermediate zone, coarse grained, graphic texture; P-P1-Q-M inner intermediate zone, fine to coarse grained; Q core, discontinuous. Pegmatite sheared.
Tabular	>5 T, 200 L	NW	SW		do	Hornblende gneiss.	Weathered (10 ft.)	F-Q-M pegmatite, fine to coarse grained; cut by faults.
Pinch and swell.	0.3-5 T, avg 1.5.	NE	NW	NE	do	Mica gneiss	Weathered (30 ft.)	P1-Q-M pegmatite; accessory tourmaline.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 2	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>WILKES DISTRICT—Continued</b>						
<b>Watauga County</b>						
70	Church prospects.....	CMC.....	1942.....	Prospect pits on 3 deposits.....	East body, clear, small; middle body, stained; west body, clear, "A" structure.	Small sheet.....
72	Locke Green mine.....	Sterrett (1923, p. 269).	Pre-WWI.....	Incline 50, several small cuts.	Stained.....	
70	Long Branch prospect.....	CMC.....	1915.....		Stained.....	Small sheet.....
71	Charlie Smith mine.....	USGS.....	1950's(?).....	Cut 100 long, 5-10 deep.....	Green, bent, cracked, ruled, stained.....	
73	Watson mine.....	USGS.....	Pre-WWII.....	Cut 80, 5-10 deep, adits(?).....	Brown, bent, ruled.....	
70	Arthur Welch prospect.....	Sterrett (1923, p. 269).	1895, 1905.....	Prospect pits.....	Green, stained.....	Small sheet.....
<b>Wilkes County</b>						
85	Barn Hill mine.....	USGS.....	WWII.....	Cut 100 long, 30 deep.....	Green, bent, cracked, reeved.....	Small sheet.....
77	Benton prospect.....	CMC.....	WWII.....		Reddish brown, small.....	do.....
76	Brown mine.....	CMC.....	WWII, 1950's(?).....		Green, soft, clear, moderate clay stain.....	do.....
	T. G. Casey prospect (location in doubt).	CMC.....	WWII.....	Small cut.....	Reddish brown, small.....	do.....
	L. J. Church prospect (location in doubt).	CMC.....	WWII.....		Clear.....	do.....
74	Sandford Crane mine.....	USGS.....	1950's.....	North cut 200; south cut 100, adit.	Light green, bent, ruled, "A" structure.	
82	Ralph Daniels deposit.....	CMC.....	WWII.....		Green.....	
88	Ferguson mine.....	USGS.....	1942.....	2 drifts on separate dikes.....	Green, reeved, cracked, bent.....	Small sheet.....
93	J. B. Ferguson-T. B. Finley prospect.....	USGS.....	1920-30, 1950's(?).....	Cut 75, 2 drifts, prospect pits.	Green, hard, "A" structure, bent, biotite intergrowths.	
82	Green prospect.....	CMC.....	1940.....	Prospect pit.....		
90	Hall mine.....	CMC.....	1944.....	Cut, incline 25, drift 30.....	Green, clear, bent.....	Small sheet.....
89	Hamby prospects.....	CMC.....	1944.....	Prospect pits.....	Yellowish green, clear, small.....	do.....
83	Hodge prospect.....	CMC.....	1943.....	do.....	do.....	do.....
81	Jones prospect.....	CMC.....	do.....	do.....	Clear.....	do.....
	Justice prospect (location in doubt).	CMC.....	1942.....	Pit, adit 25.....	Clear, small.....	do.....
	Key prospect (location in doubt).	CMC.....	1943.....		do.....	do.....
79	J. B. Nichols deposit.....	CMC.....	1944.....	Small prospect.....	Small.....	
	H. O. Parson prospect (location in doubt).	CMC.....	1944.....			Small sheet.....
91	W. A. Proffitt mine (Upper).	USGS.....	1916, 1928, WWI.....		Yellowish green, cracked, bent.....	do.....
92	W. A. Proffitt mine (Lower).	USGS.....	1916, 1928, WWI.....	Cuts, pits, inclines, drifts in strike length of 200.	Yellowish to brownish green, reeved, cracked, bent.	do.....
84	Zolly Shell (Creek) mine.....	USGS, DMEA, OF.	1932, WWII, 1950-52.	Cut 200, incline 70, 3 irregular drifts (caved or removed by cut).	Yellowish to brownish green, clear, bent, cracked, ruled, tied, reeves.	Moderate sheet.....
80	Shepard deposit.....	CMC.....	WWII, 1952.....		Clear, small.....	
89	Speed Branch Slide prospect.	CMC.....	WWII.....		Green.....	Small sheet.....
86	Joel Triplett mine.....	Sterrett (1923, p. 271).	About 1900.....	Adit 40, cuts, shallow shafts.	Greenish brown, moderate stain, "A" structure, small.	do.....
	Vennoy mine (location in doubt).	CMC.....	1942.....	Shaft 30, 3 cuts.....	Reddish brown, small.....	
87	Walker mine.....	CMC.....	WWII.....	Cut 200 long, 10-20 deep; 5 adits.	Stained, ruled, bent, cracked.....	Moderate sheet.....
78	Whittington deposit.....	CMC.....	WWII.....		Green, clear, "A" structure, small.....	
75	Wyatte prospect.....	CMC.....	1943.....		Green, stained, small.....	Small sheet.....



TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT</b>						
<b>PLUMTREE AREA</b>						
<b>Avery County</b>						
57	"A" mine (on little Elk Ridge).	USGS	WWII?	Adit 70, caved	Green, "A" structure, stained, bent	Small sheet, scrap, feldspar.
95	Big "A" mine	USGS, OF	Pre-1920, 1934, WWII, 1957.	6 adits, 5 cuts, extensive underground workings in area, 250 by 250 ft.	Ruby and brown, clear, minor "A" structure.	Moderate sheet
118	Aldridge mine	USGS	Pre-WWII, WWII	15 short adits, small cuts, and prospect pits.	Brown, clear, small, locky	Small sheet
26	Ben Aldridge mine	USGS, CMC	1900, WWII, 1955.	2 trenches, shaft, adit 175, incline 18.	Brown, clear, hard	Moderate sheet
89	Alfred (Vance) mine	USGS, CMC, Sterrett (1923, p. 179-180).	Int. 1870-1929, WWII	4 cuts, 4 adits, 2 shafts, drifts and stopes.	Greenish-brown, minor stain, ruling, cracking.	Large sheet
46	Avery Brothers (Branch; Bob Buchanan) mine.	USGS, CMC, DMEA.	Pre-WWII, WWII, 1955.	2 cuts, adit 130	Green, "A" structure, small, moderate bending, ruling, stain.	Small sheet, scrap, feldspar.
81	Bad Branch mine	USGS	Pre-WWII	2 adits, stope, shaft 8, several small cuts.	Green, bent, "A" structure, minor stain	do
122	Barrett mine	USGS	Pre-WWII	Cut 225, 2 stopes	Green, wedge "A" structure, concentrated in core; brown, biotite intergrowths, concentrated in wall zone.	Moderate sheet, scrap, large feldspar.
90	Barrett Hill Spar mine	USGS	1950-60	8 cuts, 50-200	Green, "A" structure, bent, cracked, small.	Small sheet, scrap, large feldspar.
109	Abe Beam mine	USGS	1955	Incline 55, drift 20	Ruby, clear, small, biotite intergrowths	Small sheet
1	Beech Bottom (Jackson) mine.	USGS	Pre-WWII	3 cuts, 125 short adits, shafts (reported 160 deep).	Muscovite rare	Large feldspar
97	Benfield (Tom Benfield) mine.	USGS, CMC	1895, 1910, 1943	6 adits, one at least 120 ft long. All caved.	Ruby, hard, minor stain. Some books have brown centers, green edges.	Moderate sheet
97	Benfield prospect	USGS	Pre-WWII	Cut	Ruby, small	
63	Byard Benfield mine	USGS, OF	1885-95, 1903, 1925, 1943-45, 1950's.	Cut 200, stope 150, stripped area 100 by 150.	Greenish brown, cracked, mineral inclusions, biotite intergrowths, tied, bent, ruled.	Moderate sheet, large feldspar.
103	Peter Benfield mine	USGS, CMC	Pre-WWII, 1943-44.	Cut, adit 30	Light brown, ruled, tied, small	Small sheet
12	Black mine (near Senia post office).	USGS	Pre-WWII	Caved adit	Stained	
40	Black (Vance) mine	USGS	Pre-WWII, 1960	Cut 220, 3 adits, prospect pits.	Green, "A" structure, reeved, bent, stained.	Small sheet, small beryl.
8	Bluff mine	USGS, OF	Int. 1890-1940, 1943-44.	9 cuts, 5 adits, irregular rooms.	Greenish brown, moderate stain, bending, ruling.	Moderate sheet
112	Boonfield mine	USGS	Pre-WWII	Several shallow pits, caved adits.	"A" structure, stained, mineral inclusions.	Small scrap
111	Branch mine	USGS	Pre-WWII	Cut 50, adit	Stained, concentrated along hanging wall.	Moderate sheet
17	Aaron Buchanan mine	USGS		2 cuts, adit	Green, "A" structure, tied, bent	Small sheet
80	Franklin Buchanan (Lee Cook) mine.	USGS	WWII	3 cuts, adit	Green, tied, biotite inclusions, cracked, ruled, hairlined.	do
129	Buck Hill mine	USGS	Pre-WWII	Cut 200, prospect pits	Green, "A" structure, stained, tied, bent.	Moderate sheet, feldspar.
124	Buck Hill Rock mine	USGS	WWII(?)	Cuts, adit, stope, prospect pits in area 100 by 200.	Green, hard, mineral inclusions, cracked, bent.	Moderate sheet?
88	Bug Rock (Westphalen) mine.	USGS	1929	Cut 80	Ruby, common biotite intergrowths	Moderate sheet
77	Charlie Burleson (Shuffle Vance) mine.	USGS, DMEA	1900-10, 1920-25, WWII, 1950's.	Irregular cut 300, numerous adits, stopes in area 200 by 500.	Ruby, moderate stain, mineral inclusions, biotite intergrowths, bending, ruling.	Moderate sheet, feldspar.

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

PLUMTREE AREA—Continued

Avery County—Continued

Tabular	12 T	NE	Gentle NW		Concordant	Interlayered hornblende and biotite gneiss.	Partly weathered.	Pl-P-Q-M wall zone, medium to coarse grained; Q core.
Lenses	0-8 T	NE	Gentle NW		Partly concordant.	do.	Weathered (20 ft).	Pl-P-Q-M-B pegmatite, medium to coarse grained; accessory garnet, pyrite. Lenses are in zone 10-15 ft thick. Late faults cut pegmatite.
Tabular	2 bodies, 10 T	NW	Gentle SW		Concordant	Biotite gneiss		Pl-Q-M-B pegmatite, medium grained; accessory vermiculite.
do	4-6 T	NE	SE		do	Hornblende gneiss.	Weathered (10 ft).	Pl-Q-M-B pegmatite, medium grained; accessory garnet, sulfide minerals. Late fault cuts pegmatite.
Irregular lenses.	Several bodies 1-17 T.	NW	SW	SE	do	Interlayered biotite and hornblende gneiss.	Weathered (70 ft).	Pl-P-Q-M pegmatite; accessory garnet, uraninite?, vermiculite.
Tabular	50-65 T	NW	NE		Discordant	Biotite gneiss	Unweathered	Pl-P-Q-M-B wall zone, 7 ft thick, fine to medium grained; accessory garnet; P-Pl-Q core, medium to coarse grained, accessory muscovite.
do	12 T	NW	SW		Concordant	Interlayered biotite and hornblende gneiss.		Pl-P-Q-M pegmatite, medium to coarse grained. Small lenses and stringers of pegmatite and quartz abundant.
do	50 T, 225 L	NE	SE		do	Biotite gneiss		Pl-P-Q-M wall zone, accessory biotite, vermiculite, garnet; P-Pl-Q-M core, coarse grained.
Lenses	Several 10-50 T, 100-300 L.	NW	Gentle NE		Partly concordant.	Interlayered biotite and hornblende gneiss.	Partly weathered.	P-Pl-Q-M pegmatite, fine to coarse grained, accessory biotite, garnet
do	Several 2-4 T, 5-10 L.	NE	SE		Concordant	Biotite gneiss	Unweathered	Pl-P-Q pegmatite, graphic texture; accessory biotite, muscovite, apatite.
	Large					Interlayered hornblende and biotite gneiss.		Pl-P-Q pegmatite, medium grained; accessory muscovite.
Lenses	1-3 T	NW	NE		Concordant	do	Saprolite (15+ ft).	Pl-P-Q-M pegmatite, medium to coarse grained, accessory garnet.
Lens	8 T	NE	NW		do	do		Q-F-M pegmatite fine to medium grained. Prospect east of Benfield mine.
Irregular, lens.	40 T	NW	SW		Discordant	Mica gneiss	Unweathered	Pl-P-Q-M wall zone, fine to medium grained; P-Pl-Q-M outer intermediate zone, medium to coarse grained; P-Q inner intermediate zone, medium to coarse grained; Q core; accessory biotite, garnet, pyrite, pyrrhotite, thulite.
Lens	1-2 T, 30 L	NE	SE		Concordant	Biotite gneiss	Weathered	Pl-Q-M pegmatite, fine to medium grained; accessory garnet, sericite.
Tabular	5 T	NE	SE		do	Interlayered hornblende and biotite gneiss.		Pl-P-Q-M pegmatite; accessory biotite, apatite, allanite.
Lens	5-15 T, >100 L	NE	SE	SW	Discordant	do	Saprolite (20 ft)	F-Q-M wall zone, medium to coarse grained; accessory blue, green, and yellow beryl, garnet; Q core. Prospects explored several parallel pegmatites.
Lenses	3 T	NE	SE		Concordant	do	Weathered (10+ ft).	Pl-Q-P-M pegmatite, coarse grained; accessory apatite, garnet, sericite. Larger lenses of fine grained Pl-P-Q pegmatite also present.
						Hornblende gneiss.	Weathered	Kaolinized F-Q-M pegmatite.
Tabular	15 T	N	W		Concordant	Mica gneiss		F-Q-M pegmatite.
Lens	15 T, 30 L	NE	SE		do	Biotite gneiss		Pl-P-Q-M pegmatite, medium to coarse grained; accessory biotite, garnet, sericite.
Irregular, pipe.	5-10 T, 200 L	NE	Steep NW	NE	Partly concordant.	Interlayered hornblende and biotite gneiss.		Pl-Q-M pegmatite, medium grained; accessory garnet. Pipe-like mass consists of connected lenses in zone of contorted gneiss.
Tabular	>20 T	NW			Concordant	Hornblende gneiss, biotite schist alteration.	Weathered	P-Pl-Q-M wall zone, medium to coarse grained; accessory biotite; Q core?
do	1-3 T	NE	SE		do	Mica gneiss		Pl-Q-M pegmatite, fine to medium grained; accessory sericite, garnet.
	15-30 T	N				do		Pl-Q-P-M-B pegmatite, medium to coarse grained; accessory vermiculite. Similar pegmatite worked in cut to northwest.
Irregular, lenses.	1-25 T	NE	SE	S	Partly discordant.	do	Weathered (20 ft).	Pl-P-Q-M pegmatite, medium to coarse grained; accessory biotite, garnet, apatite.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>PLUMTREE AREA—Continued</b>						
<b>Avery County—Continued</b>						
85	Ed Bureson mine.....	DMEA.....	1956-57.....	Inclined shaft, 51; drifts 58..	Ruby, hard, clear, small.....	Small sheet.....
50	George Bureson mine.....	USGS.....	Pre-WWII.....	Cut 35.....	Light brown, hard, moderate stain, mineral inclusions. Light green, "A" structure, tied, cracked, ruled.	do.....
107	C and D mine.....	DMEA.....	1955-56.....	Cut 125, inclined shaft, 19...	Green, wedge and flat "A" structure....	Small scrap.....
52	Tom Cantrell mine (east of North Toe River).	USGS, CMC.....	WWII.....	7 cuts, average 20.....	Light green, "A" structure, tied, stained, haircracks, bent, small.	do.....
14	Tom Cantrell mine (north of Powdermilk Creek).	USGS.....	1956.....	Cut 180, shaft 14, inclined shaft 18, drift.	Ruby, hard, cracked, small.....	Small sheet.....
132	Crate Carpenter mine.....	USGS, CMC.....	WWII.....	Cut 35, inclined shaft 20, prospect pits.	Light brown, bent, ruled, stained, small.	do.....
128	Tom Carpenter (Old Hennessey) mine.	USGS.....	Pre-WWII.....	3 adits, 2 are 100 ft long and connected underground.	Dark brown, moderate stain, bending, ruling.	Moderate sheet.....
113	Champ Rock mine.....	USGS.....	Pre-WWII.....	Adit 50.....	Green, "A" structure, stained, mineral inclusions.	Moderate scrap.....
19	Charles Rock mine.....	USGS.....	WWII.....	2 cuts, each 20.....	Light green, tied, cracked, small.....	Small sheet.....
108	Charles Ridge mine. (See also Reuben Green mine).	USGS, Sterrett (1923, p. 182), OF.	Int. 1882-1936, WWII, 1950's.	Several adits and inclines, numerous stopes. Main incline 750.	Pale green, common "A" structure, minor ruling, bending, haircracks, mineral inclusions.	Large sheet.....
96	Chestnut prospect.....	USGS.....	1959.....	3 cuts 100-150 long, 10-20 deep.	Green, bent.....	
64	Chestnut Mountain mine.	USGS.....	1957-58.....	Cut 50 long, 40 deep; stope 20 long, 15 high.	Green, "A" structure, bent, stained.....	
126	Clear mine (probably near Howard Smith mine).	USGS.....	Pre-WWII.....	Several caved adits and pits.	Light green, "A" structure.....	
42	Cliff mine.....	USGS, CMC.....	WWII.....	Shaft 20, drift 25, adit 30, pits.	Greenish brown, minor reeves, stained..	Small sheet.....
41	Connahey mine.....	USGS.....	Pre-WWII.....	Series of adits, shafts 300 along strike.	Greenish brown, commonly stained.....	
51	Corn mine.....	USGS, CMC.....	1920, WWII.....	Opencuts, inclines, drifts for 300 along strike.	Green, "A" structure, cracked, bent, concentrated near core; brown, bent, cracked, stained, concentrated along hanging wall, footwall, and in footwall rolls.	Moderate sheet.....
4	Cow Camp North mine...	USGS.....	Pre-WWII, 1957...	Cut 100, 8 adits, drifts.....	Brownish green, "A" structure, stained, bent.	
5	Cow Camp South mine...	USGS, DMEA...	Pre-WWII, 1951- 57.	Cut 350, 6 adits, in area 150 by 350.	Ruby, minor bending, ruling, small....	Moderate sheet, large scrap.
74	Crab Orchard prospect....	DMEA.....	1955.....	Shaft 30, drifts 50.....	Green, clear, "A" structure, small.....	Small scrap.....
91	Ed Davis mine.....	USGS.....	WWII.....	Cut 25.....	Light greenish brown, minor "A" stru- cture, mineral inclusions, ruled, small.	Small sheet.....
79	Joe Davis Rock (Big Andy) mine.	USGS.....	WWII, 1956.....	Cut 250, adit 160, stope.....	Ruby to brownish green, cracked, bent, minor stain, small.	do.....
18	Deep Gap (Old Ben Aldridge) mine.	USGS.....	WWII.....	Cut 100, incline 40.....	Brown, small.....	do.....
75	Doublehead mine (SE) Brown workings. (See also Leaning Louest mine.)	USGS, Sterrett (1923, p. 179), DMEA.	1870, 1890's, 1920's, WWII, 1950's.	10 cuts, 9 adits, drifts, stopes, inclines, in area 200 by 500.	Dark brown to brownish green, tied, cracked, minor "A" structure, ruling, bending, mineral inclusions, biotite intergrowths.	Large sheet.....
75	Doublehead mine (NW) Cantrell workings.	USGS, Sterrett (1923, p. 179).	1870, 1890's, 1920's, WWII.	4 cuts, adits, inclines, shaft..	Brown, hard, clear, cracked, biotite in- tergrowths.	Small sheet; feldspar.
78	South Doublehead mine...	USGS.....	Pre-WWII.....	Adit, cuts, pits.....	Brown, hard, clear.....	
27	Dugger mine.....	USGS, CMC.....	1905, 1933, WWII.....	Cuts, adits, stope, shafts, 600 along strike.	Brown, minor hematite stain, clay stain, cracked.	Moderate sheet, feldspar.
121	Eli Rock mine.....	USGS, CMC.....	1905, WWII.....	Incline 85, cut.....	Greenish brown, hard, small, moderately cracked, bent, stained.	Small sheet.....
59	Elk mine.....	Olson (1944, p. 65- 67), USGS, OF, DMEA.	1883-1921, Int. 1922-44, 1952-59.	3 adits, numerous drifts, stopes, in area 300 by 1,050.	Ruby, minor cracking, bending, stain, mineral inclusions.	Large sheet.....
61	Emmons Knob mine.....	USGS.....	WWI, WWII, 1950's(?).	Cut 200, adits, drifts.....	Greenish brown, clear, flat and wedge "A" structure, moderate bending, cracking.	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

PLUMTREE AREA—Continued

Avery County—Continued

Tabular	0.5-3 T	NE	SE		Concordant	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-M wall zone, fine to medium grained; accessory biotite, garnet, apatite, sericite; P core, medium grained.
Tabular(?)	>20 T	NE	SE		do	Mica gneiss	do	Pl-Q-M pegmatite, fine to medium grained; accessory sericite, garnet, biotite.
Tabular	2-3 T	NW	SW		do	Mica gneiss and schist.	Saprolite (50 ft)	Kaolinized Pl-Q-M pegmatite; accessory sericite.
do		N				Biotite gneiss	Weathered	Kaolinized Pl-P-Q-M pegmatite; accessory biotite.
Pods, lenses	0.5 T, 6 L	NE	NW, SE		Concordant	Interlayered hornblende and biotite gneiss.	do	Kaolinized Pl-Q-M pegmatite, medium grained.
Lens	1 T, 15 L	NE	SE		do	Mica gneiss	Unweathered	Pl-Q-M pegmatite, medium grained; accessory sericite, garnet, biotite.
Irregular trough	20 T, >100 L	NW	NE., SW		do	do	do	Pl-Q-P-M pegmatite; accessory biotite-vermiculite (in strips 1-4 ft long, concentrated near footwall), allanite.
Tabular	18 T	NE	SE		do	Hornblende gneiss.	do	Pl-Q-P-M pegmatite; accessory pyrrhotite, pyrite, chalcopyrite, garnet.
do	15 T, 100 L	NE	SE		Concordant	Hornblende gneiss.	Unweathered	Pl-Q-M pegmatite, fine to medium grained; accessory sericite, biotite, garnet, allanite.
Lenses tongues	1-20 T, 100-650 L, 15-40 lateral width.	NW	SW	SE	Partly concordant.	Mica gneiss and schist.	Weathered (15 ft)	Pl (An22)-Q-M-P pegmatite, medium grained; accessory garnet, apatite, epidote. Pegmatite foliated in part. Cut by faults. Main pegmatite split by gneiss inclusions.
Lenses	1-3 T, 1-20 L	NW	SW		Concordant	Interlayered hornblende and biotite gneiss.	Weathered	Pl-P-Q-M pegmatite, coarse grained; accessory biotite.
Lens		NW	SW		Partly concordant.	do	do	P-Pl-Q-M pegmatite, coarse grained; accessory garnet. Other cuts in similar pegmatite to north.
Pinch and swell	0.1-1.5 T	NE	NW		Concordant	Hornblende gneiss.		Q-F-M pegmatite.
Lenses	0-4 T	NE	SE		Concordant	Mica gneiss		F-Q-M pegmatite, mostly in landslide masses.
Pinch and swell	0.5-8 T >300 L	NW	NE		Partly concordant.	do	Unweathered	Pl-Q-M pegmatite, medium grained, some graphic texture.
Lenses, pinch and swell	0-4 T	NW	NE		do	Interlayered hornblende and biotite gneiss.	Weathered (15 ft)	Pl-Q-M wall zone, fine to coarse grained; Q core. Platy structure and deformed mica common. Some kyanite in wallrock.
Lenses	0.5-3 T, 30 L	NE	NW		Concordant	do	Saprolite (>30 ft)	Pl-Q-M pegmatite, fine grained.
do	0-2 T		Flat		do	Biotite gneiss	Unweathered	Kaolinized F-Q-M pegmatite. Many small lenses, some very rich in muscovite.
Lenses	Not exposed						Weathered (20 ft)	Pl-Q-M wall zone, medium to coarse grained; Q core.
Lenses	0-20 T	N	E		Concordant	Biotite gneiss	Unweathered	Kaolinized F-Q-M wall zone; Q core.
Pinch and swell	2-4 T	NE	SE		do	Mica gneiss		Pl-P-Q-M pegmatite, medium to coarse grained; accessory biotite.
Irregular tabular, lenses	Main body 2-20 T 500 L; lenses 1-10 T.	NW	SW	SE	Discordant	Interlayered hornblende and biotite gneiss.	Partly weathered.	Pl-Q-M pegmatite, medium to coarse grained; accessory iotite, garnet, apatite, tourmaline, pyrite. Numerous lenses of similar pegmatite have been prospected nearby.
Irregular tabular	15 T, 350 L(?)	NE	SE		Partly concordant.	Mica gneiss	do	Pl-P-Q-M pegmatite, medium to coarse grained, some graphic texture; accessory garnet, biotite, vermiculite, allanite?
Tabular	8-20 T	NE	Steep		Concordant	Biotite gneiss.	Saprolite (30 ft)	F-Q-M pegmatite.
do	10 T	NE	SE		do	Hornblende gneiss and mica gneiss.	Unweathered	Pl-Q-P-M-B pegmatite, medium grained; accessory vermiculite.
Lenses	0.1-6 T, 5-50 L		Pegmatite zone trends NW and dips NE.		Lenses are concordant.	Hornblende gneiss.	do	Pl-Q-P-M pegmatite, medium grained; accessory biotite, sericite.
Lenses; irregular bodies	1-7 T, 80 L	NE	Gentle SE		Partly concordant.	Interlayered mica and hornblende gneiss, kyanite-garnet gneiss.	do	Q-M wall zone, medium to coarse grained; Pl(An 14)-Q-M core; accessory garnet, apatite, pyrrhotite. Lenses in zone 8 ft thick in gneiss. Zone cut by faults and basalt dike.
						Interlayered hornblende and biotite gneiss.	Weathered (15 ft)	PL-Q-M wall zone, fine to medium grained; accessory garnet, epidote, thulite, sericite; Q core. Q-M pegmatite (burr rock) present locally

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>PLUMTREE AREA—Continued</b>						
<b>Avery County—Continued</b>						
44	Ewing mine.....	USGS, CMC.....	Pre-WWII, WWII.	Cuts, inclines.....	Greenish brown, "A" structure, locky, bent, stained, cracked.	Small sheet.....
70	Fall Branch mine.....	USGS.....	Pre-WWII.....	Caved.....	Light green, small, bent, ruled.....	Moderate scrap...
58	Field mine.....	USGS.....	Pre-WWII, WWII, 1950's.	3 cuts, caved incline, drifts..	Dark brown, stained.....	.....
28	Flint mine.....	USGS.....	WWII.....	Cut 25.....	Green, "A" structure, stained.....	Small sheet.....
83	Four Foot Square (Grier) mine.	USGS, CMC.....	1925, WWII.....	Cut, several adits, 300 along strike.	Brown, biotite intergrowths, stained....	Moderate sheet..
6	Franklin (Iva Johnson, Callahan) mine.	USGS, CMC.....	WWI, WWII, 1954(?).	Cut 50, adit, stope 75.....	Greenish brown, bent, stained, locky....	Small sheet.....
123	Gardner (Gardin?) mine...	DMEA, CMC....	WWII, 1954.....	Cut 200, 3 adits, 70, 29, and 37.	Green, cracked, tied, small.....	do.....
92	Grapevine mine.....	USGS.....	Pre-WWII.....	2 cuts, each 25 diameter.....	Brown, biotite intergrowths, minor stain.	Small sheet, feldspar.
108	Reuben Green mine (see also Charles Ridge mine).	USGS, OF.....	1890, WWII.....	Adit and incline 500, old caved works.	Light green, common "A" structure, minor ruling, bending, cracks, inclusions.	Large sheet.....
11	Gribble mine.....	USGS.....	Pre-WWII.....	Adit 50, caved adits.....	Brown.....	Small sheet.....
82	Henson Slope mine.....	USGS.....	Pre-WWII.....	Adit.....	Greenish brown, moderately stained, "A" structure, biotite intergrowths, locky, small.	Small sheet, feldspar.
94	Hoppey mine.....	USGS.....	Pre-WWII, 1954.....	3 adits.....	Green to light ruby, commonly stained, moderately bent, small.	.....
79	Houston Rock mine.....	USGS.....	1913-14, 1923-24, 1942.	4 cuts, 2 short stopes, adit 45.	Brown, moderately stained, biotite intergrowths, concentrated in wall zone; green "A" structure, in core.	Moderate sheet...
86	Wes Houston mine.....	USGS, CMC.....	WWII.....	Cut 40, stope 60.....	Ruby, "A" structure, biotite intergrowths, ruled.	Small sheet, feldspar.
66	Hughes (A. A. Johnson) mine.	USGS, CMC.....	1915, 1927, WWII.....	Cut 50, with adit 115 and branching drifts 60 and 35. Other caved cuts, shafts and adits.	Green, biotite intergrowths, stained, small.	Small sheet (WWII).
13	Bobby Hughes prospect...	USGS.....	.....	Cut 105, 3 adits.....	Small, bent, ruled, stained.....	Small scrap(?).....
131	Old Hyder mine.....	USGS, CMC.....	Int 1930's, WWII, 1950's.	Cuts, adits, drifts.....	Light brown, bent, ruled, stained.....	Moderate sheet...
136	Ingram (Clifton) mine.....	USGS, CMC, DMEA.	WWII, 1954-57....	Cut 150, 3 adits, trenches....	Green, "A" structure, bent, ruled, stained.	Small sheet.....
134	Ingram-Benfield mine.....	USGS.....	1890, WWII, 1954.....	Cut 200, 2 adits, 150 and 100, several caved adits and pits.	Green, clear, hard, minor "A" structure, moderate cracks, bending, ruling.	Small sheet, moderate scrap.
15	Joe mine.....	DMEA.....	1954.....	Cut 90, adit.....	Stained, bent, cracked.....	Small scrap.....
93	Johnson mine.....	USGS, Sterrett (1923, p. 181), OF, CMC, DMEA.	1880, 1928-30, WWII, 1957.	7 adits, stopes, prospect pits, in area 200 by 450.	Ruby, clear, small.....	Moderate sheet, large scrap.
65	I. M. Johnson mine.....	USGS.....	WWII.....	2 adits, 20 and 90, drift 45....	Green, minor ruby, "A" structure, bent, ruled, cracked, mineral inclusions.	Small sheet.....
23	Will Jones mine (near Lincoln Rock mine).	CMC.....	1915, 1944.....	Cut 30, adit 30.....	Rum, stained.....	do.....
110	Justice mine.....	Sterrett (1923, p. 183), USGS.	1874-76, Int 1906-36, WWII, 1953-57.	Cut 250, old stopes, inclines.	Green, minor "A" structure, moderate bending, cracking, staining.	Moderate sheet...
135	Justus mine.....	USGS.....	1890's, 1937, WWII.	Cut 30, adit 105, drift 45; cut 30, adit 30.	Green, common bending, ruling, cracking, staining.	Small sheet.....
84	Landers mine.....	USGS.....	WWII(?), 1956.....	Cut 30, adit.....	.....	.....
75	Leaning Locust mine (just south of Doublehead mine).	DMEA.....	1956-57.....	Cut 100, adit 130.....	Green, ruled, bent, minor stain.....	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

PLUMTREE AREA—Continued

Avery County—Continued

Tabular	20 T, 200 L	NE	SE			Hornblende gneiss.	Weathered (25 ft).	Pl-Q-M wall zone, fine grained; accessory biotite, garnet, sericite; Pl-P-Q-M intermediate zone, coarse grained; discontinuous Q core.
	Largest 10 T	NE	NW		Concordant	Interlayered hornblende and biotite gneiss.		Pl-Q-P-M pegmatite, fine grained; accessory garnet, epidote.
Lenses	2-10 T	NE	NW		do	do	Saprolite (20 ft)	F-Q-M pegmatite, medium grained.
Irregular	10 T?	NE	Steep		do	Mica gneiss		F-Q-M wall zone; accessory biotite, garnet; Q-M pegmatite, fine grained (burr rock), intermediate zone?; Q core.
Tabular	6 T, >300 L	NE	SE		do	do	Unweathered	Pl-Q-P-M pegmatite, medium to coarse grained; accessory biotite, vermiculite, garnet.
do	30 T	NW	SW		do	Interlayered biotite and hornblende schist.	do	P-Pl-Q-M pegmatite, fine to medium grained; accessory garnet, allanite, apatite, sericite.
Pinch and swell.	1-12 T	NW	NE		do	Biotite gneiss	Saprolite (30 ft)	Kaolinized P-Pl-Q-M pegmatite, medium grained; accessory biotite.
Tabular						Hornblende gneiss, biotite alterations.		P-Pl-Q-M pegmatite; accessory biotite.
Irregular, lenses.	0-5 T	NW	SW	SE	Partly concordant.	Mica gneiss	Unweathered	Pl-Q-M pegmatite, medium grained; accessory garnet. Pegmatite layered, contains streaks of fine grained muscovite and quartz. Northeast of Charles Ridge mine.
Tabular	Thick	NE	NW		Concordant(?)	Mica gneiss		F-Q-M pegmatite.
Pinch and swell.	3-5 T	NE	Gentle NW		Concordant	Interlayered hornblende and biotite gneiss.	Unweathered	Pl-P-Q-M wall zone, medium grained; P-Pl-Q intermediate zone; accessory muscovite; Q core. Some graphic texture.
Lenses	3-10 T	NE	SE		do	Mica gneiss		Pl-Q-P-M wall zone, medium grained; accessory garnet; Q core, discontinuous.
do	0.1-7 T, >90 L	NE	SE		do	do		Pl-P-Q-M wall zones, medium to coarse grained; accessory biotite, garnet, pyrite; Q-M core, discontinuous.
do	4-6 T	NE	NW		do	Hornblende gneiss.	Weathered	Pl-Q-P-M pegmatite, medium grained; Some graphic texture; accessory biotite, garnet.
Tabular	8-15 T	NW	SW		do	Interlayered hornblende and biotite gneiss.	Saprolite	P-Pl-Q-M pegmatite, medium grained; accessory biotite; numerous gneiss inclusions in pegmatite.
Lens	3-4 T, 40 L	NW	SW		do	Biotite gneiss	Weathered	Kaolinized Pl-Q-P-M pegmatite, fine to medium grained; accessory garnet, sericite.
Tabular	1-5 T	NW	SW		do	Mica gneiss	Saprolite (30 ft)	Kaolinized Pl-P-Q-M wall zone, medium grained; Q core, discontinuous. Several other pegmatites prospected north of large cut.
Tabular, pinch and swell.	0.5-8 T, >150 L	N	E		Partly concordant.	Biotite gneiss	Partly weathered.	Pl-P-Q-M wall zone, medium to coarse grained; accessory garnet, Q core, discontinuous.
Tabular	2-5 T	NE	SE		Concordant	Hornblende gneiss, biotite alteration.	Weathered (30 ft).	Kaolinized P-Pl-Q-M pegmatite; accessory biotite, garnet.
Lenses	0.5-8 T, 10-100 L		Gentle		Partly concordant.	Interlayered hornblende and biotite gneiss, biotite alteration.	Unweathered	Pl-P-Q-M pegmatite, medium grained; accessory garnet, apatite, allanite?, pyrrhotite.
Tabular	5-7 T	NW	SW		Concordant	Interlayered hornblende and biotite gneiss.	Weathered	Pl-P-Q-M wall zone, medium grained; Q core.
do	1-3 T	NE	SE		do	Mica gneiss	Unweathered	Pl-Q-M pegmatite.
Lenses	1-10 T	NW	SW	SE	Partly concordant.	do	Weathered	Pl-Q-M pegmatite, fine to medium grained; accessory garnet.
Lens	1-8 T	NW	SW		Concordant	do		Pl-Q-M pegmatite, fine to medium grained.
Tabular(?)	5 T	NE	SE		Concordant(?)	do	Weathered	F-Q-M pegmatite.
Lenses	1-15 T	NE	SE		Concordant	do	Partly weathered (10 ft).	P-Pl-Q-M pegmatite, medium to coarse grained.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>PLUMTREE AREA—Continued</b>						
<b>Avery County—Continued</b>						
9	Lick Log (Black) mine	USGS	Pre-WWII	Cuts, adits, inclines, connecting stopes, area 100 by 400.	Green, stained, bent, tied, ruled	Moderate sheet
22	Lincoln Rock mine	USGS, OF	1925, WWII	7 cuts, stopes, adit, inclines, in area 100 by 450.	Reddish brown, clear, biotite intergrowths.	Large sheet
7	Lineback mine	USGS	1916	19 shafts, adit, prospect pits in area 100 by 500.	Stained	
54	Little Elk Ridge mine	USGS	1926, 1928, 1931, 1943.	Cut, adit 30, prospect pits	Light brown, hard, moderate cracking, ruling, staining.	Moderate sheet
55	Mace mine	USGS	WWII	Cut 15, adit 20	Light brown, reeved, mineral inclusions, haircracked.	Small sheet
45	Marie mine	USGS	Pre-WWII	Cut and stope 80	Brown, clear, biotite intergrowths, cracked, mineral inclusions; Green, wedge "A" structure, stained.	Small sheet, scrap, feldspar.
56	Mathis mine	USGS, CMC	WWII	Cut 15, adit 25	Green, reeved, biotite intergrowths, bent, haircracks.	Small sheet
48	Meadow mine	Sterrett (1923, p. 177), Olson (1944, p. 56), USGS.	Int 1875-1960	Cuts, pits, 6 adits, large connected stopes 250 by 900. Work in 1950's mostly surface cuts west of stoped area.	Brown, large, stained, moderately bent, cracked, ruled. Mica concentrated near hanging wall and gneiss inclusions.	>200 tons sheet and punch.
47	Meadow Ridge mine	USGS	Pre-WWII	Numerous short adits		Small sheet
102	Moulton (Big Meadow) mine.	USGS; OF	1880-90, 1943-44, 1955.	Cut 250 long, 50 deep; drifts, prospect pits.	Green, soft, haircracks, ruled, clay stained.	Moderate sheet
43	Narrow Streak mine	USGS, CMC	1909, WWII	Cut, 35; 3 prospect pits	Light brown, reeved, haircracked, small.	Small sheet
16	Oaks Knob (Burnt) mine.	USGS	1928-29, 1936-38	Shafts and adits for 800 along strike.	Brown stained	Moderate sheet
49	Jake Ollis mine	USGS, CMC	WWII	6 small cuts, 2 adits, 35 and 45.	Greenish brown, color banding, tied, stained.	Small sheet, feldspar.
105	Pancake mine	USGS	1900, 1929, WWII, 1955.	Cut 300, adits, cuts, drifts	Green, "A" structure, bent, ruled	Moderate sheet
72	Penstock (Race?) mine	USGS, CMC	WWI, WWII	Cut 100, adits	Green, tied, stained, bent, ruled	Small sheet, feldspar.
10	Peru mine	USGS	Pre-WWII	Shaft, adit 100	Dark brown, stained	Small sheet
98	Pine Branch mine	USGS	Pre-WWII	Cut and stope 40	Brown, stained, bent, ruled	Small sheet, feldspar.
71	Pine Flats Spar mine	USGS	1959	Cut 150 long, 50 deep	Green, "A" structure, bent	Small scrap, feldspar.
87	Pitman prospect	USGS	1954	Cut 150 diameter	Ruby, hard, tied, stained, bent	Small sheet
73	Plumtree mine	Sterrett (1923, p. 181), CMC, USGS.	1870-85, 1906, 1925, WWII.	Several connecting adits more than 300 long, small stopes.	Greenish brown, "A" structure, stained, ruled, bent.	Moderate sheet, scrap.
24	Powdermill (Big, Shaft, McKinney) mine.	Sterrett (1923, p. 183), USGS, CMC, DMEA.	1906, 1924, WWII, 1952.	Cuts, inclined shafts, stopes, 400 along strike, 100 deep.	Greenish brown, hard, biotite intergrowths, stained, bent, cracked.	Moderate sheet, feldspar.
20	Powdermill Creek mine	USGS		Cut 80, 2 adits	Brown, minor "A" structure, commonly cracked, tied, stained, bent.	Small sheet
21	Powdermill Roughs mine.	USGS, CMC	WWII	3 cuts, incline	Reddish brown, mineral inclusions, reeved, cracked, stained, bent.	do
3	Pritchard prospect	USGS		Cut, prospect pits	Small	Small sheet, feldspar.
2	Puncheon Camp mine	USGS		Cut 200	Small, mostly scrap	Feldspar
130	Pyatte mine	USGS, CMC	1915, WWII	3 shafts, 80 deep, drifts 200, stopes(?)	Green, stained, small	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

PLUMTREE AREA—Continued

Avery County—Continued

Lenses	3-7 T	N	E		Concordant	Biotite gneiss	Partly weathered.	Pl-Q-M pegmatite, medium to coarse grained. Large lens to north has Pl-Q-M wall zone, Pl-Q intermediate zone; P core.
do	>1-12 T, >110 L	NE	SE	S	do	Interlayered hornblende and biotite gneiss.		Pl-Q-M-B pegmatite, medium to coarse grained; accessory allanite, apatite, garnet.
Tabular(?)		NE	NW		Concordant(?)	Hornblende gneiss.	Weathered	No exposures, shafts less than 80 ft deep. Heavy flow of water. All workings inaccessible.
Tabular	4 T >80 L	NE	SE		Concordant	do		Pl-Q-M pegmatite, fine to medium grained; accessory garnet, sericite, biotite.
Lens	4 T, 20 L	NE	SE		do	Mica gneiss		Pl-Q-M pegmatite, fine to medium grained; accessory biotite, garnet, sericite.
		NW	SW			do		Pl-Q-M wall zone, P intermediate zone; Q core; graphic texture common; accessory apatite, garnet, biotite, uraninite. Brown muscovite in upper workings; green muscovite in lower.
Lens		NE	SE		Concordant	do	Unweathered	Pl-Q-M pegmatite, fine to medium grained; accessory sericite, biotite, garnet.
Irregular, tabular, anticlinal.	0.5-40 T, >900 L	NW	NE	N	Partly concordant.	Biotite gneiss	do	Pl-Q-M-P wall zone, fine to coarse grained, Pl-Q-M intermediate zone, coarse grained, P-Q core, coarse grained. Numerous gneiss inclusions. Pegmatite cut by faults and joints. Accessory biotite, garnet, allanite, epidote, calcite-thulite. Gneissic texture common in wall zone.
	10 T	NE	SE		Concordant	Mica gneiss		Pl-Q-M pegmatite; accessory garnet. Several discordant pegmatite bodies exposed near mine.
Irregular, branching.	1-8 T, 180 L	NW	NE, SW		Partly concordant.	do	Saprolite (50 ft)	Kaolinized F-Q-M pegmatite. Mining hampered by large flow of water in cut.
Tabular Lenses	6 T 2-4 T	NE NW	SE SW		Concordant do	do Hornblende gneiss.	Unweathered	Pl-Q-P-M pegmatite.
Lens	1-20 T	NW	NE		Discordant	Mica gneiss	Unweathered	Pl-Q-P-M pegmatite. Numerous lenses in one zone.
Tabular	Lower pegmatite 1-3 T; upper pegmatite 3-6 T.	NE	SE		Concordant	do	Saprolite (30 ft)	P-Pl-Q-M wall zone, fine to coarse grained; accessory garnet, apatite; Q core.
Lenses	20 T	NW	SW		Concordant(?)	do	Unweathered	Lower pegmatite: Pl-Q-M wall zone, medium grained; Q core. Upper body: Pl-P-Q-M pegmatite, medium to coarse grained.
		NE	Steep		Concordant	Interlayered biotite and hornblende gneiss.		P-Pl-Q-M pegmatite, coarse grained accessory allanite.
								F-Q-M pegmatite. Another deposit 300 ft southwest contains pegmatite cut by basalt dike.
	50 T(?)					Mica gneiss	Partly weathered.	P-Pl-Q-B-M pegmatite, coarse grained; biotite and vermiculite in strips 2 ft long, graphic texture common; accessory pyrite.
Pinch and swell.	1-15 T		Flat		Concordant	Biotite gneiss		P-Pl-Q-M-B pegmatite, coarse grained; accessory garnet.
Tabular(?)	4-10 T	NW-NE	Gentle NE-SE		Partly concordant.	Mica gneiss	Weathered (15 ft?)	P-Pl-Q-B-M pegmatite, medium to coarse grained; graphic texture common; accessory sulfides. Biotite in strips 1.5 ft. long.
Branching, tabular.	4-30 T	E	Steep S		do	Hornblende gneiss.	Weathered (35 ft).	Pl-Q-M pegmatite, epidote veinlets cut pegmatite.
Lens	3 T	NW	SW		Concordant	Interlayered hornblende and biotite gneiss.	Partly weathered.	Pl-Q-M-B wall zone, medium grained; accessory apatite, allanite.
Pinch and swell.	0.5-4 T, 150 L	NE	SE		do	do	Unweathered	P-Pl-Q core, medium to coarse grained; accessory muscovite, biotite.
	6 T						Partly weathered.	Pl-Q-M pegmatite, medium to coarse grained; accessory sericite, tourmaline, allanite?
Tabular	35 T		Flat		Discordant(?)	Interlayered hornblende and biotite gneiss.		F-Q-M wall zone, medium grained; Q core.
Lenses	6 T	NW	SW		Concordant(?)	Biotite gneiss	Weathered (50 ft).	P-Pl-Q-M pegmatite; accessory epidote, vermiculite. Pegmatite cut by basalt dikes and epidote veinlets.
								F-Q-M pegmatite. Lenses pinched out in deep workings.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>PLUMTREE AREA—Continued</b>						
<b>Avery County—Continued</b>						
100	Zeb Pyatte mine.....	USGS, CMC.....	1890's, WWII.....	Cut 80, pit. 35.....	Greenish brown, ruled, stained.....	Small sheet(?).....
125	Raven Cliff mine.....	USGS, CMC.....	WWII.....	3 adits 20-50, 3 small cuts.....	Green, small.....	Small sheet.....
127	Red mine.....	USGS, CMC.....	1900, WWI, 1935, WWII, 1950's.	Cut 200, adits, stopes; other cuts, adits to NW. Workings extend 500.	Ruby, some greenish brown, moderate stain, bending, ruling. Pyrrhotite inclusions.	Moderate sheet.....
106	Riverside mine.....	USGS.....	WWII.....	Cut 40.....	Green, reeved, stained, cracked.....	Small sheet.....
53	Don Shade mine.....	USGS.....	1930's, WWI.....	Cut, adit.....	Green, bent, cracked, small.....	Small sheet.....
25	Shop mine.....	USGS.....	Pre-WWII, WWII.	5 cuts for 215 along strike, incline 60 at southeast end.	Brown, biotite intergrowths, stained.....	Small sheet.....
104	Tom Singleton mine. (See also Pancake mine.)	USGS.....	1900(?), WWII, 1956.	Cut, prospect pits, 200; 2 adits.	Green, "A" structure, bent, ruled.....	Small sheet, scrap.
68	Slippery Elm mine.....	USGS, CMC, OF.	WWII, 1953-60.....	3 adits, stopes, drifts in area 300 by 450.	Green, clear, moderately bent, ruled, tied.	Large sheet, feldspar.
126	Howard Smith mine.....	DMEA.....	1955-56.....	Cut 120, incline 40, drifts 64.	Green, reeved, bent, clay stain.....	Small sheet.....
69	Freel Vance (Jose Camina) mine.	USGS, CMC.....	WWII.....	2 cuts with adits, 1 >70.....	Green, brown centers, stained.....	Small sheet, feldspar.
101	Matilda Vance mine.....	USGS, Sterrett (1923, p. 183).	1890, 1907-10, WWII, 1957.	Numerous cuts, pits, shafts, adits in area 200 by 800.	Green, bent, ruled, stained.....	Moderate sheet.....
60	White Rock (north) mine..	USGS.....	Pre-WWII.....	Adit.....	Ruby, clear.....	Small sheet.....
62	White Rock (south) mine..	USGS.....	1957.....	2 cuts 20, adit 41.....	Green, "A" structure.....	do.....
67	Willie Knob mine.....	USGS.....	WWI(?), int 1950's.	Cut 200, numerous prospect pits or shafts (caved).	Green, "A" structure, bent, stained.....	Feldspar.....
119	Winters prospect.....	DMEA.....	1951-52.....	Prospect pits.....	Green, "A" structure, hard, cracked.....	Small sheet.....
120	Barney Winters prospect..	USGS.....	1950's.....	Cut 140.....	Green, bent, cracked, stained.....	Small sheet.....
133	Honey Waits Wiseman mine.	USGS.....	1922, 1929-31, 1939-40, 1950's.	Cut, adits, shafts, area of several acres. Workings shallow.	Brown, "A" structure, biotite intergrowths, stained, bent, clay stained.	Moderate sheet.....
114	Wolf Ridge mine.....	USGS.....	1924, 1926, 1930, 1937-38, WWII.	Cut 100, incline 100, other caved or filled inclines.	Pinkish buff, "A" structure, reeved, tied, bent, cracked, ruled, minor biotite intergrowths.	Moderate sheet, feldspar.
99	Woody mine.....	USGS.....	1936, WWII.....	Cut, 40 diameter, 16 deep.....	Ruby, "A" structure, hard, clear.....	Small sheet, feldspar(?).
<b>Mitchell County</b>						
36	Birch (Steven Greene) mine.	USGS, OF.....	1900, 1914-20, 1925, 1929, 1942-47, 1955-59.	Incline and stope >500; several adits, shafts.	Brownish green, clear, moderately ruled, bent, tied.	Large sheet, scrap.
31	Blackjack mine.....	USGS, CMC, DMEA.	1928-34, WWII, 1956.	Cut 150 long, 40 deep, adits 40, incline 55, drift 70.	Ruby, hard, clear, minor bending.....	Moderate sheet.....
37	Ade Buchanan mine.....	USGS.....	WWII.....	Cut 40, prospect pits.....	Green, reeved, bent, stained.....	Small sheet.....
30	Dellinger mine.....	USGS.....	WWII.....	Cut 40, 2 adits 65.....	Light brown, "A" structure, ruled.....	Small sheet.....
115	Falls (Arnold Rock Charlie Hole) mine.	USGS.....	WWII, 1950's.....	2 cuts 100 and 40.....	Greenish brown, reeved, tied, bent, cracked, small.	Feldspar.....
38	Happy Hill (Jeff Burleson) mine.	USGS.....	1895, 1910, 1930, WWII.	6 cuts, 4 adits in area 100 by 250.	Green, hard, ruled, stained.....	Moderate sheet, scrap.

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

PLUMTREE AREA—Continued

Avery County—Continued

		NW	SW			Biotite gneiss	Weathered	Kaolinized F-Q-M pegmatite, poorly exposed.
Lenses	0-4 T	NW	SW		Concordant	Mica gneiss	Unweathered	Pl-Q-M pegmatite, fine to medium grained.
Irregular, lenses.	5-22 T	NW	SW		Discordant	do.	Weathered	P-Pl-Q-M pegmatite, medium to coarse grained; accessory sericite, biotite, garnet, vermiculite. Muscovite in rich pockets. Fine grained pegmatite to west. Pegmatite faulted.
Tabular	10 T	NE	SE		Concordant	do.		Pl-Q-M pegmatite, fine to medium grained; accessory garnet, biotite, vermiculite.
Tabular	1-8 T	NW	SW		Partly concordant.	Interlayered hornblende and biotite gneiss.		Pl-Q-M pegmatite, poorly exposed. Pl-Q-M wall zone; accessory biotite, vermiculite; P-Pl-Q core.
Tabular(?)	3-5 T					Mica gneiss	Weathered (20 ft).	Pl-Q-M pegmatite, medium grained. Pegmatite sheared, faulted. Poor exposures.
Irregular, branching, pinch and swell.	1-10 T	Variable	Variable	Variable	Discordant	Interlayered hornblende and biotite gneiss, biotite alteration.	Unweathered	Pl-Q-M wall zone, medium to coarse grained; P-Q core, coarse grained, discontinuous; accessory garnet, allanite, pyrite, thulite. Cut by numerous joints and faults and a diabase dike.
Lens	1-15 T	NE	NW		Partly concordant.	Biotite gneiss	Saprolite (40 ft).	Pl-Q-M wall zone, fine to medium grained; accessory sericite, biotite; P-Pl core, fine grained.
Pinch and swell.	5-15 T	NE	NW		do.	Interlayered hornblende and biotite gneiss.	Unweathered	Pl-Q-M wall zone, medium grained; accessory garnet; P-Pl-Q-M core, fine to coarse grained.
		NW	NE		do.	Hornblende gneiss.	Weathered	Kaolinized F-Q-M wall zone; Q core, discontinuous.
Lenses	1-4 T, 6-16 L	NE	SE		Concordant	Interlayered hornblende and biotite gneiss.	Unweathered	Pl-Q-M-P pegmatite, fine to medium grained; accessory garnet.
Lens	20-40 T, >200 L	NW	NE		Partly concordant.	do.	do.	Pl-P-Q-M pegmatite fine to coarse grained; Q fracture fillings. Most of lens is fine grained, locally coarse grained near hanging wall.
Lens(?)	15 T	NW	SW		Concordant	do.	Weathered (>15 ft).	P-Pl-Q-M pegmatite, fine to coarse grained; accessory biotite.
Lenses	1-5 T, 15-20 L	NE	SE	NE	do.	Mica schist		Pl-Q-M pegmatite, coarse grained.
Tabular	10-20 T	NE	SE		do.	Mica gneiss		Pl-F-Q-M pegmatite.
						Mica schist	Saprolite (+30 ft).	Kaolinized P-Pl-Q-M-B pegmatite. Schist inclusions common. Exposures poor.
Irregular lenses.	10-20 T	NW	SW	S	Partly concordant.	Mica gneiss	Unweathered	Pl-F-Q-M pegmatite, medium to coarse grained; accessory biotite, garnet, sericite, apatite. Other pegmatite to east mined for feldspar.
	8-10 T	NE				Mica schist	Weathered	F-Q-M pegmatite, Poor exposures.

Mitchell County—Continued

Irregular, tabular.	1-25 T, >500 L	NE	SE	SW	Partly concordant.	Hornblende gneiss, biotite alteration.	Partly weathered (100 ft)	Irregularly zoned: Pl-P-Q-M pegmatite, fine to coarse grained in upper workings; Pl pegmatite, coarse grained; accessory quartz, muscovite, garnet, in lower workings with Pl-M pegmatite along footwall, center, or hanging wall; Q-Pl pegmatite, fine to medium grained, locally. Muscovite concentrated in areas of low dip.
Pods	1-1.5 T	NE	SE	SW	Concordant	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-M pegmatite. Some large books of muscovite are in the gneiss adjacent to pegmatite pods.
Lens	12 T, 25 L	NE	SE		do.	Biotite gneiss		Pl-Q-P-M pegmatite, fine to coarse grained; accessory garnet, biotite, sericite.
Tabular	3-4 T, 75 L	NE	90°		do.	Mica gneiss		Pl-Q-M pegmatite, fine to medium grained; accessory garnet, sericite.
Tabular	25-30 T, 250 L	E	0-45° S		Concordant	Mica gneiss	Unweathered	P-Pl-Q-M pegmatite, medium to coarse grained; graphic texture common; accessory biotite, garnet, apatite.
Ellipsoidal	7-15 T	NE	SE	NE	Partly concordant.	Biotite gneiss		Pl-Q-M pegmatite, medium grained; accessory garnet, sericite.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>PLUMTREE AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
33	Upper Henson Creek mine.	USGS.....	Pre-WWII.....	3 adits.....	Brownish green, small, ruled, bent.....	Small sheet.....
35	Bill Hughes mine.....	USGS.....	WWII.....	5 pits in area 25 by 100.....	Green, bent, cracked, small.....	do.....
117	Jiggs mine.....	USGS.....	WWII.....	Cut 20.....	Brown, green edges, tied, mineral inclu-sions, cracked, stained, small.....	do.....
39	Landers mine.....	USGS.....	1900, 1935, 1944.....	Cut, 3 inclines.....	Brown, clear.....	Moderate sheet.....
29	Little Hawk Ridge (John) mine.	USGS, DMEA.....	1920, 1924, WWII, 1950's.	Cut 220 long, 50 deep, shaft 50, 6 adits, large stopes 400 long, 10-100 deep.	Reddish brown, hard, minor ruling, bending. Some "A" structure, tied, mineral inclusions.	Large sheet.....
116	Pitman mine.....	USGS.....	Pre-WWII.....	Cut 50, 2 inclines.....	Reddish brown.....	do.....
34	Rocky Ridge mine.....	USGS.....	WWII.....	Cut 18, adit 15.....	Green, mineral inclusions, bent, cracked.....	Small sheet.....
32	Bob Wise (Hawk Ruby) mine.	USGS, DMEA.....	1900, 1932, WWII, 1955-56.	Cut 125, several adits, shaft 27, prospect pits.	Ruby, hard, clear, mineral inclusions.....	Moderate sheet.....
<b>GLEN AYRE AREA</b>						
<b>Mitchell County</b>						
141	Biddix Spar mine.....	USGS.....	Pre-WWII.....	3 cuts with short adits.....	Brown.....	Feldspar.....
140	Dont Buchanan mine.....	USGS.....	WWII.....	Cut 25, incline 20, drift 20.....	Brown, biotite intergrowths, bent, ruled.....	Small sheet.....
137	Gouge mine.....	USGS.....	Pre-WWII.....	Cut 50.....	do.....	Feldspar.....
143	Big Hawk mine.....	USGS.....	1934, WWII.....	Cut 53.....	Brown, "A" structure, tied, mineral inclusions, bent.....	Small sheet.....
142	Ledford prospect.....	USGS.....	1956.....	Cut 150.....	Ruby, biotite intergrowths, stained, haircracks.....	do.....
139	Middle Ridge mine.....	USGS.....	Pre-WWII.....	Cut 30, adits.....	Brown, biotite intergrowths, stained.....	Small sheet, feldspar.....
138	Ward (Rock Creek, Queen) mine.	USGS, DMEA.....	WWII, 1954.....	Cut 70, drift 20.....	Ruby, moderately bent, cracked.....	Small sheet.....
<b>HAWK-BAKERVILLE AREA</b>						
<b>Mitchell County</b>						
166	Azaline mine.....	DMEA.....	1954-55.....	Cut 25, adit 85.....	Ruby, hard, clear, small.....	Small sheet.....
188	Baker mine.....	USGS.....	WWII.....	Adit 200, shaft, series of pits 400 along strike.	Brown.....	Moderate sheet.....
194	Horace Baker mine.....	USGS.....	WWI, WWII, 1955.	Adit 170, shaft 60, cut 66.....	Green, "A" structure, biotite inter-growths, small.....	Small sheet(?).....
155	Bardon (Bordon) mine.....	USGS, DMEA.....	Pre-WWII, 1954.	Cut 50, shaft 60 drifts 94.....	Ruby, ruled, bent.....	Moderate sheet, feldspar.....
160	Ben prospect.....	USGS.....	1957.....	Cut 50.....	Nonruby.....	Small sheet.....
149	Bergen Rock mine.....	USGS.....	Pre-WWII.....	Cut 75.....	Greenish brown, minor "A" structure, commonly ruled, mineral inclusions, stained.....	do.....
197	Sam Black mine.....	USGS.....	1900, WWII.....	2 shafts 20 and 42 deep, cut 70, adit 80.	Cinnamon brown, ruled.....	Small sheet(?).....
159	Branch (Zach Young) mine.	USGS.....	1905, 1933, WWII, 1955-56.	Cut 70, stope 50, shaft 31.....	Brown, minor stain, biotite inter-growths.....	Feldspar, small sheet(?).....
183	Buchanan mine.....	USGS.....	WWII, 1954.....	Pit 20 diameter, 25 deep.....	Ruby, hard, clear, small.....	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

PLUMTREE AREA—Continued

Mitchell County—Continued

Tabular.....	3 T, >100 L, >50 D.	NW.....	NE.....		Concordant.....	Hornblende gneiss.		Pl-Q-M pegmatite; accessory biotite, vermiculite, garnet.
do.....		NE.....	SE.....		do.....	Mica gneiss.....	Weathered.....	Kaolinized F-Q-M pegmatite; accessory biotite, garnet, sericite.
Tabular(?).....		NE.....	SE.....		do.....	Hornblende gneiss.	Unweathered.....	Pl-Q-P-M pegmatite; accessory sericite, garnet, biotite.
Pinch and swell.	1-7 T.....	NE.....	SE.....		do.....	Hornblende gneiss, biotite alteration.		Pl-Q-P-M pegmatite; accessory garnet.
Pinch and swell, elongate lens.	1-12 T, avg 5.....	NE.....	SE.....	E.....	Partly concordant.	Interlayered biotite and hornblende gneiss.	Weathered (25-50 ft).	Pl-Q-M wall zone, medium grained; Pl-Q-P intermediate zone, medium to coarse grained, Q-P core, in southwestern part; northeastern part unzoned Pl-P-Q-M pegmatite; accessory biotite, sericite, garnet pyrite.
Tabular.....	6 T.....	NE.....	NW.....		Concordant.....	Hornblende gneiss, biotite alteration.		Pl-Q-P-M pegmatite; accessory biotite, vermiculite, garnet.
Lens.....	0.5-3 T.....	NW.....	SW.....		do.....	Biotite gneiss.....	Weathered.....	Pl-Q-M pegmatite, fine to medium grained; accessory garnet, sericite.
Lens, pods.....	1-20 T.....	NE.....	NW., SE.....	SW.....	Partly concordant.	Interlayered hornblende and biotite gneiss.	do.....	Pl-P-Q-M-B pegmatite, medium grained; accessory garnet.

GLEN AYRE AREA—Continued

Mitchell County—Continued

Tabular.....	40 T.....	N.....	E.....		Partly concordant.	Hornblende gneiss.	Weathered.....	Kaolinized Pl-P-Q pegmatite; accessory biotite, vermiculite, garnet, muscovite.
Tabular.....	10 T.....	NW.....	SW.....		Discordant.....	Biotite gneiss.....		Pl-Q-M-B pegmatite, fine to medium grained; accessory garnet, sericite.
Tabular.....	5-10 T.....	NW.....	NE.....		do.....	Hornblende gneiss.	Weathered.....	Kaolinized Pl-P-Q pegmatite; accessory vermiculite.
Tabular.....	10-12 T.....	NE.....	SE.....		Concordant.....	do.....		Q-Pl-M pegmatite, medium to coarse grained; accessory sericite, garnet.
Lenses.....	1-2 T, 2-20 L.....	NE.....	NW.....		do.....	Mica gneiss.....	Weathered.....	Pl-Q-M pegmatite; accessory biotite.
Tabular(?).....	4 and 7 T.....	NW.....	NE.....		Partly concordant.	Hornblende gneiss.		P-Pl-Q-M-B pegmatite, medium to coarse grained; accessory vermiculite.
Branching, pinch and swell.	1.5-7 T, 100 L.....	E.....	Vertical.....	NE.....	Discordant.....	Interlayered hornblende and biotite gneiss.	Unweathered.....	Pl-P-Q-M-B pegmatite, medium to coarse grained; accessory garnet.

HAWK-BAKERVILLE AREA—Continued

Mitchell County—Continued

Tabular.....	15-25 T.....	NE.....	Steep.....	NE.....	Discordant.....	Hornblende gneiss.	Unweathered.....	Pl-Q-P-M wall zone?, medium to coarse grained, discontinuous; P-Q-Pl-B core? medium grained, gneissic.
Pinch and swell.	0.5-3 T.....	E.....	S.....		Concordant.....	Mica gneiss.....		F-Q-M pegmatite.
Pinch and swell, lenses.	1-6 T.....	NE.....	SE.....		Partly concordant.	Mica gneiss-schist.	Weathered.....	Pl-Q-P-M-B wall zone, medium to coarse grained; P core, coarse grained.
Tabular.....	1-8 T.....	NE.....	SE.....	SW.....	Concordant.....	Biotite gneiss.....		Pl-Q-P-M wall zone, medium grained; accessory pyrite, Q core.
Lenses.....	1-5 T, 20 L.....	NE.....	SE.....	NE.....	Concordant(?).....	Interlayered biotite and hornblende gneiss.	Partly weathered.	Pl-Q-B-M pegmatite, medium grained.
Tabular.....	5-10 T.....	NE.....	SE.....		Concordant.....	do.....		Pl-Q-M pegmatite; fine to medium grained; accessory garnet.
Lenses.....	0-11 T.....	NE.....	SE.....	NE.....	do.....	Mica gneiss.....		Pl-Q-M pegmatite, fine to medium grained. Several mica-poor pegmatite bodies in adit.
Anticlinal lenses.	Several bodies 1-40 T, 10-120 L.	NE.....	NW., SE.....	SW.....	do.....	Interlayered biotite and hornblende gneiss.	Partly weathered.	Pl-P-Q-M-B wall zone, medium to coarse grained; accessory garnet, epidote, allanite?. Q core, accessory pyrite. Small lenses to southwest.
Lenses.....	0-3 T.....	NW.....	SW.....		do.....	Biotite gneiss.....	Unweathered.....	Pl-Q-M pegmatite, fine to medium grained; accessory garnet.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>HAWK-BAKERVILLE AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
150	Carter Buchanan mine	USGS	Pre-WWII	3 cuts, each 20 diameter	Green, stained	Small sheet, feldspar.
171	Delia Buchanan mine	USGS	WWII	2 shafts, each 25 deep	Light brown, green mottling, mineral inclusions, cracks.	Small sheet(?)
151	Dobie and Russ Buchanan mine	USGS	Pre-WWII	Large pit 80 deep?, 2 pits, shaft 30.		Feldspar
178	Ed Buchanan mine	USGS		2 cuts, 40 and 70	Brown, biotite intergrowths, books long and thin.	Small sheet(?), feldspar.
176	Fate Buchanan mine	USGS	WWII(?)	Cut 60	Light brown, reeved, cracked	
185	J. K. Buchanan (Milt Wilson) mine	USGS, DMEA, Dahners and McIntosh, (1948), OF.	1936-45, 1954-55	3 shafts, incline 250, cuts prospect pits.	Cinnamon brown, moderate "A" structure, mineral inclusions, ruled, cracked.	Large sheet, scrap.
184	Buckeye mine	USGS	1911, WWII, 1954-56.	Cut 60, incline 50, shaft 80, stope, shaft 25 to NE.	Light green, minor "A" structure, reeves, stain, cracks, ruling.	Moderate sheet
148	Bud mine	USGS	WWII	2 cuts, 40 and 90, shaft 30, prospect pits.	Light brown, greenish edges, ruled, haircracked, stained.	
199	Burleson and Gouge mine	USGS, DMEA	Pre-WWII, 1956	Cut 30 with incline 62, drifts 78, 2d incline 34, near road.	Ruby, clear, minor "A" structure, stain, cracks.	Small sheet
175	W. C. Burelson (Joe Stevenson) mine	USGS, DMEA	1900, 1930-32, 1939-45, 1952, 1956.	2 cuts, incline and stope 150, shaft 65 with incline 25, and drifts 85, inclined shaft 49.	Reddish brown (hanging wall), brownish green (footwall), minor stain, mineral inclusions, ruling, bending, cracking.	Large sheet
196	Jeff Byrd (Sheep McKinney) mine	USGS, DMEA	1904, WWII, 1952-58.	4 shafts, deepest 95, adit 75, drifts, stopes, cut 200.	Ruby, minor cracks, bending, clay stain.	Moderate sheet
170	Clarissa mine	USGS, Sterrett (1923, p. 245-247).	1869, int to WWII, 1952, 1958-60.	2 cuts, 80 and 160 long, 10-30 deep, 14 shafts 60-350 deep, stoped area 200 long, 300-350 deep.	Ruby, hard, minor stain, bending, ruling. Mica concentrated in 3 steeply plunging shoots.	Large sheet
180	Cloudland (Pizzle) mine	USGS, Sterrett (1923, p. 247-248), DMEA, OF.	1870-1900, int 1900-39, WWII, 1958-59.	Cut 250 long, 75 deep, shaft, adits, drifts, stopes, 320 along strike, 200 deep.	Ruby, hard, stained, moderate ruling, bending, cracking.	Large sheet, some feldspar.
182	Ben Cox mine	USGS	1935-37, WWII	Cut 80 long, 120 deep (reported).	Ruby, biotite intergrowths, stained, haircracks.	Moderate sheet, feldspar.
172	Dellinger prospect	USGS	1956	Cut 60, shaft 24	Green, clear, small	Small sheet
191	Duck Branch mine	USGS	Pre-WWII, 1943	Cut 60, adits, prospect pits, shaft 50, drifts 40.	Green "A" structure, ruled, haircracks, biotite intergrowths, stained.	do
181	Chet Green mine	USGS	WWII	Cut 90	Light brown, hard, reeved, tied, ruled, small.	
181	Dave Green mine	USGS	Pre-WWII	Cut 40, 4 adits 30-80 long over strike distance 250.	Light brown, clear, hard, ruled, bent	
177	Bill Greene prospect	DMEA	1955	Cut 100	Ruby, biotite intergrowths, stained, cracked, small.	Small sheet
157	R. P. Greene prospect	USGS	1956	Cut 150	Greenish brown, stained, cracked, small	do
144	Haw Flat mine	USGS	Pre-WWII	Cut 40, shaft 20, prospect pits.	Dark greenish brown, biotite intergrowths.	Small sheet(?)

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

HAWK-BAKERVILLE AREA—Continued

Mitchell County—Continued

Tabular(?)	>20 T	NE							P-P1-Q-B-M pegmatite, graphic texture common; accessory vermiculite, garnet, hyalite. Pegmatite walls not exposed.
Tabular(?)	>600 L	NE	SE		Concordant	Mica gneiss	Weathered		Kaolinized F-Q-M pegmatite, poorly exposed.
						Hornblende gneiss			PI-P-Q pegmatite, medium grained; accessory muscovite, garnet.
						Biotite gneiss			P-P1-Q-M-B pegmatite, coarse grained, graphic texture common; accessory vermiculite, garnet apatite.
Tabular		NE	SE		Concordant	Mica gneiss			PI-Q-M pegmatite, fine to medium grained; accessory biotite, garnet, sericite.
Lenses	1-20 T, avg 12	NE	SE	SW	do	do	Weathered (30 ft)		PI-P-Q-M wall zone, medium to coarse grained; accessory sericite, garnet, apatite, kyanite; Q-P core, discontinuous.
Lenses, pinch and swell	0-7 T	NE	SE, SW	SW	do	Hornblende gneiss, biotite alteration.	Unweathered		PI-Q-M wall zone, medium grained, discontinuous, P-P1-Q-M intermediate zone, fine to medium grained; Q core. Accessory garnet, sericite. Lenses in zone of drag-folded gneiss.
Tabular(?)		NE	SE		Concordant(?)	Biotite gneiss	Weathered		PI-Q-M pegmatite; accessory garnet, biotite, sericite.
Tabular, pinch and swell	1-6 T, >120 L	NE	SE		Concordant	Interlayered hornblende and biotite gneiss.	Weathered (20 ft)		PI-Q-P-M wall zone, medium to coarse grained; accessory biotite, sericite, tourmaline; P core, discontinuous. Some graphic texture.
Contorted tabular	3-15 T, >165 L	NE	Variable SE	SW, NE	Partly concordant	Interlayered hornblende and biotite gneiss; biotite alteration.			PI-Q border zone, fine grained, discontinuous; accessory muscovite, garnet; PI-Q-M wall zone, coarse grained, discontinuous; PI-P-Q-M intermediate zone, coarse grained. P-Q inner intermediate zone, graphic texture; Q core. Accessory biotite, apatite, sericite, garnet, pyrite, hyalite.
Irregular, tabular	Several bodies 1-4 T, one 20 T	NE	SE	NE	Concordant	Interlayered biotite and hornblende gneiss.	Weathered (60 ft)		PI-Q-P-M pegmatite; accessory garnet, sericite. Large body is mica poor and contains gneiss inclusions.
Pinch and swell, tabular, lenses	1-11 T, >500 L, >350 D	NE	SE		do	Interlayered hornblende and biotite gneiss.	do		PI-Q-M pegmatite, fine to coarse grained; accessory sericite, garnet, biotite, apatite, sulfide minerals. Some sheet muscovite in gneiss adjacent to pegmatite. First worked by Indians.
Irregular, lenses, pinch and swell	1-35 T	NE	SE	SW	Partly concordant	Mica gneiss-schist.	Unweathered		F-Q border zone, fine grained; Q-M wall zone, fine to medium grained; PI-Q intermediate zone, medium to coarse grained; Q-M-PI-P core, medium to coarse grained; accessory garnet, apatite. Smaller lenses PI-Q-M pegmatite.
Tabular(?)	>20 T	NE	SE		Concordant	Mica gneiss			P-P1-Q-M wall zone, coarse grained; accessory biotite, vermiculite, apatite, garnet; Q core. Gneiss inclusions and quartz layers form layered structure. Graphic texture common.
Lenses	1-10 T, 6 to >45 L	NE	NW		do	do	Weathered (30 ft)		Kaolinized PI-P-Q-M pegmatite, coarse grained.
Tabular	18 T	NE	SE		do	Hornblende gneiss, biotite alteration.	Weathered		PI-Q-M wall zone, fine to medium grained; accessory zoisite, biotite, garnet, layered structure; P core, coarse grained. Pegmatite sheared and cut by faults.
Tabular(?)	8 T	NW	SW		do	Biotite gneiss	do		Kaolinized PI-Q-M pegmatite, poorly exposed.
do	>8 T	N	W		Discordant	Hornblende gneiss, biotite alteration.			PI-P-Q-M pegmatite, medium to coarse grained; accessory biotite.
Tabular	30 T	NE	SE		Concordant	Mica gneiss	Weathered		P-Q-PI-M-B pegmatite, medium grained, graphic texture common.
Contorted, lens(?)	1-12 T, >90 L	NE	NW	SW	do	do	do		PI-Q-P-M pegmatite, fine to coarse grained; accessory biotite.
Tabular(?)	4 T	NE	SE		do	Interlayered biotite and hornblende gneiss.			P-P1-Q-M pegmatite; accessory biotite, vermiculite.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>HAWK-BAKERVILLE AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
152	Hawk mine.....	USGS (Sterrett, 1923, p. 245) Olson (1944, p. 60-63, pls. 8-10).	1870-95, 1920, 1929-30, 1939-44, 1953-59.	Cut 500 long, 125 deep, adit 600. Stopes, inclines, drifts above and to 200 below adit level.	Light reddish brown, ruled, minor bending.	Large sheet scrap..
146	Little Hawk mine (on Hawk Creek).	USGS.....	Pre-WWII.....	2 cuts.....	Green, "A" structure, mineral inclu- sions.	Moderate sheet(?), feldspar.
179	Horton Rock mine.....	USGS.....	1930-WWII int.....	Cut 125 long, 20-60 deep, slope 40 long.	Brown, biotite intergrowths.....	Large sheet, feld- spar.
165	Ivy Knob prospect.....	USGS.....	1930(?).....	Shaft 15, drifts 20.....	Ruby, clear, small.....	Small sheet.....
154	Jack Rock mine.....	USGS.....	1933, 1943.....	Cut 45 long, 15 deep.....	Pale green to light brown, reeved, cracked, stained.	do.....
162	Lick Ridge mine.....	USGS.....	1890, int 1929-38, 1944, 1954-58.	Cut 300, irregular rooms 70- 90 long, adit 80.	Brown, moderately stained, bent, ruled, biotite intergrowths.	Moderate sheet.....
163	McKinney Cove (Moun- tain Top) mine.	USGS, DMEA.....	1890(?), WWII, 1954-55.	2 shafts, 80 and 100 deep, drift 70, prospect pits.	Brown, hard, ruled, bent, stained.....	do.....
157	Dewey McKinney pros- pect.	USGS.....	1955.....	Prospect pit.....	Green to brown, clear, sparse.....	None.....
164	Green B. McKinney mine.	USGS.....	WWI, WWII.....	Cut 25, 3 shafts, 60 deep, adit 160.	Ruby, hard, common ruling, cracking, stain, small.	Small sheet.....
190	Howard McKinney pros- pect.	DMEA.....	1957-58.....	Cut 130, inclined shaft 63, drift 52.	Green, "A" structure, bent, ruled, stained.	Small sheet, scrap.....
156	Paul McMahan prospect..	DMEA.....	1957.....	Inclined shaft 47.....	Greenish brown, cracked, bent, stained, ruled, minor "A" structure.	Small scrap.....
168	Middle Ridge mine.....	USGS.....	WWII.....	Adit 85(?), shaft 18.....	Brown, minor "A" structure, mineral inclusions, cracked, ruled.	do.....
145	Mossy Rock mine.....	USGS.....	1890-1901, 1937.....	Cut 150 long, 30 deep, in- clined shaft 104.	Greenish brown, biotite intergrowths..	Moderate sheet(?), feldspar.
189	Pannell mine.....	USGS.....	Pre-WWII.....	2 series of shafts 200-300 along strike, several adits.	Brown, stained, biotite intergrowths...	do.....
161	Paul (Sol Biddix) pros- pect.	USGS.....	WWII.....	Cut 50.....	Greenish brown, clear.....	do.....
169	Potato Hill mine.....	USGS.....	Pre-WWII.....	Cut 25, adit 40.....	Greenish brown, stained, cracked, small..	do.....
158	Roby (Tim Twiggs) mine..	USGS, DMEA.....	1910, 1920, WWII, 1956-57.	Cut 65, inclined shaft 100, drifts 90.	Greenish brown, biotite intergrowths, moderate bending, ruling, minor "A" structure.	Moderate sheet, large scrap.
174	Boise Slick mine.....	USGS.....	WWII.....	Cut 45.....	Light brown, reeved, locky, small.....	do.....
193	Fred Sparks prospect.....	USGS.....	1958.....	Cut 90.....	Ruby, clear, small.....	do.....
167	Charles Stamey mine.....	USGS.....	Pre-WWII.....	Cut 60.....	Green, sparse.....	Feldspar.....
147	Twiggs mine.....	USGS, DMEA.....	WWII, 1956-58.....	4 Adits, shaft 100, stopes, drift 93.	Greenish brown, hard, bent, cracked, stained.	Moderate sheet.....
186	Cain Twiggs prospect.....	USGS.....	1905, 1943.....	Pit 12 diameter, 25 deep.....	Light green, "A" structure, concen- trated near quartz vein; light brown, cracked, bent, stained, sparsely dis- tributed.	Small sheet.....
187	White Oak Creek mine....	DMEA.....	Pre-WWII.....	Cut 100 long, 20 deep, shaft 76, drifts 104, caved pits and adits 200 along strike.	Ruby, hard, clear, bent.....	do.....
163	Clarence Wilson mine (200 ft south of Mc- Kinney Cove mine).	USGS.....	WWII.....	Cut, incline 10.....	Cinnamon brown, sparse.....	do.....
195	Edd Wilson prospect.....	USGS.....	Pre-WWI, 1957- 58.	Cut 100, shaft 30.....	Green, "A" structure, small.....	do.....
192	R. V. and J. L. Wilson mines.	USGS.....	1915, WWII.....	Several shafts 40-60 deep, short drifts, adits, strike distance 400.	Ruby, green mottling, biotite inter- growths, moderate ruling, reeving, cracking.	Small sheet(?).....
198	Woody Hill (Woody) mine.	USGS, DMEA.....	1885, 1910, 1930, WWII, 1955.	5 shafts, 30-125 deep, 3 adits, trenches, pits 300 along strike.	Ruby, moderately cracked, ruled, tied...	Moderate sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Shape	Size (feet)	Pegmatite			Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
		Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

HAWK-BAKERVILLE AREA—Continued

Mitchell County—Continued

Lenses, pinch and swell.	1-12 T.	NE.	SE.	S.	Concordant.	Interlayered hornblende and biotite gneiss; biotite alteration.	Saprolite (100 ft).	PI-Q-P-M pegmatite, medium to coarse grained; accessory biotite, spessartite, tourmaline, apatite, thulite, pyrite, pyrrhotite. Thicker lenses tend to have PI-Q-M wall zone and P core.
		NE.	SE.		Concordant(?)	Interlayered biotite and hornblende gneiss.		P-PI-Q-M pegmatite; accessory garnet, sulfides.
		NE.	SE.					P-PI-Q-M-B pegmatite, coarse grained, graphic texture common; accessory vermiculite, garnet, apatite. Biotite in large strips in fractures.
Pods.	0.5 T.	NE.	SE.		Concordant.	Mica gneiss.	Weathered.	F-Q-M pegmatite, poorly exposed.
Tabular.	6-8 T, 45 L.	NE.	SE.		do.	Biotite gneiss.		PI-Q-M pegmatite; accessory garnet, biotite, sericite.
do.	10-15 T, 280 L.	NE.	SE.		Partly concordant.	Hornblende gneiss.	Unweathered.	PI-Q-P-M-B pegmatite, coarse grained; accessory garnet, pyrite, apatite, allanite, thulite. Pegmatite has gneissic structure along hanging wall.
Tabular, pinch and swell.	1-9 T.	NE.	SE.	SW.	Concordant.	Hornblende gneiss, biotite alternation.	Weathered (80 ft).	PI-Q-M wall zone; accessory biotite, garnet; Q-P core, discontinuous. Pegmatite cut by faults; wall contacts have slickensides.
Lens.	0-4 T, 60 L.	NE.	SE.		do.	do.	Unweathered.	PI-P-Q-B-M pegmatite, graphic texture common.
		NE.	Vertical.			Mica gneiss.		PI-Q-M pegmatite; accessory garnet, biotite, sericite. Pegmatite poorly exposed.
Tabular.	3-6 T.	NE.	SE.		Partly concordant.	Interlayered biotite and hornblende gneiss.	Weathered (20 ft).	PI-P-Q-M pegmatite, medium to coarse grained; accessory garnet, sericite, epidote.
Lens.	18 T.	NE.	SE.	NE.	do.	Interlayered hornblende and biotite gneiss.	Unweathered.	P-PI-Q-M pegmatite, fine to coarse grained; accessory biotite. Pegmatite cut by quartz vein.
						Mica gneiss.	Weathered.	Kaolinized F-Q-M pegmatite, poorly exposed.
Tabular.	2-12 T, 250 L.	NE.	SE.		Concordant.	Interlayered hornblende and biotite gneiss.		P-PI-Q-M pegmatite; some graphic texture; accessory biotite, garnet, pyrite.
Pinch and swell.	0-4 T, 200-300 L?	NE.	SE.		do.	Mica gneiss.		PI-Q-M pegmatite; accessory biotite.
Pinch and swell.	10 T.	NE.	NW.		Poorly concordant.	Interlayered biotite and hornblende gneiss.	Weathered.	PI-P-Q-M wall zone, Q core. Poorly exposed.
						Mica gneiss.		PI-Q-M pegmatite, medium grained; accessory garnet, sericite, biotite.
Irregular, lens.	1-33 T.	NE.	NW.	NE.	Concordant.	Interlayered biotite and hornblende gneiss; biotite alteration.	Weathered (10 ft).	PI-Q-M-B wall zone, medium to coarse grained; accessory chlorite, epidote, pyrite; Q core.
Tabular.		NE.	SE.		Concordant.	Mica gneiss.		PI-Q-M pegmatite, fine to medium grained; accessory sericite, garnet.
do.	3-6 T.	NE.	Steep NW.		do.	Interlayered biotite and hornblende gneiss.	Weathered (15 ft).	PI-Q-M wall zone, fine to medium grained; accessory garnet, Q core.
do.					Concordant(?)	do.		P-PI-Q-B pegmatite; accessory muscovite, vermiculite, garnet, tourmaline.
Tabular, pinch and swell.	0.1-3 T, 200 L, 150 D.	NE.	SE.	NE.	Concordant.	do.	Unweathered.	PI-Q-M pegmatite, fine to medium grained; accessory garnet, pyrite, chlorite, epidote, biotite.
Tabular.	12 T, >100 L.	NE.	SE.		do.	Mica gneiss.		PI-Q-M pegmatite, fine to medium grained; accessory sericite, garnet, biotite. Crosscutting quartz vein reported.
do.	1-3 T.	NE.	SE.		do.	Mica schist.	Weathered (80 ft).	Kaolinized F-Q-M wall zone, medium to coarse grained; Q core.
do.	10 T.	NE.	SE.		do.	Biotite gneiss.		F-Q-M pegmatite.
Lens.	1-4 T, >45 L.	NE.	SE.		do.	Interlayered hornblende and biotite gneiss.	Weathered (30 ft).	PI-Q-M pegmatite, medium grained.
Tabular.	2-6 T.	NE.	SE.	SW.	do.	Mica gneiss.	Weathered.	Kaolinized F-Q-M pegmatite; accessory biotite, garnet.
Lenses.	1-12 T.	NE.	SE.		do.	Mica schist.	do.	PI-P-Q-M pegmatite; accessory biotite, garnet.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>INGALIS AREA</b>						
<b>Avery County</b>						
214	"A" (Poteat) mine.....	USGS.....	1885, 1922, 1926, 1930, 1938, WWII.	Cuts 600, prospect pits, adits, shafts.	Green, hard, bent, cracked, ruled, tied...	Moderate sheet....
215	Brushy Creek mine.....	USGS.....	1927.....	Cut 100, caved adits, incline.	Green, clear, "A" structure, mineral inclusions, bent.	Small sheet(?).....
213	Butler mine.....	USGS.....	Pre-WWII.....	Cut 20 diameter, 20 deep....	Green, bent.....	Small sheet(?), feldspar.
218	Corduroy Ridge mine.....	USGS, CMC.....	WWII.....	Shaft 40, drifts 230, prospect pits.	Green, "A" structure, cracked, tied....	Small sheet, large scrap, feldspar.
201	Doe Hill (south) mine.....	USGS, DMEA... ..	WWII, 1956-57....	Cut 350 long, 10-30 deep, 3 adits 20 to 150 long.	Green, "A" structure, bent, minor stain.	Small sheet.....
202	Doe Hill (north) mine.....	USGS, DMEA... ..	1955-59.....	Cuts, adit 170, stopes.....	Green, hard, moderate bending, crack ing, minor stain.	Moderate sheet... ..
203	Doe Hill (west) prospect....	USGS.....	1956.....	Cut and stripped area 180 by 200.	Green, stained, bent, small.....	Small sheet, scrap.
223	East Side mine.....	USGS, CMC.....	WWII.....	Pit 25 diameter, 100 deep(?).	Green, "A" structure, bent, tied, cracked, stained.	Small sheet, feldspar.
221	Field prospect.....	USGS.....	1956.....	Cut 30.....		None.....
204	Gusher Knob (Waterhole) mine.	USGS.....	Pre-WWII, WWII.	Several cuts 20-150 long, 70 deep, stopes, adits, drifts.	Green, wedge "A" structure, stained; minor clear, flat "A" structure.	Moderate sheet, scrap, feldspar.
207	Hempile mine.....	USGS.....	Pre-WWII.....	Cut 100 long, 30 deep, adit 30.	Green, "A" structure, tied, bent, small.	Small sheet(?), scrap, feldspar.
209	Horseshoe (Brushy Creek) mine.	USGS.....	Pre-WWII 1957-58.	Cut 300 long, 60 deep.....	Green, "A" structure, bent, ruled.....	Small sheet(?).....
224	Laurel Creek mine.....	USGS, CMC.....	1939, 1943-45.....	Cut and incline, 40.....	Brown, moderatly cracked, ruled, tied, stained.	Small sheet.
216	Ed Love mine.....	USGS, CMC.....	WWII.....	Cut 60, inclines, 13 and 35.....	Green, bent, ruled.....	do.....
208	Madam Bank mine.....	USGS, OF.....	WWII, 1950's.....	10 small cuts and inclines. Main incline reported 300.	Green, hard, haircracked, moderately bent, stained.	Large sheet(?).....
222	Mill Race mine.....	USGS, CMC, OF.	1875, 1918, 1927, WWII, 1950's.	Cuts, inclines, large stope 100 by 400.	Green to brownish green, clear, hair-cracks, ruling, minor "A" structure, bending.	Large sheet, feldspar.
211	Mullen Hill mine.....	USGS, CMC.....	1890's int 1920-40, 1943.	2 shafts 70, adit 200, drifts...	Green, locky, "A" structure, mineral inclusions, small.	Small sheet.....
219	Notover mine.....	USGS.....	Pre-WWII.....	2 small cuts.....	Green, "A" structure.....	Small sheet, feldspar(?).
210	Ollis (Brushy Creek west) mine.	USGS.....	Pre-WWII, 1959..	Cut 150 long, 50 deep.....	Green, "A" structure, bent.....	Small sheet(?).....
205	Patrick mine.....	USGS.....	Pre-WWII.....	Cut 80, 2 shafts 70, 4 adits...	Green, ruled, small.....	Feldspar.....
217	Old Rock mine.....	USGS, CMC.....	1876, int to 1944..	Cut 100, adit 100, prospect pits.	Green, minor "A" structure, stain, cracks, ruled, mineral inclusions.	Moderate sheet... ..
200	Fate Taylor mine.....	USGS.....	1880, 1900-44, int.	Numerous slumped pits and cuts in area 75 by 100.	Green, hard, mottled, stained, cracked, ruled.	
220	Wiseman prospect.....	USGS.....	1956.....	No workings.....	Green, small.....	None.....
206	William Wiseman mine... ..	USGS.....	WWII(?).....	Cut 35, adit 130, prospect pits.	Green, wedge "A" structure, small.....	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				
<b>SPRUCE PINE DISTRICT—Continued</b>								
<b>INGALIS AREA—Continued</b>								
<b>Avery County—Continued</b>								
Tabular	50 T	NW	SW		Partly concordant	Mica gneiss	Weathered (50 ft)	P-Pl-Q-M pegmatite, fine grained. Sheet mica reported concentrated in shoots in coarse grained pegmatite near footwall.
do	50 T				do	do	Saprolite (50 ft)	P-Pl-Q-M pegmatite, fine grained; accessory garnet. Some coarse grained P-Q pegmatite.
Lens	40 T(?)	NE	SE		do	do	Unweathered	Pl-P-Q-M pegmatite, fine to coarse grained; accessory garnet, allanite. Gneissic texture near footwall.
						do	Weathered (40 ft)	Kaolinized F-Q-M wall zone, medium to coarse grained; Q core. Coarse-grained pegmatite near gneiss inclusion in larger body of fine-grained pegmatite (alaskite).
Tabular	>20 T	NW	SW	NW	Concordant	Mica gneiss	Weathered	Pl-P-Q-M pegmatite, fine to medium grained; accessory sericite, biotite. Local concentration quartz-muscovite pegmatite.
Lenses(?)	5-20 T	NW	SW		Partly concordant	Interlayered biotite and hornblende gneiss.	Weathered (45 ft)	Pl-Q-M-B wall zone, fine to medium grained; Pl-Q-M intermediate zone, medium to coarse grained; accessory garnet; Q core. NE pegmatite has Pl-P-Q-M core, coarse grained. Gneissic texture common.
Lenses	10-20 T	NW	NE		do	Mica schist	Weathered (40 ft)	Pl-P-Q-M pegmatite, fine to medium grained.
Tabular	25 T(?)	NE	SE		Discordant	Granite	Unweathered	Pl-P-Q-M pegmatite, medium to coarse grained; accessory sericite, garnet. Body is coarse grained unit in larger mass of fine-grained pegmatite or granite (alaskite).
Lenses	1 T, 3 L				Concordant	Biotite gneiss	Weathered	Kaolinized F-Q pegmatite.
Tabular(?)	>100 T(?)	NW	SW			Granite and mica gneiss.		Pl-Q-P-M wall zone, medium grained; P intermediate zone, coarse grained; Q core, irregular; branching. Pegmatite near western edge of large intrusive of fine-grained pegmatite or pegmatitic granite (alaskite). Inclusions of mica gneiss common.
Tabular(?)	20 T	NE	NW		Concordant	Mica schist and gneiss.	Weathered	Pl-Q-P-M pegmatite, medium to coarse grained; accessory garnet. Several pegmatite bodies exposed.
Lenses	4-10 T	NW	SW		Partly concordant	Interlayered biotite and hornblende gneiss.	Weathered (60 ft)	Pl-P-Q-M wall zone, medium to coarse grained; Q core, discontinuous. Pl-Q-M pegmatite, fine grained; exposed in floor of cut.
Tabular	1-2 T	NE	NW		Concordant	Hornblende gneiss.	Weathered	Kaolinized Pl-Q-M pegmatite; accessory garnet, sericite.
		NW	SW		do	Mica gneiss	do	Kaolinized F-Q-M pegmatite; accessory biotite, garnet, sericite.
Pinch and swell, tabular lenses.	1-6 T	NE	NW		do	do	Unweathered	Pl-Q-P-M pegmatite; gneissic texture common; accessory pyrite, epidote.
Tabular	20 T	NW	SW		Partly concordant	Granite, mica schist.	Weathered (10 ft)	Pl-Q border zone, fine to medium grained; Pl-Q-M wall zone; Pl-P-Q-M intermediate zone coarse grained; Q core, discontinuous. Gneissic texture prominent in both granite (alaskite) and pegmatite.
do	3-5 T	NE	SE		Concordant	Mica gneiss	Weathered (80 ft)	Kaolinized F-Q-M pegmatite; accessory garnet.
Tabular	12 T	N	E		Concordant	Biotite schist	Partly weathered.	P-Pl-Q-M pegmatite; accessory garnet. Feldspar kaolinized. Quartz in pods and crosscutting veins.
Lenses	2-12 T	NW	SW		do	Interlayered hornblende and biotite gneiss.	Weathered (50 ft)	Kaolinized Pl-P-Q-M pegmatite, fine to medium grained.
						Interlayered biotite and hornblende gneiss, granite.		Pegmatite not exposed but near contact between gneiss to west and fine grained pegmatite or granite (alaskite) to east.
Irregular, lens.		NW			Partly concordant	Granite, biotite gneiss.		Pl-Q-M wall zone, medium grained; accessory garnet, sericite; P-Q intermediate zone, coarse grained; Q core(?), not seen but large masses of quartz on dump.
Tabular	6 T, 100 L	NE	SE		Concordant	Mica gneiss	Weathered	Q-Pl-M pegmatite, medium grained; plagioclase kaolinized. Pegmatite poorly exposed; 2 sills reported.
	10-12 T(?)							Boulders of F-Q-M pegmatite on hill slope.
	100 T(?)	NW	SW		Concordant	Mica schist	Weathered	Kaolinized Pl-P-Q-M-B pegmatite, fine to medium grained, graphic texture common.

TABLE 4.—Summary description of mica mines and

Mine or prospect					Description of muscovite	Production
Local-ity No. on pl. 3	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>INGALIS AREA—Continued</b>						
<b>McDowell County</b>						
212	Flem Vance mine.....	USGS.....	1890's, WWII.....	2 cuts 25-30.....	Green, bent, ruled, stained, locky, mineral inclusions.	.....
<b>SPRUCE PINE AREA</b>						
<b>Mitchell County</b>						
330	Adams mine.....	USGS.....	Pre-WWII.....	2 shafts 25, caved adit.....	Brownish green.....	.....
263	A. S. O. mine.....	USGS.....	WWII.....	2 shafts 40 and adits in area 50 by 100.	Green, moderate clay and iron stain, cracked, small.	Small sheet.....
333	Al Autrey mine.....	USGS.....	1937-38.....	Adit 60.....	Green, "A" structure, stained, ruled, small.	Moderate sheet.....
296	Barbara prospect.....	USGS.....	.....	Prospect pits.....	Green, clear, small.....	Small sheet.....
226	Bartlett mine.....	USGS.....	Pre-WWII.....	Maze of irregular workings..	Light brown, clear, concentration near footwall.	.....
227	Cole Bartlett prospect.....	USGS.....	1895, 1948, 1956.....	Cut 150 long, 20 deep.....	Ruby, bent, small.....	Feldspar.....
239	Bearwolf mine.....	USGS.....	Pre-WWII.....	Cut 30 deep, adit 30.....	.....	do.....
282	Beaver Spar mine.....	USGS.....	Pre-WWII.....	Cut and caved underground workings in area 35 by 100.	Dark green, "A" structure, small.....	do.....
305	Biggerstaff Branch mine.....	USGS.....	Pre-WWII.....	Several adits form caved area 40 by 80.	Light green, "A" structure, ruled.....	.....
242	Bird Eye (Phillips) mine.....	USGS.....	1900, 1935, WWII.....	Pit 20 diameter, 25 deep; cut 115 long, 15 deep to east.	Light green, reeved, bent, haircracked, small.	Small sheet(?).....
332	Black mine.....	USGS.....	Pre-WWII.....	Cut 120 long, 30 deep.....	Light green, stained.....	.....
304	Blalock mine.....	USGS.....	1880, int to 1940.....	Shafts, cuts, pits in area 100 by 400.	Greenish brown "A" structure, stained, cracked, ruled.	Large sheet.....
311	Bloodworth mine.....	USGS.....	Pre-WWII.....	Cut 80 long, 12 deep.....	Light green, moderately stained.....	.....
261	Buchanan (Waterhole) mine.....	USGS.....	Pre-WWII.....	4 shafts.....	Green, "A" structure, cracked, bent.....	.....
225	Adam Buchanan mine.....	USGS.....	1925-26, 1929-30, 1937, 1939-41.	2 cuts leads into stopes 70 long, 45 wide.	Green, stained, bent, ruled.....	Large sheet, feldspar.
289	Boone Buchanan (Bartlett No. 2) mine.....	USGS, CMC.....	1920, WWII.....	12 pits, several shafts, adit for 150 along strike.	Brown to green, some color banded, hard, moderate ruled, bent, tied, cracked, reeved.	Small sheet (WWII).
248	Bull Ridge mine.....	USGS, CMC.....	1930, WWII.....	Cut 80 long, 35 deep, drift, adit 35.	Light yellowish green, "A" structure, ruled, cracked, stained.	Small sheet, feldspar.
262	Bunker Hill mine.....	USGS.....	1895, WWII.....	Cut 60, 2 shafts, drifts, and stopes to 100 depth.	Light green, "A" structure, hard, bent, ruled, haircracked.	Moderate sheet (WWII).
306	Butler mine.....	USGS.....	Pre-WWII.....	Adit 70, incline 20.....	Brown, "A" structure.....	.....
303	Jess Carpenter mine.....	USGS, CMC.....	1900 int to 1943.....	Adits, 4 shafts, drifts, stopes to depth of 60, for 300 on strike.	Greenish brown.....	.....
336	Case mine.....	USGS, CMC.....	1885, WWII.....	5 shafts, drifts in area 20 by 80, 55 deep.	Light green, reeved, locky, stained.....	None during WWII.
273	Case Cut mine.....	USGS.....	1880-97.....	Cut 100 long, 5-20 deep.....	Greenish brown, clear.....	.....
326	Chalk Mountain mine.....	USGS, Sterrett (1923, p. 257-258).	Pre-1910, 1930, WWII.	20 cuts and shallow shafts for 600 along strike.	Green, "A" structure, moderate stain.....	Small sheet (1930), feldspar.
325	Chalk Slope mine.....	USGS.....	Pre-WWII.....	Narrow cut and stope.....	Green, moderate stain.....	.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

INGALIS AREA—Continued

McDowell County—Continued

Tabular.....	2.5 T.....	NE.....	SE.....	.....	Concordant.....	Mica gneiss.....	.....	Pl-Q-M pegmatite; accessory sericite, garnet.
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SPRUCE PINE AREA—Continued

Mitchell County—Continued

Tabular(?).....	.....	NW.....	SW.....	.....	.....	Interlayered hornblende and biotite gneiss.	.....	Pl-Q-P-B-M pegmatite, fine grained. Workings followed 2 quartz veins 10 ft apart.
Irregular.....	.....	NW.....	SW.....	.....	Partly concordant.	Mica gneiss.....	Weathered.....	Kaolinized F-Q-M pegmatite.
Tabular(?).....	.....	NE.....	.....	.....	Discordant(?).....	Granite.....	.....	Pl-P-Q-M pegmatite. Body along margin of mica gneiss inclusion in large mass of fine-grained pegmatite or granite (alaskite).
.....	.....	NW.....	.....	.....	.....	do.....	.....	P-Pl-Q-M pegmatite, coarse grained in fine-grained pegmatite or granite.
Tabular.....	12 T.....	NE.....	SE.....	.....	Concordant.....	Hornblende gneiss biotite alteration.	.....	Pl-Q-P-M-B pegmatite, medium grained.
.....	.....	NE(?).....	SE(?).....	.....	.....	Hornblende gneiss.	Weathered.....	P-Pl-Q-B-M pegmatite, fine to medium grained. Poorly exposed.
.....	.....	.....	.....	.....	.....	Biotite gneiss.....	.....	P-Pl-Q-M pegmatite; accessory garnet. Workings along footwall of gneiss inclusion.
.....	.....	.....	.....	.....	.....	Mica gneiss.....	.....	Pl-P-Q-M pegmatite, fine to medium grained; accessory garnet, biotite. Poorly exposed.
Tabular(?).....	8 T.....	NE.....	SE.....	.....	Concordant.....	Hornblende gneiss; biotite alteration.	.....	Q-F-M pegmatite, accessory beryl. Poorly exposed.
do.....	5 T.....	NW.....	Vertical.....	.....	do.....	Mica gneiss.....	.....	Pl-Q-M pegmatite; accessory sericite, garnet, biotite. Cut entirely in kaolinized F-Q pegmatite.
Tabular.....	.....	NE.....	NW.....	SW.....	.....	Granite, hornblende gneiss.	.....	F-Q-M pegmatite.
Lenses.....	.....	NE.....	.....	.....	.....	Granite.....	Weathered.....	Pl-P-Q-M pegmatite, graphic texture common. Pegmatite forms lenses in pegmatitic granite (alaskite).
Tabular, lenses.....	15 T.....	N.....	45° E.....	.....	Concordant.....	Interlayered biotite and hornblende gneiss.	.....	P-Pl-Q-M pegmatite, medium to coarse grained, graphic texture common; some quartz pods. Many lenses present, 2 mined.
.....	10 T.....	NE.....	NW.....	.....	do.....	Mica gneiss.....	.....	Pl-Q-M wall zone, medium grained; accessory garnet; Q core. Q-M pegmatite (burr rock) on dump.
Tabular.....	30 T.....	NE.....	45° SE.....	.....	Discordant.....	Hornblende gneiss.....	.....	P-Q-Pl-M pegmatite; graphic texture common; accessory sericite, garnet.
do.....	2-4 T.....	NE.....	75° SE.....	.....	.....	Granite.....	Weathered.....	Kaolinized F-Q-M wall zone; accessory garnet; Q core, discontinuous.
.....	6-8 T(?).....	NW.....	Steep.....	.....	.....	.....	do.....	Kaolinized F-Q-M pegmatite. Contacts not exposed.
Irregular.....	1-10 T.....	.....	.....	.....	Discordant.....	Granite, interlayered hornblende and biotite gneiss.	Weathered (100 ft.).....	Kaolinized Pl-Q-M wall zone, medium to coarse grained; accessory garnet, sericite; Q core. Pegmatite in pegmatitic granite near gneiss inclusions. Pegmatite-granite contact gradational.
Lenses(?).....	4 T.....	E.....	.....	.....	Discordant.....	Interlayered hornblende and biotite gneiss.	Weathered.....	Q-F-M pegmatite, medium to coarse grained; accessory garnet. Feldspar kaolinized.
Lens.....	5 T, >250L.....	NW.....	SW.....	.....	.....	Granite and mica gneiss.....	Weathered (60 ft.).....	Kaolinized F-Q-M pegmatite, as associated with gneiss inclusion in larger mass of fine-grained pegmatite or granite (alaskite).
Tabular(?).....	.....	NE.....	SE.....	.....	Concordant(?).....	Mica gneiss.....	Weathered (55 ft.).....	Kaolinized F-Q-M pegmatite.
Tabular.....	1-10 T.....	NE.....	NW.....	.....	Gradational.....	Granite.....	.....	Pl-P-Q-M pegmatite, medium grained; accessory garnet.
Irregular.....	.....	NE.....	.....	.....	.....	Granite.....	.....	Pl-P-Q-M pegmatite graphic texture common, accessory garnet. Several bodies in fine-grained pegmatite or granite (alaskite) associated with gneiss inclusions.
.....	.....	NE.....	NW(?).....	.....	.....	do.....	.....	Pl-P-Q-M pegmatite, medium to coarse grained; associated with fine grained-pegmatite or granite (alaskite).

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 2	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>SPRUCE PINE AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
317	Cherry Tree group of mines.	USGS.....	Pre-WWII.....	Numerous shallow work-ings, cuts, adits, inclines.	.....	Feldspar.....
234	Chestnut Flat mine.....	USGS, Olson (1944, p. 58-60).	1915-45(?), int 1950's.	Large inclined stope 180 wide, 30-75 high, 750 long.	Green, "A" structure, wedged, bent, stained, concentrated near quartz core.	Large tonnage feldspar, quartz, scrap.
323	Childers (Boone, Chaik Mountain, Mason, Phillips) mine.	USGS DMEA...	1900, 1951, 1957-58.	Several adits, shafts stopes, cuts for 1,500 along strike, mined to 40 depth.	Dark green, clear, moderately cracked, bent.	Moderate sheet (1957).
324	Cliff prospect.....	USGS.....	1958.....	Cut 55 long, 5 deep.....	Green, stained, small.....	None.....
292	Connolly mine.....	DMEA.....	1900, 1953-55.....	Cut 180' long, 25 deep, shaft 80, drifts 120.	Ruby, moderately cracked, bent, ruled, minor stained.	Moderate, sheet, feldspar.
286	Davis mine.....	USGS, OF.....	1930, 1935.....	Cut 240.....	Brownish green to green, moderate "A" structure, fractured, ruled.	.....do.....
298	Deake (Dake) mine.....	USGS, OF.....	1882-1928, WWII.....	2 opencuts, 6 shafts, 2 adits, large inclined stopes in area 200 by 450.	Green to brownish green, "A" structure, clear, ruled. Concentrated along foot-wall and core.	Large sheet, feldspar.
293	Deer Park mines.....	Sterrett (1923, p. 252-254), Olson (1944, p. 51-54), OF.	1911-39, 1942-45, 1954.	No. 1, 2 cuts, total 110; No. 2, cut 265, incline 110; No. 3, cut 80, incline 110; adit 110; No. 4, cut 55, incline 180; No. 5, 2 cuts 120 and 150, 3 shafts, one 470 deep, stopes 600.	Green to greenish brown, flat and wedge "A" structure.	Large sheet, scrap, feldspar.
243	Dogwood Flats mine.....	USGS.....	Pre-WWII.....	3 cuts, trenches, prospect pits.	Stained.....	Feldspar.....
249	Lower Dogwood Flats mine.	USGS.....	Pre-WWII.....	Cut 60, prospect pits.....	Light green, ruled.....	.....do.....
315	Drawbar mine.....	USGS.....	1926, 1929, 1934.....	Adit and cuts for 200 along strike.	Light greenish brown, clear, moderate "A" structure, bent.	Moderate sheet.....
265	Duncan mine.....	USGS, CMC.....	1895, 1925, 1943.....	Cut and inclined stope 40 long and 35 deep.	Greenish brown, moderate "A" structure, cracked, clay stain.	Small sheet.....
231	John Duncan (Florence Young) mine.	USGS, CMC.....	1900, 1937, 1944.....	Adit 110; 4 shafts, 50 deep; drifts, prospect pits, 200 along strike.	Green, clay stained	Small sheet (1944);
241	Eagle Nest (Spread Eagle) mine.	USGS.....	Pre-WWII.....	2 cuts, stopes 20 by 40.....	.....	Feldspar.....
232	Hesby Edwards mine.....	DMEA.....	Pre-WWI, 1953, 1956.	Cut 60, incline 50, drifts 60.....	Ruby, hard, biotite intergrowths, bent, ruled.	Small sheet (1956). ruled.
237	Emily Knob mine.....	USGS.....	Pre-WWII.....	Cut and stope 60 long, 50 downdip.	Green, "A" structure, stained, concentrated near quartz pods.	Feldspar.....
238	Upper Emily Knob prospect.	USGS.....	WWII(?).....	Prospect pit.....	Light brown, minor "A" structure, bent, small.	Small sheet(?).....
276	English Knob mine North.	USGS, Sterrett (1923, p. 260-261).	1904, 1924, 1934-35, 1937.	2 cuts 100-150 long, 40-60 deep, and large stope.	Green, wedge and flat "A" structure, stained.	Moderate sheet(?), feldspar.
277	English Knob mine South.	USGS, Sterrett (1923, p. 261).	1904, 1924, 1930's, WWII.	Cut 150, stope; other cuts to west and east.	Light green, "A" structure, moderately stained.	.....do.....
322	Estatoe mine.....	USGS.....	Pre-WWII.....	2 shafts 30 deep, drifts.....	Green, "A" structure, stained, garnet inclusions.	Small sheet(?), feldspar(?).

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

SPRUCE PINE AREA—Continued

Mitchell County—Continued

Irregular pods, lenses.		NE				Granite		F-Q-M pegmatite, medium to coarse grained; several bodies associated with fine-grained pegmatite or granite (alaskite) and biotite gneiss inclusions.
Tongue	25-8 T, <180 wide, <750 long.	NE	SE	SE	Partly concordant.	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-M wall zone, medium to coarse grained; P-Q-M intermediate zone, coarse grained; Q core, 1-20 ft thick. Several parallel bodies above and below main mass.
Tabular lenses.	4-10 T, one 150 L.	NE	NW		Discordant	Granite	Weathered (35 ft.)	Pl-Q-P-M wall zone, medium to coarse grained, Q core. Several dikes present near west margin of large fine-grained pegmatite or granite body.
Tabular(?)	7 T	NE	NW		Discordant	Biotite gneiss	Weathered	Pl-Q-M pegmatite, fine grained.
Tabular	4-20 T, 300 L	NE	NW		Partly concordant.	Interlayered biotite and hornblende gneiss.	Weathered (40 ft.)	P-Pl-Q-M wall zone, coarse grained; accessory biotite, apatite, garnet, tourmaline; P core, coarse grained.
Lens(?)	4-60(?) T	NE	SE	SW	Discordant	Granite and mica gneiss.		P-Pl-Q-M wall zone; accessory beryl; Q core.
Tabular	4-20 T, <360 L	N	E		do	Granite and interlayered hornblende and biotite gneiss.	Weathered (15 ft.)	Pl-Q-P-M wall zone, medium grained; accessory garnet, biotite, columbite, vermiculite, allanite, apatite, uranium minerals; Q core with minor perthite crystals. Main pegmatite cut by late P-Q-Pl-M pegmatite.
Elongate lenses.	No. 1, 8-10 T; No. 2, 1-40 T; No. 3, 15 T; No. 5, 120 T, <600 L.	NE	SE	SW	do	Granite and interlayered biotite and hornblende gneiss.	Unweathered	No. 1: F-Q-M pegmatite. No. 2: Pl-P-Q-M wall zone; Q core, discontinuous. No. 3: Q-F-M pegmatite. No. 4: F-Q-M pegmatite. No. 5: Pl-P-Q-M wall zone, medium to coarse grained; accessory sulfides, uranium minerals; P core. Muscovite in discontinuous Q-M zone, near center of body. Contacts with granite (alaskite) gradational.
Lens	10 T	NE	SE		Concordant	Granite		F-Q-M pegmatites, poorly defined in fine-grained pegmatite or pegmatitic granite (alaskite).
Irregular bodies.	2 T	NE	SE			Biotite gneiss		F-Q-M pegmatite.
Tabular	4-5 T	NE	SE			Granite and hornblende gneiss.		Pl-Q-P-M pegmatite, coarse grained in fine-grained pegmatite or pegmatitic granite (alaskite).
Tabular(?)	15-20 T (in adit), 6-8 T (in shafts).	NE	SE		Concordant	Mica gneiss	Weathered (60 ft.)	Pl-Q-M wall zone, medium to coarse grained; Q core. Pegmatite poorly exposed but associated with gneiss inclusion in granite (alaskite).
Curved tabular.	4-10 T, 75 L	NE	SE		Partly concordant.	Hornblende gneiss.		Kaolinized F-Q-M pegmatite. Large body in adit contains scrap mica; sheet mica recovered from shafts.
Tabular	12 T	NE	SE		Concordant	Interlayered hornblende and biotite gneiss.		P-Pl-Q-B-M pegmatite; accessory vermiculite, epidote, thulite, calcite. Pegmatite jointed and fractured.
do	8 T	NE	SE		do	Biotite gneiss		Pl-Q-M-B pegmatite; accessory garnet, pyrite.
		NW	NE			Granite and interlayered hornblende and biotite gneiss.		P-Q-Pl-M pegmatite; accessory garnet, pyrite, vermiculite, zoisite.
Irregular	1-4 T(?)	NE			Partly concordant.	Interlayered biotite and hornblende gneiss and granite.		Pl-Q-P-M pegmatite, fine to medium grained.
						Hornblende gneiss.		P-Pl-Q-M pegmatite, coarse grained; accessory garnet, magnetite. Pegmatites in fine-grained pegmatite or granite (alaskite).
								P-Pl-Q-M pegmatite, coarse grained, may be zoned; accessory garnet.
								F-Q-M pegmatite, coarse grained, graphic texture; grades at depth into fine-grained pegmatite or granite.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>SPRUCE PINE AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
257	Flat Rock mine.....	USGS, Sterrett (1923, p. 250- 251), OF.	1872-1904, 1933-34..	Cut 150, shafts, adits, stopes in area 100 by 150.	Cinnamon brown to brownish green, hard, moderate "A" structure, garnet inclusions locky.	Moderate sheet, feldspar.
228	Gimbel mine.....	USGS.....	Pre-WWII.....	Cut 80, adit, underground workings.	Ruby, minor stain.....	Small sheet (1929).
247	Sim Gouge mine.....	USGS.....	Pre-WWII.....	Bench cut 175.....		Feldspar.....
245	Gouges Creek mine.....	USGS.....	1922-27, 1930, 1936, 1939, WWII.	Numerous pits and tunnels.	Light greenish brown, both clear and stained.	Large sheet.....
337	Grassy Creek (Hunger- ford, Wiseman, American Gem Co.) mine.	USGS, Kunz (1907).	1890-1905.....	Numerous shallow pits and adits.		Small beryl.....
308	Griffin mine.....	USGS.....	Pre-WWII.....	Open pits, shallow under- ground workings.	Green, "A" structure, moderate stain.....	
288	Gudger mine.....	USGS, OF.....	1895, 1925, WWII, 1950's.	Cut 100, 3 shafts 70 deep, drifts, prospect pits 250 along strike.	Yellowish to brownish green, flat and flat "A" structure, moderately cracked.	Moderate sheet (WWII).
313	Guy mine.....	USGS.....	1926-28, 1931.....	Cut 200 long, 10 deep; cut 50.	Brown, clear.....	Moderate sheet.....
266	Hawkins mica mine.....	USGS.....	1882-89, 1917, 1923- 26, 1930.	Cut 200, caved adit, prospec- t pits. Large cuts to south for feldspar.	Brownish green, flat "A" structure, commonly stained.	do.....
281	Henline mine.....	USGS.....	1922-23.....	3 narrow cuts.....	Green, "A" structure, concentrated near quartz core; greenish brown in wall zone.	do.....
294	Hickey mine.....	USGS, CMC.....	1920, 1940, 1943- 44.	Several cuts in belt 400 long.	Greenish-brown, "A" structure.....	Small sheet (1943), feldspar.
244	Hickory Flat mine.....	USGS.....		Cuts, irregular tunnels, caved.	Green, clear, cracked, small.....	Small sheet(?), feldspar.
320	Hoppus mines: Northeast.....	USGS.....	Pre-WWII.....	Cut 100, extensive shallow workings in belt 200 long.	Light green to light brown wedge "A" structure, ruled, cracked, small.	do.....
321	Southwest.....	USGS.....	Pre-WWII.....	2 cuts 30-90 deep in belt 300 long.	Brownish green, reeved, ruled, bent, cracked, stained.	Feldspar, by- product mica.
285	Horton (Gudger) mine....	USGS.....	Pre-WWII.....	Series of shafts and shallow cuts 600 long, deepest 75(?).	Green.....	
284	Cling Howell mine.....	USGS, CMC.....	1939, WWII.....	3 shafts, 4 adits.....	Light brown, cracked.....	
256	Jase mine.....	USGS, CMC, OF.	1905, 1930, 1943- 44.	2 pits, 2 shafts, 3 adits, drifts, prospect pits in area 150 by 250. Deepest workings 120.	Brown, clear, minor ruling and cracks...	Moderate sheet (1944).
268	Jeff Cut mine.....	USGS.....	WWII.....	Cut 90 long, 30 deep.....	Light green to brownish green, moderate reeves, cracks, ruling, bending. Bio- tite intergrowths.	Small sheet.....
271	Jimmy Cut mine.....	USGS, OF.....	1916-18, 1921, WWII, 1950's.	Cut 150 long, 10-50 deep, opens into stope 160 deep.	Brownish green clear, minor haircracks. small.	Large sheet.....
334	Theo Johnson mine.....	USGS, CMC.....	1944.....	2 adits, drifts in area 70 by 90.	Green, ruled, small.....	Small sheet.....
290	Kaolin Ridge mine.....	USGS.....	Pre-WWII.....	3 cuts.....	Green, "A" structure, mostly scrap.....	Feldspar.....
267	Klondike mine.....	USGS.....	1902.....	Cut 160, caved underground workings.	Green, stained.....	
314	Luke Lewis mine.....	USGS.....	Pre-WWII.....	Cut 60 diameter, 30 deep....	Pale green, minor stain.....	
236	Mitch Lincoln mine.....	DMEA.....	1956-57.....	Inclined shaft 105.....	Brownish green, reeved, locky, cracked, stained.	Small sheet.....
283	Little Bear Creek mine....	USGS.....	Pre-WWII.....	Inclined stope 45 long, 15 wide.	Greenish brown, haircracked.....	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

SPRUCE PINE AREA—Continued

Mitchell County—Continued

Irregular, tabular.	2-15 T	NE	SE		Partly concordant.	Granite and mica gneiss.		Pl-Q-M wall zone, fine to coarse grained; P-Q-M intermediate zone; Q core. Accessory garnet, biotite, apatite, beryl, thulite, uraninite. Pegmatite contacts with granite gradational.
Pinch and swell.	15 T avg.	NW	SW		Concordant.	Hornblende gneiss. Granite and mica gneiss.		P-Pl-Q-M-B pegmatite, coarse grained.
					Gradational.	Granite.	Weathered	F-Q-M pegmatite in fine-grained pegmatite or granite. Gneiss inclusions in granite. Prominent northeast joints.
						Mica gneiss.	do	P-Pl-Q-M pegmatite, coarse grained; accessory garnet, thulite, uranium minerals. Plagioclase kaolinized.
Irregular.						Granite.		F-Q-M pegmatite, coarse grained, gradational contacts with large mass of fine-grained pegmatite or granite. Mica gneiss inclusions.
Tabular(?)		NE	SE	SW	Gradational.	do	Unweathered	Pl-Q wall zone, Pl-P-Q-M intermediate zone, coarse grained; Q core. Flat "A" muscovite along core margins.
Irregular.		NE				do		Pl-Q-P-M pegmatite; accessory garnet.
Lenses.	0.5-4 T	NW	SW		Concordant.	Mica gneiss.	Unweathered	Pl-P-Q-M pegmatite, fine to medium grained; accessory garnet, apatite. Large pegmatites in granite to south mined for feldspar.
		NE	NW			Granite and mica gneiss.		P-Q-Pl-M wall zone; Q core discontinuous. Pegmatite contacts with granite partly gradational.
Tabular(?)	20 T	NE	SE			Mica gneiss.		P-Q-Pl-M pegmatite, coarse grained; graphic texture common; accessory garnet, uraninite, gummite, autunite.
								P-Pl-Q-M pegmatite; accessory garnet, thulite, uranium minerals.
Tabular.		NE	SE		Discordant.	Biotite gneiss.		Pl-P-Q-M pegmatite, fine to medium grained.
do	30 T	N	Vertical		Concordant.	do		Pl-Q-M-P wall zone, medium grained; P-Pl-Q intermediate zone, coarse grained; P-Q core, coarse grained; accessory beryl, apatite, spessartite, tourmaline, columbite-tantalite, smarskite(?), uranophane(?), sericite.
Tabular(?)		NE			Gradational.	Granite.	Weathered	Pl-Q-P-M pegmatite, coarse grained accessory garnet.
Irregular.	4 T (avg)	NE	SE			Granite and mica gneiss.	do	F-Q-M pegmatite bodies along inclusions of gneiss in granite or alaskite.
Flattened pipe.	10-30 T, 250 L	NE	SE	SW	Concordant.	Mica gneiss.	Weathered (25 ft).	Pl-Q-P-M wall zone, medium to coarse grained; accessory garnet, thulite, sulfides; Q core. Gneiss inclusions common.
Pinch and swell.	3-5 T, >90 L	NE	NW			Granite.	Unweathered	Pl-Q-P wall zone, fine grained; Pl-Q-P-M core, coarse grained; accessory garnet, allanite, biotite.
Irregular, tabular.	1-10 T	NE	NW			do	do	Pl-Q-M-P pegmatite; accessory garnet. Plagioclase ranges from An <sub>3</sub> to An <sub>1</sub> .
Tabular.	2-4 T	NW	NE			do	Weathered	Kaolinized F-Q-M pegmatite.
Tabular(?)		NE	SE		Concordant(?)	Mica gneiss.		Pl-Q-P-M pegmatite, medium grained, accessory garnet.
Tabular(?)	25 T	NE	SE		Concordant.	Biotite gneiss.		F-Q-M pegmatite, fine to coarse grained.
Irregular.						Granite.		F-Q-M pegmatite, coarse grained in granite or fine grained pegmatite. Pegmatite near mica gneiss inclusion.
Irregular, tabular.	6-15 T, 100 L	N	W	SW	Partly concordant.	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-M wall zone fine to coarse grained; P core, coarse grained; accessory garnet, apatite.
Irregular, elongate, masses.					Gradational.	Granite.		P-Pl-Q-M pegmatite, coarse grained; accessory garnet, allanite, thulite.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>SPRUCE PINE AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
287	Long Cut mine.....	USGS, CMC, OF.	1895, 1925, 1944....	Cut 145 long, 20-60 deep; stope 80.	Brownish green, clear, minor locky, cracked, ruled.	Moderate sheet (1944).
259	Lower Bear Creek mine...	USGS.....	Pre-WWII.....	2 cuts 30 to 50 long, 10-25 deep.	-----	Feldspar.....
254	Ed McBee.....	USGS, CMC.....	1906, 1944.....	Cut 90 long, 15 deep, incline 20.	Brownish green, reeved, mineral inclusions, cracked, stained.	Small sheet (1944).
329	McChone-East mine.....	USGS, Sterrett (1923, p. 258).	Pre-WWII.....	8 adits and inclines, 600 along strike.	Green stained.....	Small sheet(?).....
328	McChone-West mine.....	USGS.....	Pre-WWII.....	5 shafts, stopes, adit.....	Green, "A" structure, stained, ruled....	Scrap feldspar.....
250	McClellan mine.....	USGS.....	1900, WWII.....	Cut 125 long, 15-20 deep.....	Green, "A" structure, stained.....	Small sheet (WW-II).
327	McHone mine.....	USGS.....	1910, 1946, 1955-57....	3 adits, small stope in area 50 by 180.	Green, ruled, bent, stained.....	Small sheet (1950's).
258	Miller mine (near Penland).	USGS.....	1880, 1921, 1936-37, 1943-44.	Cut 60 long, 10-25 deep, stope 50 wide, 75 deep, drifts, adit, shaft.	Brown, moderate "A" structure, commonly stained.	Moderate sheet....
312	Miller mine (west of Spruce Pine).	USGS.....	1895-1900, 1934, 1943-44.	Cuts, shafts, stopes, adit 100, with inclined stope.	Light brown, clear, moderate "A" structure, locky, minor bent.	-----do.....
252	Negro mine.....	USG.....	Pre-WWII.....	Put 75, adit 100.....	Brown, "A" structure.....	-----
233	Norman mine.....	USGS.....	WWII.....	Cut 25, shaft 30.....	Ruby, clay stained, quartz inclusions, small.	Moderate sheet....
291	Number Twelve mine.....	USGS.....	1900, 1937, 1940....	Incline adit, shaft, stope 45, 2 open cuts.	Brownish green, flat and wedge "A" structure, moderate stain.	Moderate sheet, feldspar.
259	Pegram mine.....	USGS.....	1939-40.....	Small pits and cuts, 2 adits, extensive underground workings.	Green, "A" structure; brown.....	-----do.....
302	Peterson mine.....	USGS.....	1925-39, 1950's.....	Open cut 600 long, 30 wide, 25 deep. Several shafts, inclines, adit 290.	Green, "A" structure, cracked, bent, stained.	Large sheet, feldspar.
253	Pine Mountain mine.....	USGS.....	1927, 1935, 1937, 1945.	Cut 220 long, 100 wide, 80 deep. Other cuts, shafts, stopes, adits, in belt 1,600 long.	Green flat and wedge "A" structure, tied, stained.	Moderate sheet, large scrap, feldspar.
278	Pink mine.....	USGS.....	1929, 1934-39.....	Cut with inclined stope 200 long, 40 wide.	Green, moderate "A" structure.....	Moderate sheet, feldspar.
274	Audie Pitman prospect....	USGS.....	1955.....	Prospect pits.....	Green, clear, minor "A" structure, cracked, small.	Small sheet.....
264	Mary Pitman ("A") mine.	USGS.....	1925-27.....	3 cuts, 150 to 200 long, 35-40 wide, in belt 900 long.	Greenish brown, common "A" structure, stained.	Moderate sheet, feldspar.
319	Poteat (Old Bursleson) mine.	USGS, DMEA...	1914, 1917-20, 1930, 1939, 1955.	6 shafts, cut 200 with incline 200.	Green, "A" structure, garnet inclusions..	Large sheet.....
318	Henry Poteat mine.....	USGS.....	1932-33, 1942, 1944-45.	Cut 250 long, 5-85 deep, drifts, stopes, prospect pits.	Greenish brown near walls, green "A" structure near core, stained, mineral inclusions, locky, cracked, ruled.	Moderate sheet, feldspar.
255	Putman mine.....	USGS, OF.....	1920, 1923, 1935-39, WWII.	Putman Cut 140, stope 250, prospect pits in area 200 by 300; Phillips Cut 90, stope 100 by 100, small cuts and pits in area 100 by 250.	Brown, mostly clear, some "A" structure and stained.	Large sheet, feldspar.
335	Queen mine.....	USGS.....	Pre-WWII.....	35 small adits in area 200 by 500.	Dark green, "A" structure, soft, cracked..	-----
275	Raven Cliff mine.....	USGS.....	WWII.....	Cut 400 long, 4-8 wide.....	Pale green, minor "A" structure, moderate ruling, cracks, stain, small.	Large sheet.....
309	Renfro mine.....	USGS.....	Pre-WWII.....	2 cuts, 30-50 long, 10-12 deep.	Greenish, brown "A" structure, stained..	-----
310	Renfro prospect.....	USGS.....	1939.....	Cut, stope, winze 15.....	Green.....	Sheet, feldspar.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

SPRUCE PINE AREA—Continued

Mitchell County—Continued

Tabular	1-10 T, 300 L	NE	Steep		Discordant	Granite	Unweathered	Pl-P-Q-M wall zone, fine to coarse grained; accessory garnet, apatite; Q core, discontinuous. Pegmatite cuts banding in granite.
						do	Weathered	F-Q-M pegmatite, coarse grained in granite or fine grained pegmatite.
Tabular	10 T	NW	Vertical		Concordant	Mica gneiss	Unweathered	Pl-Q-M pegmatite, medium grained; accessory biotite, garnet, apatite, sericite.
Irregular	1 T	NE	NW			Granite	Weathered	Q-P-Pl-M pegmatite; accessory beryl, spodumene.
						Mica gneiss		F-Q-M pegmatite.
Tabular(?)	25 T	NE	SE		Concordant	do		F-Q-M pegmatite, fine grained; pods and stringers of coarse-grained pegmatite in the fine grained; accessory garnet.
Tabular	15 T(?), 200 L	NE	NW			Granite	Partly weathered (10 ft).	Pl-Q-M wall zone, fine to coarse grained; P-Pl-Q-M core.
Tabular(?)	45 T	NE	SE		Partly concordant	Mica gneiss (hanging wall), granite (foot-wall).		Pl-P-Q-M wall zone, medium to coarse grained; accessory garnet; Q core.
Irregular	3-8 T	NE	SE			Granite		Pl-Q-P-M wall zone, coarse grained; accessory garnet; P-Q core discontinuous.
		NE	SE			do		Pl-Q-M pegmatite, coarse grained, graphic texture, in granite with mica gneiss inclusions.
Tabular	2-3 T	NW	SW		Concordant	Mica gneiss	Partly weathered.	Pl-Q-M pegmatite.
Irregular		NE	SE			Granite		P-Q-Pl-M pegmatite, fine to coarse grained.
						do		Q-F-M pegmatite.
Tabular(?)	8-T avg	NE	SE		Gradational	do	Weathered	Pl-Q-P-M pegmatite, coarse grained; accessory garnet, thulite. Only small bodies exposed in walls of cut.
Irregular, tabular.		NE	SE	SW		Granite and inter-layered biotite and hornblende gneiss.		P-Pl-Q wall zone, coarse grained; graphic texture common; accessory garnet, granite, torbernite, autunite, allanite; Q core, discontinuous. Numerous coarse-grained pegmatites in granite, many near granite-gneiss contact.
		NE	SE		Gradational	Granite		P-Pl-Q-M pegmatite, coarse grained; accessory garnet, thulite, allanite, samarskite, columbite-tantalite, sulfides.
Tabular	1-1.5 T, 250 L	N	Gentle E		Concordant	Biotite gneiss		Pl-P-Q-M wall zone; accessory garnet; Q core, discontinuous.
do	>10 T, 900 L(?)	NW	SW		Gradational	Granite		F-Q-M pegmatite, coarse grained, grades into granite or fine grained pegmatite on hanging wall. Foot-wall not exposed. Muscovite in rosette concentrations.
Tabular bodies.	12 T	N	W			Granite and mica gneiss.	Weathered (65 ft).	P-Q-Pl-M pegmatite, coarse grained; accessory garnet. Several pegmatites present, some near granite-gneiss contact.
Tabular	20 T, 300 L	NE	Vertical		Gradational	Granite		Pl-Q-P-M wall zone, medium grained; P-Pl-Q-M intermediate zone, coarse grained, discontinuous; Q core, discontinuous, accessory sericite, garnet.
do	5-30 T	N	W		do	do		Pl-Q-P-M wall zone, coarse grained; P-Pl-Q intermediate zone, coarse grained, graphic texture common; Q core; accessory biotite, garnet, thulite. Zones generally discontinuous. Pegmatite locally concordant to mica gneiss inclusions in granite.
Irregular masses.					do	do		Pl-P-Q-M pegmatite, coarse grained.
Lens	0.5-4 T	NE	SE		Concordant	Mica gneiss	Unweathered	Pl-Q-M pegmatite, fine to medium grained; accessory garnet, biotite, sericite.
Irregular masses.					Gradational	Granite		F-Q-M pegmatite, coarse grained.
						do		Do.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>SPRUCE PINE AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
269	Riddle mine group (Miller, Roy Wiseman mine) east of Sullins Creek.	USGS.....	WW II.....	6 large cuts. One (Miller) 100 long, 60 deep.	Light green, small.....	Moderate sheet (Miller cut), feldspar.
251	Riddle mine (near Howston Gap).	USGS.....	Pre-WWII.....	4 cuts, 30 diameter, in line 300 long.	Green, small.....	
316	Calhoun Smith mine.....	USGS.....	1918, 1920.....	Cuts, caved shallow stopes, adit 90.		Moderate sheet, feldspar.
299	Jasper Smith prospect.....	DMEA.....	1955.....	Cuts in area 80 by 150, shaft 10.	Green, cracked, stained.....	Small sheet.....
301	Lissie Smith (E. K. Sparks) mine.	USGS, DMEA.....	1895, 1924-39, 1955.	10 shafts 40 to 84 deep, 4 adits, stopes.	Dark green, "A" structure, stained, cracked.	Large sheet, feldspar.
246	Soft Ridge mine.....	USGS.....	Pre-WWII.....	3 cuts, one 70 long, 45 deep, 3 adits.		Feldspar.....
300	Ken Sparks mine.....	USGS, CMC.....	1925-30, WWII.....	Cut 60, inclined shaft 40, 2 adits 60 in area 75 by 150.	Green, "A" structure, cracked, tied, clay stain.	Small sheet (WWII).
295	Rube Sparks (Cook) mine.	USGS, DMEA.....	1900 int to 1925, WWII, 1955.	Cut 40, 3 adits, shaft 145, large stopes 150.	Green, flat and wedge "A" structure, garnet inclusions.	Moderate sheet (WWII), feldspar.
229	Sugar Tree Cove mine.....	USGS.....	1925-26.....	Cut, with inclined stope 180; 2 cuts about 500 east.	Green, wedge "A" structure, stained, ruled, garnet inclusions.	Moderate sheet, Feldspar.
230	Lower Sugar Tree Cove mine.	USGS.....	Pre-WWII.....	Cut 80 long, 30 deep.....	Ruled, bent.....	Feldspar.....
272	Sullins Rock mine (Irby Cut).	USGS, CMC.....	1880-97, 1930, WWII.	Cut 75 long, 50 deep, 2 smaller cuts to north.	Greenish brown, clear.....	Large sheet (re-ported). Mod-erate sheet (1930, WWII).
307	Westall mine.....	Sterrett (1923, p. 257), USGS.	1876 int to 1914.....	Cut 50, shaft, stope, adit.....	Greenish brown, "A" structure.....	
297	Bill Willis mine.....	Sterrett (1923, p. 256), USGS.	1906, WWII.....	Cut 125, incline, adit, stope.	Brown, minor stain; green, "A" structure, garnet inclusions.	Small sheet (WWII).
279	W. W. Wiseman mine.....	Sterrett (1923, p. 258-260), USGS, OF.	1875 int to 1936, WWII.	Cut 300 long, 10-130 deep; adit and stopes below.	Green to brownish green, commonly stained.	Large sheet, feld-spar.
280	Wiseman No. 2 mine.....	USGS.....	WWII, 1955.....	Adit and stope 90, shaft 65, drift 60.	Green, "A" structure, moderate ruling, cracking, bending.	Moderate sheet.....
240	Wolfden mine.....	USGS.....	Pre-WWII.....	3 cuts, 35 to 170 long.....	Sparse.....	Feldspar.....
270	Woody Spar mine.....	USGS.....	1916-18.....	Cut 160, adit 100.....	Scrap.....	do.....
331	S. S. Young mine.....	USGS, CMC.....	1910, 1917-18, 1943-44.	Cut and pits 200, 2 adits 40 and 60.	Green, "A" structure, mineral inclu-sions, cracked, stained.	Moderate sheet (WWII).
235	Zimmerman mine.....	USGS, CMC, DMEA.	1895 int to 1943, 1952.	Series of shafts and con-nected works 175 along strike. Deepest 95.	Green, "A" structure, bent, mineral inclu-sions.	Small sheet (WWII).
<b>KONA-LEDGER AREA</b>						
<b>Mitchell County</b>						
354	A very prospect.....	DMEA.....	1957-58.....	Shaft 54, drift 11.....	Greenish brown, commonly stained, minor bending, ruling.	Small sheet.....
387	Old Ben mine.....	USGS.....	1890, WWII.....	Cut 50 long, 20 deep, shaft.....	Light brown, reeved, moderately stained, small.	Small sheet(?).....
403	Big Ridge mine.....	DMEA.....	1957-58.....	Inclined shaft 52, drift 58.....	Light greenish brown, minor reeves, stain, bending.	Small sheet.....
356	Bill prospect.....	DMEA.....	1956-57.....	Trench 50, cut 30, shaft 50, drift 57.	Green, stained, cracked, bent, small.	None.....
349	Billy prospect.....	USGS.....	1956.....	Prospect pit 6.....	Ruby, biotite intergrowths, stained, small.	do.....
393	Black (Old Dave Silvers) mine.	USGS.....	1867 int to 1925, 1939-40.	Shaft 30, shaft 60, drift; several pits and caved workings.	Green, clear; brown, stained, moderate "A" structure.	Moderate sheet.....
371	Black mine (on Rebels Creek).	USGS.....	Pre-WWII.....	Several cuts and adits.....	Smoky brown, "A" structure, stained, ruled.	Moderate scrap.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

SPRUCE PINE AREA—Continued

Mitchell County—Continued

Tabular		NE	SE		Gradational	Granite		F-Q-M pegmatite, coarse grained.
Stringers(?)						Mica gneiss		Pl-P-Q-M pegmatite, poorly exposed. Hyalite coats irregular fractures and northeast-trending joints.
Tabular	2-8 T, >100 L	NE	Vertical		Concordant	Mica schist	Weathered (40 ft).	Pl-Q-P-M pegmatite; accessory beryl, samarskite, pink mica.
Tabular(?)	15 T (avg), 1,000 L(?)	NE	20° SE		do	Interlayered hornblende and biotite gneiss.		Pl-P-Q-M pegmatite, medium grained.
					Gradational	Granite		Pl-Q-M wall zone(?); P-Q core(?), graphic texture, discontinuous; accessory garnet.
Tabular	10-15 T, 150 L	NE	SE		Concordant	Biotite gneiss		P-Q-Pl-M pegmatite; accessory garnet.
Elongate lens.	11-45 T	N	Vertical	S	Gradational	Granite and interlayered hornblende and biotite gneiss.	Weathered	Pl-Q-M pegmatite, fine to medium grained; accessory biotite, sericite, garnet.
Tabular(?)	30 T, 850 L(?)	E	S		Discordant	Interlayered hornblende and biotite gneiss.		Pl-P-Q-M wall zone, medium to coarse grained; accessory garnet; Q-P core; Pl-Q-M-P pegmatite fine grained, fracture fillings. Some graphic texture. Gneiss inclusions common in granite nearby.
		NE	SE		Concordant(?)	Mica gneiss		P-Q-Pl-M pegmatite, coarse grained.
Tabular(?)	1-10 T	NE	NW		Gradational	Granite	Unweathered	P-Q-M pegmatite with large masses of perthite, graphic granite, and quartz.
Tabular	15 T	NW	SW		Concordant(?)	Interlayered biotite and hornblende gneiss.		Pl-P-Q-M pegmatite, medium grained; accessory garnet.
Irregular	8 T	NW	SW	SE	Gradational	Granite		F-Q-M wall zone, medium to coarse grained; Q core. Poorly exposed.
Tabular, branching.	10-50 T	NE	NW			do	Weathered	Pl-Q-M wall zone, medium grained; P intermediate zone, coarse grained; Q core.
Tabular, anticlinal.	5-15 T	NE	NW., SE	NE	Concordant	Mica schist		Pl-P-Q-M wall zone, medium to coarse grained; P-Pl-Q-M intermediate zone, coarse grained; Q core, discontinuous. Accessory cleavandite, garnet, samarskite, uranium minerals. Epidote, zoisite and thulite in fracture fillings.
	35 T	NE	NW			Mica gneiss		Pl-Q-M pegmatite, medium to coarse grained; accessory garnet, apatite.
Irregular						Granite		F-Q-M pegmatite, graphic texture common.
Tabular	>16 T	NW	SW		Concordant	Mica gneiss	Weathered (15 ft).	Pl-P-Q pegmatite; accessory muscovite.
do	1-2 T	NE	Vertical		do	do	Saprolite (93 ft).	Pl-Q-P-M wall zone, fine to medium grained; accessory garnet, zoisite, thulite; Q core, discontinuous. Kaolinized F-Q-M pegmatite, fine to medium grained.

KONA-LEDGER AREA—Continued

Mitchell County—Continued

Irregular, tabular.	0-3 T, 100 L	NE	SE	SW	Concordant	Mica schist	Weathered (25 ft).	Pl-Q-P-M pegmatite, fine to medium grained; accessory biotite, sericite.
Tabular	8 T (avg)	NW	SW		do	Mica gneiss		Pl-Q pegmatite; accessory muscovite, biotite, garnet.
Irregular, tabular.	0.1-4 T	NE	SE	SW	Partly concordant.	do	Weathered (15 ft).	Pl-Q-M wall zone; accessory garnet; Q core, discontinuous.
Tabular, pinch and swell.	0.5-7 T	NE	SE		Concordant	Biotite gneiss	Weathered	P-Q-Pl-M pegmatites; accessory garnet. Locally, quartz in thin parallel layers.
Tabular	4 T	NW	SW		do	do	Unweathered	P-Pl-Q-M pegmatite, fine to medium grained; accessory biotite.
Lenses	4 T	NE	SE		Concordant(?)	Interlayered hornblende and biotite gneiss.		P-Pl-Q-M pegmatite, poorly exposed.
Tabular	3 bodies 10-12 T.	NE	SE		Partly concordant.	do		P-Pl-Q-M pegmatite, graphic texture common; accessory garnet, biotite, vermiculite; Q-M core present in lower cut.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>KONA-LEDGER AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
351	J. W. Boone prospect.....	DMEA.....	1955.....	Inclined shaft 40, drifts 60.....	Green, stained, small.....	None.....
409	Sol Boone mine.....	USGS.....	.....	3 adits, shaft.....	Green, clear, small.....	.....
340	Jake Buchanan mine.....	Sterrett (1923, p. 249), USGS.....	1875, 1923.....	Cut 40, caved area 80, several adits, shaft 25.....	Green, moderate "A" structure, stained.....	Moderate sheet.....
373	Old Buchanan mine.....	DMEA.....	Pre-WWII, 1948, 1955-57.....	Cut 150 long, 25 deep, 2 inclined shafts 60, drifts 100.....	Greenish brown, biotite intergrowths, common bending, ruling, reeving.....	Small sheet.....
402	Charles prospect.....	USGS.....	1957.....	Trench 80.....	Green, clear, minor cracking, bending, reeving; small.....	None.....
381	Charlie prospect.....	USGS.....	1956.....	Prospect pit.....	Green, mineral inclusions, bent, small.....	.....do.....
361	Bill Conley prospect.....	USGS.....	Pre-WWII.....	2 small cuts.....	Brown, vermiculite intergrowths, bent, stained, small.....	.....
405	Jim Conley mine.....	USGS.....	Pre-WWII.....	Cut 40, adit.....	"A" structure, small.....	Feldspar(?).....
350	John Conley mine.....	DMEA.....	1955-56, 1960.....	Inclined shaft 50, drift 85.....	Green, "A" structure, moderately bent, ruled.....	Moderate sheet.....
365	Dinkey Line prospect.....	DMEA.....	1908, 1942, 1957.....	Cut 110 long, 10 deep.....	Greenish brown, hard, bent, small.....	None.....
370	Ed prospect.....	DMEA.....	1956.....	Cut 90 long, 5 deep, in-clined shaft 60, drifts 83.....	Ruby, clear, moderate staining, bend-ing; small.....	Small sheet.....
392	John Ellis mine.....	USGS.....	1937, 1943.....	Cut 30 long, 25 deep; shaft 25, drift.....	Light brown, reeved, stained, small.....	Small sheet (1943).....
400	Fate mine.....	USGS.....	Pre-WWII.....	3 shafts, 2 adits.....	Smoky brown, stained.....	.....
379	Forney prospect.....	USGS.....	1956.....	Cut 80.....	Greenish brown, stained, small.....	None.....
352	Frank prospect.....	USGS.....	1956.....	Cut 30 long, 8 deep.....	Green, stained, bent.....	Small scrap.....
391	George prospect.....	DMEA.....	1955-56.....	Cut 50, 2 adits, drift 92, prospect pits.....	Green, cracked, bent, small.....	Small sheet.....
358	W. G. Geouge prospect.....	DMEA.....	1958.....	Adit 76, prospect pits.....	Green, stained.....	.....do.....
367	George Green mine.....	USGS.....	Pre-WWII.....	Cut 80 long, 35 deep.....	Rare.....	Feldspar.....
408	Gibbs Green mine.....	USGS.....	1906, int to 1944.....	5 adits, drifts, 2 shafts in area 100 by 400.....	Green, moderately stained.....	Small sheet (1944).....
378	Greene prospect.....	DMEA.....	1956.....	Cut 120 long, 15 deep, 2 prospect pits.....	Green, flat and wedge "A" structure, stained.....	None.....
357	Walter Grindstaff mine.....	DMEA.....	1955.....	Cut 125 long, 4 deep, in-cline 16.....	Green, clear, hard, cracked.....	Small sheet.....
401	Grover prospect.....	DMEA.....	1956.....	Cut 125 long, 5 deep.....	Green, commonly bent, stained, small.....	.....do.....
366	Hectorfield mine.....	USGS.....	1905, 1956.....	Trench 150 long, 15-35 deep.....	Rum, hard, commonly stained, small.....	.....
362	Hensley prospect.....	DMEA.....	1955-57.....	Cut 250 long, 15 deep; 2 inclines 35-65, small stope, drifts 80.....	Ruby, minor "A" structure, stained.....	Small sheet.....
348	Howard prospect.....	DMEA.....	1956.....	Adit and crosscut 112.....	Green, stained, small.....	None.....
377	Howell mine.....	USGS.....	1956.....	2 cuts 70 long, 4-15 deep.....	Rum, hard, stained, ruled, cracked, bent, small.....	.....
376	Jeff Howell mine.....	USGS, OF.....	1875 int to 1917, 1925, 1937-38, 1943-45, 1954-55.....	Several large cuts, adits, drifts, inclines and stopes in area 200 by 400 and 200 deep.....	Brownish green, moderate bending, minor "A" structure, stain. Con-centrated in rolls and near gneiss inclusions.....	>35,000 lb sheet and punch. Feldspar.....
384	Hoyle and Sparks prospect.....	USGS.....	1957.....	2 prospect pits 10-30.....	Green, bent, cracked, small, stained.....	None.....
388	John Hoyle (John Hall, Jobe Willis) mine.....	USGS.....	1880's, WWII, 1955-57.....	Cut 30 diameter, shaft 20, drift 10.....	Brownish green, moderate "A" struc-ture, minor bending, ruling, tied.....	Small sheet.....
383	Hoyles prospect.....	USGS.....	1955.....	Trench 150 long, 6-10 deep.....	Green, stained, bent.....	None.....
389	J. K. Irby mine.....	DMEA.....	1900, 1956.....	2 trenches 95-110 long, 3-8 deep. Caved shaft, adit, pits.....	Greenish brown, commonly stained.....	.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

KONA-LEDGER AREA—Continued

Mitchell County—Continued

Tabular.....	1-3 T, >65L.....	NE.....	SE.....		Concordant.....	Interlayered biotite and hornblende gneiss.	Unweathered.....	Pl-Q-M pegmatite, medium to coarse grained; accessory sericite.
Lens(?).....						Mica schist.....	Weathered.....	No pegmatite exposed.
Lenses(?).....		NE.....	SE.....		Concordant.....	Mica gneiss.....	do.....	Pl-P-Q-M wall zone; accessory beryl, apatite, garnet, monazite, uranium minerals (reported); graphic texture common; Q core. Several similar bodies present. First mined by the Indians.
Tabular.....	Several bodies 1-7 T.....	NE.....	SE.....		Partly concordant.....	Interlayered biotite and hornblende gneiss.	Saprolite (25 ft).....	Pl-P-Q-M pegmatite, medium to coarse grained; accessory apatite, garnet, sericite, biotite, epidote. Southeastern body has Pl-Q-M wall zone, P-Q core.
Lenses.....	1.5 T, 5 L.....	NE.....	SE.....		Concordant.....	Mica schist.....	Weathered.....	Pl-Q-M pegmatite, fine grained.
Lens.....	5 T, 30 L.....	NE.....	SE.....			Mica gneiss.....	Unweathered.....	Pl-P-Q-M pegmatite, fine grained.
Tabular(?).....		NE.....	SE.....		Concordant(?).....	do.....		P-Pl-Q-M pegmatite, medium grained; graphic texture common.
Tabular.....	30 T(?), >275 L(?).....	NE.....	SE.....		do.....	do.....		P-Q-M pegmatite, fine to medium grained.
Pinch and swell.....	1-4 T, >90 L.....	NE.....	SE.....		Concordant.....	Interlayered biotite and hornblende gneiss.	Unweathered.....	Pl-Q-P-M pegmatite, coarse grained; accessory garnet, pyrite.
Irregular, tabular.....	15 T, >65 L.....	NE.....	SE.....		Partly concordant.....	do.....	Saprolite.....	P-Pl-Q-M pegmatite, medium to coarse grained.
Tabular.....	3-6 T.....	N.....	E.....		Concordant.....	Mica gneiss.....	Weathered.....	Kaolinized F-Q-M pegmatite; accessory biotite, sericite.
Irregular.....	6-8 T.....	NE.....	SE.....		Partly concordant.....	do.....		Pl-Q-P-M pegmatite.
Tabular.....	Thin.....	NE.....	SE.....	NE.....	Concordant.....	Interlayered biotite and hornblende gneiss.		Pl-Q-P-M pegmatite. "A" mica obtained from another body in adit to northwest of shafts.
do.....	3-4 T.....	NE.....	SE.....		do.....	Biotite gneiss.....		Pl-Q-M pegmatite, medium grained.
do.....	2 bodies, 3-5 and 2 T.....	NE.....			do.....	Mica schist.....	Weathered.....	Kaolinized F-Q-M pegmatite. Near Susie mine.
Irregular.....	4-6 T, >110 L.....	NE.....	SE.....		do.....	Interlayered biotite and hornblende gneiss.	do.....	Kaolinized Pl-P-Q-M-B pegmatite. Muscovite along hanging wall, biotite along footwall. Graphic texture common.
Tabular, lenses.....	3 bodies, 2-6 T.....	NE.....	SE.....		do.....	Mica schist.....	do.....	Pl-Q-M wall zone, medium grained; P-Q core, medium grained.
Tabular.....	20 T.....	NE.....	SE.....		do.....	Biotite gneiss.....		P-Q-Pl-B-M pegmatite, fine to coarse grained; accessory garnet, vermiculite.
Lenses.....	3 T, 20 L (avg).....	NE.....	SE.....		do.....	Interlayered biotite and hornblende gneiss.		Pl-Q-M pegmatite, fine to medium grained.
Warped, tabular.....	10-15 T.....	NE.....	SE.....		do.....	do.....		P-Pl-Q-M pegmatite, coarse grained; accessory garnet.
Lenses.....	0-2 T, 10 D.....	NE.....	SE.....		do.....	Hornblende gneiss.....	Unweathered.....	Pl-Q-M pegmatite, medium grained; accessory garnet.
Tabular.....	10 T.....	NE.....	SE.....	SW.....	do.....	Mica schist.....	Weathered.....	Kaolinized Pl-P-Q-M-B pegmatite, fine to medium grained; accessory sericite.
do.....	28 T.....	N.....	E.....		Partly concordant.....	do.....		Pl-M wall zone, medium grained, discontinuous; P-Q core, graphic texture common.
do.....	1-5 T, 160 L.....	NE.....	SE.....		Concordant.....	Interlayered hornblende and biotite gneiss.		Pl-Q-M wall zone, medium to coarse grained; accessory garnet, apatite; P core, medium to coarse grained.
Tabular.....	20-30 T, >100 L.....	NE.....	SE.....		Concordant.....	Mica gneiss.....	Weathered.....	P-Pl-Q-M-B pegmatite, some graphic texture, crude foliation parallel to walls.
do.....	1.5-9 T, 120 L.....	NE.....	SE.....		do.....	Mica schist.....		Pl-Q-M wall zone; P-Q-M core, some graphic texture.
Irregular, tabular.....	2-15 T.....	NE.....	SE.....		Partly concordant.....	Interlayered hornblende and biotite gneiss.	Weathered (100 ft).....	Pl-Q-P-M pegmatite, medium to coarse grained; accessory biotite, garnet, apatite, sericite. Locally gneissic texture and fine grained. Numerous gneiss inclusions. Cuts to north in P-Q-Pl-M-B pegmatite, medium grained, worked for feldspar.
Lenses.....	1-4 T.....	NE.....	SE.....		do.....	Mica gneiss and granite.....	Unweathered.....	Pl-Q-M pegmatite, discontinuous.
do.....	1-6 T.....	NE.....	SE.....		do.....	Mica gneiss.....	Weathered (50 ft).....	Pl-P-Q-M wall zone, medium grained; Q core, discontinuous.
Tabular.....	3-4 T, >50 L.....	NW.....	NE.....		Discordant.....	Hornblende gneiss.....	Weathered.....	Pl-Q-M wall zone; P-Q core.
Lenses.....	1 T, 10 L.....	NE.....	SE.....		Concordant.....	Interlayered biotite and hornblende gneiss.	do.....	Kaolinized F-Q-M pegmatite, medium to coarse grained.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>KONA-LEDGER AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
395	Jarrett prospect.....	DMEA.....	1905.....	4 shafts, drifts, trenches, prospect pits in area 80 by 200, 40 deep.	Green, "A" structure, bent, cracked, small.	.....
394	F. G. Jarrett mine.....	USGS.....	Pre-WWII.....	3 cuts, 60 long, 10 deep, 3 adits, caved stopes or drifts(?).	Scrap.....	Feldspar.....
374	Ralph Jarrett prospect....	DMEA.....	Pre-WWII, 1955....	2 caved shafts and 2 adits, 2 trenches 150-170 long, 10-16 deep, inclined shaft 50, drift 80.	Green, minor "A" structure, commonly cracked, moderately stained, bent; small.	Small sheet.....
359	Ralph Jarrett Spar mine...	USGS.....	Pre-WWII.....	Cut 100 long, 50 deep.....	Green, wedge "A" structure.....	Scrap, feldspar.....
339	Jimmy prospect.....	USGS.....	1954(?).....	Cut 65 long, 9 deep.....	Green, "A" structure.....	.....
338	George Ledford prospect...	USGS.....	1954.....	Cut 25 long, 10 deep.....	Grayish green, "A" structure, ruled, bent.	.....
364	Old Luke mine.....	USGS.....	Pre-WWII, 1957....	Cut 70, trench.....	Greenish brown, stained, small.....	.....
360	McBee prospect.....	DMEA.....	1956-57.....	Cut 18 with inclined shaft 60, drifts 100. Inclined shaft 64, drifts 50 just east of cut.	Ruby, biotite intergrowths, moderate bending, ruling, stain.	Small sheet.....
396	McKinney mine (on Rebels Creek).	USGS.....	Pre-WWII.....	Cut 60 long, 80 deep.....	Light brown, stained, small.....	Feldspar(?).....
382	May prospect.....	DMEA.....	Pre-WWII, 1956....	Cut 100 long, 15-20 deep, adit 25, drift 31, caved incline.	Green, "A" structure, stained.....	Small sheet.....
380	Murdick mine.....	USGS.....	Pre-WWII.....	Pits, small cuts in area 150 by 500.	Small.....	Feldspar(?).....
406	Murphy Rock mine (on Rebels Creek).	USGS.....	1938.....	2 cuts 10-20.....	Ruby, clear.....	Moderate sheet.....
404	Nate prospect.....	USGS.....	1956.....	.....	Flat and wedge "A" structure, biotite intergrowths.	None.....
363	North Field prospect.....	USGS.....	Pre-WWII.....	Series of caved pits 200 along strike.	Small, scrap on dumps.....	.....
375	Peggy prospect.....	USGS.....	Pre-WWII.....	2 adits, caved.....	Scrap mica on dumps.....	.....
537	Old Peggy mine.....	CMC, USGS.....	1915, 1943.....	Shaft 25, several pits.....	Greenish brown, bent, cracked, stained.	.....
407	Pepper Pot (Perrin) mine.	USGS.....	1885, 1910, 1930, WWII.	2 large cuts, 5 small cuts, shaft 80, several adits in area 150 by 250.	Cinnamon brown, stained, minor ruling, reeving, haircracks.	Small sheet (WWII).
346	R. B. Phillips mine.....	DMEA, Amos (1959).	1954-59.....	3 shafts, large stope 380 long, 80 high.	Green, clear, minor "A" structure, bending, ruling. Mica concentrated in rolls.	>100,000 lb sheet and punch.
353	Old Susie Phillips (Robert Phillips) mine.	USGS.....	1868 int to WWII, 1950's.	Cut 100 diameter, 50 deep, caved underground works.	Greenish brown, stained, moderate ruling, "A" structure, haircracks.	Small sheet (1950's).
341	Earl Pitman prospect.....	DMEA.....	1900, 1957.....	Inclined shaft 70, drifts 34...	Green, moderately reeved, cracked, bent.	None.....
342	Sam Pitman prospect.....	USGS.....	1900.....	Pit 12 deep.....	Green, clear, "A" structure, small, minor bending, ruling.	.....
399	Rebel mine.....	USGS.....	Pre-WWII.....	Cut 50 long, 20 deep.....	Green, bent, small.....	Feldspar.....
372	Rich Cove mine.....	USGS.....	WWII.....	3 pits, trend NE.....	Green, "A" structure, tied, bent, small.	Small sheet.....
397	Sidney mine.....	USGS.....	Pre-WWII.....	7 adits and shafts.....	Greenish brown, stained.....	.....
385	Snow Creek prospect.....	USGS.....	1955.....	Cut.....	Brownish green, reeved, biotite intergrowths, stained, small.	None.....
347	Sparks prospect.....	DMEA.....	1955.....	2 parallel trenches 75 long, 2 deep; small prospect pits.	Green, small.....	None.....
368	Clyde Sparks mine.....	USGS.....	Pre-WWII.....	Cut 175, stopes 50-75.....	Green, wedge "A" structure.....	Scrap, feldspar.....
369	Clyde Sparks South mine.	USGS.....	1920.....	Cut 75 long, 10 deep, adit...	Green, wedge, "A" structure.....	.....
355	Squibb prospect.....	USGS.....	1956.....	Cut 50.....	Greenish brown, moderate "A" structure, clear, commonly bent, cracked.	.....
343	Vera Stapleton prospect...	USGS.....	1954(?).....	Prospect pits, 5-10 deep.....	Green, clear, small.....	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

KONA-LEDGER AREA—Continued

Mitchell County—Continued

Tabular	40 T, 500 L(?)	N	E	SE	Partly concordant	Mica schist	Weathered	Kaolinized Pl-P-Q-M wall zone, fine to coarse grained, graphic texture common; Pl-Q-M intermediate zone, coarse grained; Q core.
do	2 parallel bodies 25 T.	NE	SE		do	Interlayered biotite and hornblende gneiss.	do	P-Q-Pl-M pegmatite; accessory biotite, vermiculite.
Pinch and swell.	2.5-3.5 T	NE	SE	NE	Concordant	do	Weathered (50 ft).	Pl-Q-M pegmatite, medium to coarse grained; accessory garnet. Gneiss inclusions. Several small pegmatites exposed to south.
Tabular	50 T	NE	SE		do	Hornblende gneiss.		Pl-Q-P-M wall zone, medium to coarse grained; accessory garnet, pyrite; P-Q core, coarse grained, discontinuous graphic texture common.
do	8 T(?)	NE	SE	NE	do	Mica gneiss		Q-Pl-M wall zone, medium grained; accessory garnet, beryl; P-M intermediate zone; Q core.
Lenses	1-4.5 T, 2-20 L	NE	SE		do	do	Weathered (10 ft).	Pl-P-Q-M pegmatite, larger lenses have Q core.
Lenses	6 T(?)	N	E		do	do	Weathered	P-Pl-Q-M pegmatite, poorly exposed.
	1-10 T	NE	SE		do	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-M wall zone, discontinuous; P-Pl-Q-M-B core, 2 separate pegmatites explored, similar in composition.
Tabular	>30 T	NE	SE		do	Hornblende gneiss.		P-Pl-Q-M-B pegmatite; accessory garnet, pyrite; cut by late quartz vein.
do	20-25 T	NE	SE		do	Interlayered biotite and hornblende gneiss.	Weathered (20 ft).	Pl-P-Q pegmatite, fine grained, graphic texture. Along hanging wall there is Pl-Q-M pegmatite, coarse grained, separated from main mass by discontinuous zone of massive quartz.
Irregular	3 bodies 3 T	NE	SE		Concordant	Biotite gneiss		P-Q-Pl-M pegmatite, medium grained; accessory biotite, vermiculite.
							Weathered	Q-Pl-M pegmatite; accessory biotite, garnet, uranium minerals.
							do	No pegmatite exposed, only muscovite in soil.
							do	F-Q-M pegmatite fine grained, on dump. No exposures.
Tabular	3-4 T	NE	SE		Concordant(?)	Mica gneiss	Weathered (30 ft).	No exposures. Dumps weathered and overgrown. Kaolinized F-Q-M pegmatite.
do	10-20 L, >180 L	NE	SE	SW	Concordant	do		Q-Pl-M pegmatite, medium grained; accessory garnet, apatite, sericite. Several similar pegmatites exposed to southeast.
Irregular, tabular.	0.5-20 T, avg 6, 400 L, >140 D.	NE	SE	SW	do	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-P-M pegmatite, medium to coarse grained; accessory garnet, apatite, sericite.
Irregular	2-20 T	NE	SE	SW(?)	Partly concordant.	do		P-Pl-Q-M wall zone, medium to coarse grained; accessory garnet, beryl, columbite-tantalite, uranium minerals(?), pyrite; Q core reported.
Lens	1-6 T, 50 L	NE	SE	E	do	Mica gneiss	Weathered (15 ft).	Pl-P-Q-M wall zone, fine to medium grained; Q core.
Tabular	2 T	NE	SE		Concordant	do		Pl-P-Q-M pegmatite, medium grained; accessory beryl, biotite, sericite.
	>20 T(?)	NE	SE					P-Q-Pl-M pegmatite, fine to coarse grained.
Tabular	8 T	NE	SE		Concordant	Mica gneiss		P-Q-M-B pegmatite.
		NE	SE		Discordant	Hornblende gneiss.		P-Q-Pl-M-B pegmatite; graphic texture common; accessory vermiculite.
Lens	3 T, 18 L	NE	SE		Concordant	Mica gneiss	Weathered	F-Q-M pegmatite.
Tabular	0.5-2 T	NE	SE		do	Hornblende gneiss.		Pl-Q-M pegmatite, medium grained.
do	15 T		flat		Discordant	Interlayered hornblende and biotite gneiss.		Q-P-M-Pl pegmatite, graphic texture common.
do	20 T	NE	vertical		Concordant	Mica gneiss		Pl-Q-M wall zone, medium grained; Q core.
Lens	2-10 T	NE	SE		Discordant	do	Weathered	P-Q-Pl-M pegmatite.
Tabular	1 T	NE	SE		Concordant	Biotite gneiss		Pl-Q-M wall zone, medium grained, Q core.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>KONA-LEDGER AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
386	Turbyfill mine.....	USGS, DMEA...	1895, 1909, 1940, WWII, 1956.	Shallow pits, 4 shafts 35-80 deep, 3 trenches 5-10 deep, in area 50 by 250.	Green, stained, bent, cracked.....	.....
390	Willis prospect.....	DMEA.....	1952, 1955.....	Cut 120 long, 10 deep, inclined shaft 75, drifts 75.	Ruby, "A" structure, locky, stained, ruled, cracked.	Small sheet, scrap.
398	Sugar Dave Willis mine....	DMEA, USGS...	Pre-W WWII, 1955, 1958.	Cut 100 long, 10-20 deep, several adits, shaft 50, drifts.	Brownish green, mineral inclusions, stained, bent, cracked.	Moderate sheet, large scrap.
345	Arnold Young mine.....	DMEA.....	1957-58.....	Shaft 85, stope (extension of R. B. Phillips mine).	Green.....	Small sheet.....
344	Arnold Young prospect....	DMEA.....	1953-55.....	Trench 100, adit 100.....	Green, "A" structure, bent, stained.....	.....
<b>BANDANA AREA</b>						
<b>Mitchell County</b>						
432	Abernathy mine.....	USGS, OF.....	1880-1903, 1931, 1933, 1938-40, 1942-44, 1953-62.	2 large partly open stopes, old cuts, shafts, stopes, adit, winzes, drifts in area 200 by 500, 200 deep.	Ruby, minor "A" structure, moderate ruling, cracking. Common biotite intergrowths.	Large sheet.....
425	Banner mine.....	USGS, DMEA, OF.	1884-1900, 1945, 1958-60.	2 shafts 150; large stope 200 long, 100 deep, drifts.	Ruby, minor ruling, cracking, bending, air stain.	.....do.....
410	Briggs prospect.....	DMEA.....	1956.....	Adit 80.....	Ruby, stained, bent, small.....	None.....
417	Jess Buchanan (Mack Thomas) mine.	USGS.....	WWII, 1954.....	2 shafts 25-40 deep, pits, drifts in area 300 long.	Greenish brown, bent, stained.....	Moderate sheet (WWII).
420	Clinch prospect.....	USGS.....	1956.....	Cut 100 long, 25 deep.....	Brownish green, small.....	.....
419	Devils Looking Glass mine.	USGS, CMC.....	1925, 1943.....	Cut 20, adit 60, pit.....	Light brown, locky, bent, stained.....	Small sheet.....
436	Dog Pond (Chestnut Branch) mine.	USGS, DMEA...	1943, 1954, 1957.....	Cut 20 diameter, 15 deep, with incline 60.	Ruby, ruled, cracked, moderate "A" structure.	.....do.....
413	Flukens Hill mine.....	USGS.....	1923, 1935-39, WWII, 1950's.	Large cut, shaft 90, stopes.....	Ruby, moderate "A" structure.....	Moderate sheet, feldspar, clay.
430	Joe Fouts mine.....	USGS, CMC, OF.	1910, WWII, 1953-55.	Cut 50, inclined shaft 50, stope.	Ruby, moderate bending, locky, biotite intergrowths, mineral inclusions.	Moderate sheet.....
415	Gage prospect.....	USGS.....	1955.....	Trench 75 long, 12 deep.....	Small.....	None.....
426	George mine.....	USGS.....	1933, 1943, 1950's.....	2 cuts, each 200 long, 20-40 deep; several shafts 50-80 deep.	Brown, "A" structure, locky, bent, stained.	Small sheet.....
433	Half Moon mine.....	DMEA.....	1953.....	Cut 80 long, 30 deep, shaft 80, drifts 180.	Ruby, moderately bent, ruled, stained, small.	.....do.....
418	Dave Hall (Bryants Hill) mine.	USGS, CMC.....	1930, 1941, 1944.....	Cut 55, incline 30.....	Ruby, minor bending, stain.....	.....do.....
414	George Howell (Water-hole) mine.	USGS, DMEA...	1936-37, 1940, 1944, 1954-57.	Cut 75 long, 40 deep, stopes, 100 and 200 long, deepest 150. Drift extends 400 southwest of cut.	Ruby, minor biotite intergrowths.....	Large sheet.....
414	George Howell No. 2 mine.	DMEA.....	1955-56.....	Shaft 154, drifts 300 at 100 and 154 levels.	.....	.....
411	Jane prospect.....	USGS.....	1956.....	Trench 150 long, 5 deep.....	Ruby, bent, stained, small.....	.....
431	Johnson mine.....	DMEA.....	1955-58.....	Cuts, 2 inclined shafts 40, drifts 87, in area 100 by 300.	Ruby, commonly bent, ruled, locky.....	Small sheet.....
429	Ernest Johnson mine.....	USGS, OF.....	1910, WWII.....	Cuts, stope, shaft 35, shaft 60, drift 84 in area 50 by 150.	Ruby, minor stain, bending, locky.....	Moderate sheet.....
434	Lester Putnam (Marsh Putnam) mine.	USGS, DMEA...	WWII, 1953-55.....	Shaft 85, drifts 120, numerous shallow shafts, cut 250 long, 5-20 deep.	Ruby, biotite intergrowths, moderate bending, ruling, cracking, stain.	.....do.....
435	Marsh (Morris) Putnam mine.	USGS.....	1908, 1944, 1953-56.	Adit, 2 shafts, drifts, stope in area 100 long, 40 deep.	Ruby, minor "A" structure, moderate cracks, biotite intergrowths, mineral inclusions.	.....do.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

**SPRUCE PINE DISTRICT—Continued**

**KONA-LEDGER AREA—Continued**

**Mitchell County—Continued**

Lenses(?)	0.5-4 T	NE	Steep		Concordant	Interlayered biotite and hornblende gneiss.	Weathered	Pl-Q-M pegmatite, medium to coarse grained; accessory biotite, garnet, sericite.
Pinch and swell.	1-8 T, avg 3	NE	SE		do	Hornblende gneiss; biotite alteration.	Weathered (20 ft).	Pl-Q-P-M wall zone, medium to coarse grained; accessory garnet, apatite; Q core, discontinuous.
Tabular	1-6 T, avg 3	NE	SE		Partly concordant.	Interlayered hornblende and biotite gneiss.	Weathered (30 ft).	Pl-Q-P-M pegmatite; accessory garnet, apatite, sericite. Muscovite is locally abundant.
do	1-4 T	NE	SE		Concordant	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-P-M pegmatite. Several thin bodies in area.
do	1-4 T	NE	SE		do	Interlayered hornblende and biotite gneiss.	Weathered	P-Pl-Q-M pegmatite, fine to medium grained; accessory garnet.

**BANDANA AREA—Continued**

**Mitchell County—Continued**

Tabular	10-25 T, >300 L	NE	SE	NE	Concordant	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-M-B wall zone, medium to coarse grained; P-Q core; accessory garnet, apatite, allanite, sulfides. Several large parallel bodies mined and prospected.
Irregular, tabular.	5-25 T, >300 L	NE	SE	SW	Partly concordant.	do	Weathered (60 ft).	Pl-Q-M wall zone; P-Pl-Q-M core, coarse grained; accessory biotite, garnet, sericite, sulfides. Rare beryl, tourmaline. Several parallel pegmatite bodies prospected.
Tabular	0.1-4 T, 100 L	NE	SE		Concordant	Mica gneiss	Saprolite	P-Pl-Q-M-B pegmatite, fine to medium grained, graphic texture common.
Pinch and swell.	0.5-4 T	NE	SE		do	Mica schist	Weathered (40 ft).	P-Pl-Q-M pegmatite; accessory biotite. At least 2 pegmatites present.
Lens		NE	SE		do	Mica gneiss	Weathered	F-Q-M pegmatite; accessory tourmaline. Little pegmatite exposed, mostly removed.
Tabular	4.5 T	NE	SE		do	do	Unweathered	Pl-Q-M pegmatite, fine to medium grained; accessory biotite, garnet.
Irregular, anticlinal.	4-8 T at crest, 1-2 T on flanks.	NE	SE	SW	do	do	do	Pl-Q-P-M pegmatite, medium grained; accessory apatite, sericite.
Irregular, tabular.	6-25 T	NE	SE	NE	Partly concordant.	Hornblende gneiss, mica gneiss	Weathered	P-Pl-Q-M pegmatite, coarse grained.
Tabular		NE	SE		Concordant	do	Unweathered	Pl-P-Q-M-B pegmatite, coarse grained; accessory garnet, beryl. Possibly southwestern part of pegmatite at Ernest Johnson mine.
do	8-15 T	NE	SE		do	Interlayered biotite and hornblende gneiss.	Weathered (40 ft).	P-Q-M-B pegmatite.
do	1-4 T	NE	SE		do	Mica schist	Weathered (30 ft).	Pl-Q-M pegmatite, medium to coarse grained, 4 parallel pegmatites explored in southeast crosscut.
do	0.5-6 T	NW	SW		do	Mica gneiss	Unweathered	Pl-Q-P-M pegmatite; accessory biotite.
Tabular, pinch and swell.	3-8 T	NE	SE	SW	do	Interlayered biotite and hornblende gneiss.	do	P-Pl-Q-M pegmatite, coarse grained; some graphic texture; accessory biotite, garnet, pyrrhotite, pyrite.
Tabular	2-15 T	NE	SE		Concordant	Interlayered biotite and hornblende gneiss.	Weathered	P-Pl-Q-M pegmatite, 4 pegmatites intersected by prospect drilling. Prospect 500 ft. Southwest of George Howell mine.
Lens	1-10 T, 100 L	NE	SE		do	Mica gneiss	do	F-Q-M wall zone, fine to medium grained, Q core, discontinuous.
Irregular	1-11 T	NE	SE		do	do	Weathered (30 ft).	Pl-Q-M wall zone, medium to coarse grained; P-Q core, discontinuous; accessory garnet, pyrite.
Irregular, tabular.	2-40 T	NE	SE	NE	Partly concordant.	Mica gneiss	Unweathered	Pl-Q-M-B pegmatite, coarse grained; accessory garnet, sulfides.
Tabular	3-5 T, 500 L(?)	NE	SE		Concordant	do	Weathered (30 ft).	Pl-Q-M wall zone, fine grained; P-Q-M core, coarse grained; accessory biotite, garnet, sericite.
do	3-10 T	NE	SE		Partly concordant.	do	Unweathered	Pl-P-Q-M pegmatite, medium to coarse grained; accessory biotite, garnet, apatite, tourmaline, chalcopyrite, sericite.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>BANDANA AREA—Continued</b>						
<b>Mitchell County—Continued</b>						
412	Randolph (Randall) mine.	Sterrett (1923, p. 259), USGS, DMEA.	1875, int to 1944, 1954-55.	Numerous adits, shafts and stopes partly destroyed by later cuts. Shaft 60, drift 80.	Ruby, small, biotite intergrowths.....	Moderate sheet (WWII), feldspar.
427	Ed Robinson (Ancient; Willis) mine.	USGS, OME.....	Pre-WWII, 1944, 1959.	Adit 250, small cuts, shaft 100, drift 100, in area 100 by 300.	Ruby, ruled, bent, moderate stain, mineral inclusions.	Small sheet.....
428	Fred Robinson mine.....	USGS, DMEA.....	1915, 1944, 1955.....	Several pits, shaft 25, trench 85 long, 15 deep.	Greenish brown, stained, bent, mineral inclusions.	.....do.....
424	Sinkhole mine.....	USGS, DMEA, OF.....	1868-79, 1906-10, 1914-20, 1940-45, 1952-62.	Numerous shafts, adits, drifts in area 300 by 1,000. Stopped out to depth of 300. Open cut 300 long, 30 deep destroyed part of old works.	Ruby, clear, hard, minor bending, ruling. Books 0.2-2.0 ft in diameter.	Large sheet, scrap, feldspar. >200,000 lbs of sheet (1952-62).
421	Snow White mine.....	USGS.....	WWII.....	Cut 150 long, 5 wide, >25 deep, adit, prospect pit.	Light brown, ruled, stained, small.....	Small sheet.....
416	Thomas (Black Bull) mine.	USGS, DMEA.....	WWII, 1955, 1959.	Cut 120 long, 10-20 deep; shaft 64, drifts 60.	Ruby, stained, bent.....	.....do.....
423	D. M. Thomas (Ovenlifter) mine.	USGS.....	WWII.....	Shaft 60, adit, several pits....	Light brown, cracked, ruled, tied.....	Small sheet.....
422	Doc Thomas mine.....	DMEA.....	1900, WWII, 1954-55.	Several small cuts, 3 adits 2 shafts 75-115 deep, drifts, in area 50 by 250.	Ruby, stained, minor reeves, tied.....	.....do.....
<b>BRUSH CREEK AREA</b>						
<b>Yancey County</b>						
443	Avery prospect.....	USGS.....	1956(?).....	Cut 60 long, 15 deep.....	Ruby, clear, small.....	.....do.....
447	Chestnut Branch mine.....	USGS.....	1880, int to 1938, 1950's.	Open stope 250 long, 30-50 deep.	Ruby, minor stain, small.....	Large sheet.....
446	Coletta prospect.....	USGS.....	1959.....	Prospect pit.....	Ruby, moderate bending, ruling.....	Small sheet.....
444	Jim Curl (Deck Grindstaff, Charles Garland) mine.	USGS, CMC.....	1935-36, 1953.....	Cut 50, numerous caved shafts 35-60 deep, adit 40 in area 300 long.	Brown, moderate stain, locky, ruling, bending.	Moderate sheet.....
437	Carroll Deyton mine.....	USGS.....	1937-38.....	2 small cuts.....	Green, stained, ruled.....	Moderate sheet, feldspar.
440	Jake Farney mine.....	USGS, CMC.....	1905, 1944.....	Shaft 40, drift 25, 2 adits, several pits.	Ruby, cracked, ruled, bent, mineral inclusions, stained.	Small sheet.....
452	Fox mine (upper Brush Creek).	USGS, DMEA.....	WWI, WWII, 1954-58.	Cut 80 with open stope 50 long and 30 deep; caved adit, inclined shaft 65, southeast of cut.	Greenish to reddish brown, moderately cracked, stained, bent, ruled. Concentrated in southeast plunging rolls.	Moderate sheet, feldspar.
449	Andy Hall mine.....	USGS.....	Pre-WWII.....	Cut 45, adit 20.....	Reddish brown, moderate "A" structure, near quartz masses.	Feldspar, sheet.....
438	Horse Ridge mine.....	USGS.....	Pre-WWII.....	Cut, adit 250.....	Green, "A" structure, garnet inclusions, small.	.....do.....
448	Hughes and Gouge prospect.	USGS.....	1955.....	Inclined shaft 50, drift 30.....	Ruby, clear, tied.....	Small sheet.....
445	William (Jim) Hughes mine.	USGS.....	Pre-WWII.....	Series of adits and shafts 600 along strike, 50 deep.	Brown, biotite intergrowths.....	Small sheet (1931).
439	Narrow Ridge mine.....	USGS.....	WWI, 1952.....	Cut 50 long, 20 deep, shaft 20, adit 35.	Greenish brown, hard, bent, cracked, ruled.	.....do.....
442	Flem and Cas Thomas (Dan Jarrett) mines.	USGS.....	1904, 1943.....	11 pits, 4 adits, 4 shafts, drifts in area 200 by 600.	Brown, small.....	Moderate sheet.....
451	Tommy Thomas mine.....	USGS.....	1943.....	Shaft 80, drifts 45, inclined shaft 45.	Light brown to green, reeved, hair-cracks, quartz inclusions, small.	Small sheet.....
450	Wash Green mine.....	USGS.....	1943.....	Cut 60, 2 prospect pits.....	Light brown, "A" structure, stained, small.	.....do.....
441	Nelson Woody prospect.....	USGS.....	Pre-WWII(?), 1955.	Adit 50, pit 15 deep.....	Ruby, stained, cracked, bent, small.....	.....do.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

BANDANA AREA—Continued

Mitchell County—Continued

Tabular	Several bodies 1-20 T.	NE	SE		Concordant	Mica gneiss	Weathered (40 ft.)	P-Pl-Q-M pegmatite, medium to coarse grained, some graphic texture; accessory biotite, garnet, sulfides, autunite.
do	5-20 T.	NE	SE		Partly concordant	Interlayered biotite and hornblende gneiss.	Weathered (20 ft.)	Pl-P-Q-M wall zone, medium grained; P-Pl-Q-B core, medium coarse grained; accessory garnet, pyrite.
do	Several bodies 1-5 T.	NE	SE		Concordant	Mica gneiss	Weathered	P-Pl-Q-M pegmatite; accessory biotite, garnet.
Tabular, lenses.	Several bodies 1-25 T.	NE	SE		Partly concordant	Interlayered biotite and hornblende gneiss.	Weathered (100 ft.)	Pl-Q-P-M wall zone, medium to coarse grained; P-Q-M core, coarse grained; accessory biotite, garnet, apatite, tourmaline (rare). Numerous connected lenses with tabular gneiss inclusions in main zone 1,200 ft. long. Several parallel tabular bodies to the northwest.
Tabular	5 T.	NE	SE		do	Mica gneiss and marble.		Pl-Q-M pegmatite, medium grained; accessory sericite, garnet, biotite.
Tabular, lenticular.	One 20 T, another 1-4 T.	NE	SE		do	Mica schist	Weathered (20 ft.)	Pl-Q-P-M wall zone, medium grained; P-Q core, discontinuous; accessory biotite.
		NE	Vertical		Concordant(?)	Mica gneiss	Weathered (60 ft.)	Kaolinized F-Q-M pegmatite, poorly exposed.
Tabular, lenticular.	1-14 T.	NE	SE		Concordant	Mica schist	Weathered (110 ft.)	Pl-P-Q-M pegmatite; accessory biotite, garnet. Pods of massive quartz in surface cut may be core. Pegmatite thins with depth.

BRUSH CREEK AREA—Continued

Yancey County—Continued

Tabular	2-4 T.	NE	SE		Concordant	Interlayered biotite and hornblende gneiss.	Weathered	Pl-Q-M pegmatite, medium grained.
Tabular, pinch and swell.	0.1-6 T.	NE	SE		do	Interlayered hornblende and biotite gneiss.	Unweathered	Pl-Q-P-M pegmatite, medium grained; accessory garnet, apatite.
Pinch and swell.	1-2 T.	NE	SE		Discordant	Mica gneiss	do	Pl-Q-M pegmatite; accessory garnet, sericite.
Tabular(?)	2-4 T (?)	NE	SE		Concordant	Interlayered biotite and hornblende gneiss.	Weathered	Kaolinized Pl-Q-P-M pegmatite; accessory garnet; poorly exposed.
Tabular	15 T.	NE	SE		Concordant(?)	Interlayered hornblende and biotite gneiss.		Pl-P-Q-M pegmatite, medium grained; accessory garnet.
do	6-8 T.	NE	SE		do	Mica gneiss	Weathered (30 ft.)	Kaolinized F-Q-M-B wall zone, medium to coarse grained; Q core.
do	3-8 T.	NW	SW	SE	Discordant	Interlayered hornblende and biotite gneiss.	Weathered (20 ft.)	Pl-Q-M wall zone, medium to coarse grained, discontinuous; P-Q-Pl-M core, medium grained; accessory garnet, biotite, allanite, tourmaline.
Lenses	1-12 T, avg 6 T.	NE	SE		Concordant	Mica schist		P-Pl-Q-M wall zone; Q core, discontinuous.
Tabular	35 T.	NE	SE		do	Interlayered hornblende and biotite gneiss.		Pl-Q-M wall zone; P-Q intermediate zone, graphic texture common; Q core, discontinuous; accessory garnet, uraninite, secondary uranium minerals.
Lens	1-4 T, 50 D.	NE	SE		do	Mica gneiss		Pl-Q-P-M pegmatite, medium to coarse grained; accessory garnet, biotite, sulfides.
		NE	SE		do	Interlayered hornblende and biotite gneiss.		Pl-P-Q-M-B pegmatite, accessory vermiculite.
Pinch and swell.	0.5-3 T.	NE	SE		do	Hornblende gneiss.		Pl-Q-M-B pegmatite, medium grained, sheared.
Pinch and swell lenses.	1-6 T.	NE	SE	SW	do	Interlayered biotite and hornblende gneiss.		Pl-Q-M pegmatite; accessory garnet. Several similar pegmatite bodies mined and prospected.
Tabular	4-T, >45 L.	NE	SE		do	Mica gneiss		Pl-Q-P-M-B pegmatite.
do	12 T.	NE	SE		do	do	Weathered	Kaolinized F-Q-M pegmatite, medium grained.
do	8 T.	NE	SE		do	Hornblende gneiss.		Pl-Q-B-M pegmatite.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>GREEN MOUNTAIN AREA</b>						
<b>Yancey County</b>						
457	Bailey and Johnson mine	USGS	Pre-WWII	Adit, 4 small prospect pits	Light brown, stained, biotite intergrowths, ruled.	
485	Beech mine	USGS, OF	1880, WWII	Cut 100, incline	Reddish brown, clear, "A" structure, bent, ruled.	Moderate sheet
488	Bittner mine	USGS, OF	1880, 1935, WWII	Cut 100, several small cuts, adits.	Brownish green, clear	Moderate sheet (1935), small sheet (WWII), feldspar.
489	Cilley (Silly, Celia) mine	USGS, OF	1879, WWII, 1950's	Cut 250 long, 100 deep, shafts, adits, stope.	Green, minor "A" structure, moderate cracks, ruling, locky, mineral inclusions.	Moderate sheet (WWII).
464	Edwards mine	USGS	1943-44	Cut 80	Light brown, minor "A" structure, moderately bent, cracked.	
465	J. W. Edwards mines	USGS	1928, WWII	Narrow cuts, the largest is 60 long, 80 deep.	Yellowish green, clear, lepidolite intergrowths.	Feldspar sheet
470	Jack Field mine	USGS	1943	3 cuts in line 80 long	Brown, clear, biotite intergrowths, cracked, locky.	Small sheet
479	Fox mine	USGS	1885, 1930-32, WWII	Cut 150, shaft 70, adit, drifts.	Green, small	Moderate sheet
470	Green Mountain mine	USGS	1880 int to WWII, 1950's	3 long narrow open stopes, inclines, pits, 850 along strike, stopes 10-130 deep.	Ruby to rum, hard, "A" structure, moderate ruling, minor stain, biotite intergrowths.	Large sheet
469	Hampton (Hensely) mine	Sterrett (1923, p. 276), DMEA	1890, 1906, 1953	Cut 50, 4 shafts 40-80 deep, 2 adits in area 50 by 200.	Brown, stained	Moderate sheet (WWII)(?).
476	Harding (Charlie Young) mine	USGS, OF	1925-30, 1935-36, WWII	Cut 110, shaft, incline 200, drifts, stope.	Ruby, reeved, ruled, cracked, bent, biotite, intergrowths, locky.	Large sheet
459	Huskins (East) mine	USGS	1936-37, 1952-58	Cut 250 long, 40 deep, several adits, 180-225 long, drifts and stopes.	Ruby, minor "A" structure, commonly bent, ruled, stained.	Large sheet, scrap.
460	Huskins (West) mine	USGS	Pre-WWII	4 drifts, shallow cuts	Light brown, stained	Scrap, sheet
462	Sam Huskins mine	DMEA	1952-54	Cut 200 long, 30 deep; shaft 50, drift, 30.	Ruby, hard, biotite intergrowths, cracked, bent.	Small sheet, moderate scrap.
463	Jones mine	USGS	Pre-WWII	2 shafts, adit 150	Brown, moderate stain, concentrated near core margins.	
468	Laws (Walt Laws) mine	USGS	1936-37, 1939-40	2 cuts 20-60 long, 30 deep, adit, prospect pits.	Reddish brown, moderately ruled, minor stain	Moderate sheet
467	Grant Laws mine	DMEA	1952-54	Cut 275 long, 5-30 deep; shaft 65, drifts at 40 and 60 levels.	Ruby, bent, ruled	Small sheet
454	John Letterman (North) mine	USGS	Pre-WWII	Adit 50, slumped cuts, caved shallow stopes.	Light brown, stained moderately ruled; concentrated on hanging wall of core(?).	
455	John Letterman (South) mine	USGS	Pre-WWII, 1959	Cut	Green, stained, bent, ruled	Feldspar
458	M. P. Letterman mine	Sterrett (1923, p. 278), USGS	1905-06	Several shafts, drift 150, adit 50, irregular pits.	Reddish brown, clear, hard	
484	Locust Rough (B. T. Snopp) mines	USGS	Pre-1900, WWII	Cut 130 long, 20 deep, many pits, adits, small cuts in belt 1600 long.	Brownish green, common biotite intergrowths, stained, ruled, reeved.	Small sheet (WWII).
481	Mitchell Branch prospect	DMEA	1953-54, 1956-57	2 cuts 80 long, 5-15 deep; adit 60, shaft 60, drift 35.	Reddish brown, moderate reeves, cracking, bending, ruling, stain.	Moderate sheet
478	Moody Rock mine	DMEA	1956-58	Cut 380 long, 10-25 deep; shaft 63, drifts 225, several shallow shafts, drifts and small stopes.	Light green, commonly bent, ruled moderate stain. Mica concentrated in northeast plunging shoots.	Moderate sheet, large scrap.
466	Peterson mine (on Mine Fork)	USGS	1944	2 shafts 12 and 25	Light brown, reeved, stained	Small sheet
453	Peterson mine (on Toe River)	USGS	Pre-WWII	Cut	Light green, clear	Feldspar
480	John Randolph mine	USGS		Cut 30 long, 18 deep	Light greenish brown, quartz inclusions, cracked, bent.	
456	Polly Randolph mine	USGS	Pre-WWII	9 adits, cut, 2 shafts in belt 350 long.	Green, "A" structure, ruled, bent, moderate stain.	Sheet

prospects in the Blue Ridge of North Carolina—Continued

Shape	Size (feet)	Pegmatite			Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
		Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

GREEN MOUNTAIN AREA—Continued

Yancey County—Continued

Tabular	Several bodies 1-6 T.	NE	SE		Concordant	Mica gneiss		Pl-Q-M wall zone; P-Q core, coarse grained. Pegmatites deformed and cut by horizontal faults.
		NE	SE		Concordant(?)	do	Weathered	Pl-Q-M Pegmatite; accessory biotite, garnet.
Tabular	80 T	NE	SE		Concordant	do		Pl-Q-P-M-B pegmatite.
do	40 T	NE	SE	NE	do	Interlayered biotite and hornblende gneiss; biotite alteration.	Weathered	Pl-Q-P-M pegmatite, fine to medium grained; Q-M pegmatite (burr rock) abundant locally. Accessory garnet, biotite.
do	8 T, 80 L	NE	SE		Discordant	Biotite gneiss	do	Kaolinized F-Q-M wall zone; accessory biotite, garnet; Q core. Poorly exposed.
do	3-4 T (several bodies).	NE	SE	NE	do	Hornblende gneiss		P-Pl-Q-M pegmatite; accessory cleavelandite, garnet, blue, green, and yellow beryl, tourmaline, lepidolite, gahnite, columbite.
do	1.5-2 T	NW	SW		Concordant	Biotite gneiss	Weathered	Kaolinized F-Q-M pegmatite, medium grained; accessory biotite.
do	6-7 T	NE	Vertical		do	Mica gneiss	do	F-Q-M pegmatite, medium grained.
Pinch and swell	0.1-4 T	NE	SE		do	Biotite gneiss	Unweathered	Pl-Q-M-P pegmatite, medium to coarse grained; accessory garnet, pyrrhotite, apatite.
Lenses	3-8 T	NW	Vertical		do	do	Weathered (80 ft.)	Kaolinized F-Q-M pegmatite. 1953 shaft abandoned because of heavy dangerous ground.
Irregular, tabular	10-30 T	NE	SE		Partly concordant	Mica gneiss		Pl-Q wall zone, medium grained; Pl-Q-M intermediate zone, coarse grained; B-M-Pl-Q intermediate zone, medium grained, on the hanging wall side only; Pl-P-Q core, coarse grained.
Tabular, pinch and swell	4-10 T, avg 6 T, >155 L.	NE	SE		do	Biotite schist	Weathered (90 ft.)	P-Pl-Q-M pegmatite, coarse grained, some graphic texture; accessory garnet. Pegmatite sheared and crushed.
Pinch and swell	1-12 T	NE	Vertical		Concordant	Mica gneiss	Weathered	F-Q-M wall zone; Q-M core, discontinuous.
Tabular	12-18 T	NE	SE		do	Interlayered hornblende and biotite gneiss.	Weathered (40 ft.)	Pl-P-Q-M-B pegmatite.
do	6 T	NE	SE		do	do		F-Q-M wall zone; Q core.
do	10-12 T	NE	SE		do	Hornblende gneiss, biotite alteration.		Pl-Q-P-M pegmatite, medium to coarse grained; accessory biotite, garnet. Numerous prospects on similar bodies in area 1,500 by 3,000 ft.
do	4-8 T	N	E		do	do	Weathered	Pl-Q-M pegmatite, medium to coarse grained.
Tabular	10 T	NE	SE		Concordant	Hornblende gneiss		Pl-P-Q-M wall zone; accessory garnet; Q core. Pegmatite and gneiss cut by small faults.
		NE	SE		Discordant	Mica gneiss		P-Pl-Q-M pegmatite, fine to coarse grained; accessory garnet.
Pinch and swell	8-12 T	NW	Vertical		Concordant	Biotite gneiss		Pl-P-Q-M pegmatite; accessory garnet, pyrite.
Irregular, sinuous	1-20 T (several bodies).	N			do	Interlayered biotite and hornblende gneiss.	Weathered	Pl-P-Q-M pegmatite, fine to medium grained; accessory biotite.
Irregular, tabular	3-8 T, >160 L.	NE	Steep	NE	do	Mica gneiss	Weathered (20 ft.)	Pl-Q-P-M pegmatite, medium grained; accessory biotite, garnet apatite.
do	3-20 T, >300 L.	NE	Variable	NE	Partly concordant	Interlayered biotite and hornblende gneiss.	Weathered (10 ft.)	Pl-P-Q-M pegmatite, medium to coarse grained, some graphic texture; accessory garnet, biotite, tourmaline, apatite, beryl.
		NE					Weathered	Kaolinized F-Q-M pegmatite, poorly exposed.
		NE						Pl-P-Q-M wall zone(?), coarse grained; Q-P core(?), poorly exposed. Accessory columbite(?), samarskite, uranium minerals.
Pinch and swell	3-8 T, >100 L.	NE	NW		Concordant	Mica gneiss	Unweathered	Pl-Q-M pegmatite, accessory garnet.
		NE	SE		do	Interlayered biotite and hornblende gneiss.	Weathered	Pl-Q-P-M wall zone; accessory garnet, vermiculite, columbite, uraninite, autunite; Q core. Several pegmatites worked and prospected.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>GREEN MOUNTAIN AREA—Continued</b>						
<b>Yancey County—Continued</b>						
461	Ray and Deyton mine.....	USGS.....	Pre-WWII.....	Pit 30 diameter, adit 125.....	Light brown, stained, ruled.....	Small sheet.....
471	Riddles prospect.....	DMEA.....	1956.....	2 trenches 110-140 long, 5-10 deep.	Green, flat and wedge "A" structure, cracked, bent, stained.	
473	Ruby (Shaft) mine.....	DMEA.....	1953-58.....	Cut 80, inclined shaft 45.....	Light brown, bent, ruled, locky, biotite intergrowths.	Small sheet, moderate scrap.
487	Shugart mine.....	USGS.....	1930(?), 1951.....	Cut 200 long, 25 deep, underground workings reported.	Green, stained, cracked.....	Large scrap; reported beryl production.
486	M. P. Smith prospect.....	USGS.....	1953.....	Several prospect pits.....	Ruby and green, small.....	
475	Straub mine.....	USGS.....	1944.....	Cut 40 deep.....	Ruby.....	Small sheet.....
490	Three Quarters Creek mine.	USGS.....	1879, 1944, 1950's(?).	Cut 200 long, 40 deep, adits, shaft, drifts.	Brownish green, moderate stain.....	Moderate sheet.....
483	Vance Sugar mine.....	USGS.....	1938-39.....	Cut, adits 400.....	Greenish brown, "A" structure, bent, ruled.	Moderate sheet, feldspar.
474	Biddie Wallace mine.....	USGS.....	Pre-WWII, 1943.....	4 pits in area 75 by 100.....	Light brown, moderate "A" structure, ruled, bent, stained.	Small sheet (1943).
482	Wolf mine.....	USGS.....	1943.....	Cut 40 long, 25 deep.....	Light brown, reeved, biotite intergrowths, stained.	Small sheet.....
477	Young mine.....	USGS.....	WWII.....	Cut 150 long, 20 deep.....	Ruby, locky, ruled, cracked, bent, biotite intergrowths.	Small sheet(?).....
<b>BLACK MOUNTAIN-BOWLENS CREEK AREA</b>						
<b>Yancey County</b>						
493	J. W. Autrey mine.....	USGS, DMEA, OF.	1935, 1943-45, 1951-53.	Cut 250 long, 40 deep, shaft 155, drifts 185, 2 stoped inclines >100.	Ruby, biotite intergrowths, common ruling, bending, locky, stain.	Moderate sheet (WWII), small sheet (1953).
511	Balsam mine.....	USGS, DMEA.....	1900, WWI, 1928, 1936, 1943-45, 1953.	Cut 60, incline >400 deep, several small trenches and cuts.	Ruby, commonly stained, mineral inclusions, ruled.	Large sheet (WWII).
517	Banks mine.....	DMEA.....	1953-54.....	Cut 100, shaft 35, drifts 115..	Ruby, bent, stained, ruled, cracked, biotite intergrowths.	Small sheet.....
494	W. K. Boone mine.....	USGS.....	1944.....	Pit 25 deep.....	Ruby.....	do.....
521	Cattail (Cattail Branch, Cattail Creek, Isom) mine.	Sterrett (1923, p. 277), USGS, DMEA, OF.	1904, 1924, 1929-32, 1934, 1943-45, 1949, 1951-55.	Open inclined stope 350 deep, adit 440, stope and drifts.	Ruby, moderate bending, ruling, cracking, reeving.	Large sheet and scrap. Production of sheet >200,000 lb.
498	Elkins mine.....	USGS.....	1937, 1943-44.....	Pit 35, shaft 65.....	Light brown-pale green, moderately stained, ruled, bent.	
503	Georges Fork (Price) mine.	USGS.....	1900, 1910-13, 1939, 1952.	Incline 110 long, 25 high.....	Reddish brown, "A" structure, ruled, bent, moderately stained, biotite intergrowths.	
518	Grassy Knob mine.....	USGS, CMC.....	1943-44.....	Pit 25 long, 20 deep.....	Ruby, hard, moderately ruled, stained..	Small sheet.....
519	Grassy Knob prospect.....	DMEA.....	1952-53.....	2 shallow trenches 200-300 long, 10 deep, shaft 50, drifts 50.	Ruby, hard, stained, biotite intergrowths, ruled, bent.	do.....
526	Grassy Wood mine.....	USGS, DMEA.....	WWII, 1958.....	Cut 130 long, 5-10 deep, pit 16.	Ruby, ruled, bent.....	do.....
520	H and 3 R prospect.....	USGS.....	1953.....	Prospect pit 10 deep.....	Ruby, small.....	
500	Dolph Hensley mine.....	USGS.....	1925, 1940, 1953.....	Cut 50 long, 35 deep; adit 36.	Ruby, hard, stained, cracked.....	
529	Jass mine.....	USGS.....	(?).....	Adit 15.....	Ruby, clear, hard, bent, cracked.....	
504	Johnson's Cove mine.....	USGS.....	Pre-WWII.....	Cut 300.....	Green, "A" structure.....	Small sheet, feldspar.
496	Lawhern mine.....	USGS.....	1955.....	Cut 15 long, 18 deep; inclined shaft 39, drifts 42.	Ruby, commonly bent, biotite intergrowths, stained.	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

GREEN MOUNTAIN AREA—Continued

Yancey County—Continued

Pinch and swell.	1-4 T.	NE	SE		Concordant	Mica gneiss		Pl-Q-M pegmatite, fine to medium grained; accessory garnet.
Pinch and swell, lenses.	1-12 T, 20-60.	NW	SW		do	Interlayered hornblende and biotite gneiss.	Weathered	P-Pl-Q-M pegmatite, poorly exposed.
Tabular	8-12.5 T.	NE	SE		Partly concordant.	Interlayered biotite and hornblende gneiss.	Partly weathered.	Pl-P-Q-M-B wall zone, medium to coarse grained; Q core.
Lenses(?)	6-12 T.	NE			Concordant	Hornblende gneiss.	Weathered	Kaolinized F-Q-M pegmatite; accessory beryl.
							do	F-Q-M pegmatite, several small bodies, poorly exposed.
Lenses	1-8 T.	NE	NW		Concordant	Interlayered biotite and hornblende gneiss.	do	Kaolinized Pl-Q-M pegmatite; accessory garnet.
Tabular, lenses.	8 bodies 1-40 T.	NE	SE		do	Mica gneiss	do	Pl-Q-P-M pegmatite, medium to coarse grained; accessory garnet, biotite. Pegmatite faulted locally.
Tabular	90 T(?)	NE	Variable		Partly concordant.	Hornblende gneiss.	do	P-Pl-Q-M wall zone; accessory garnet; Q core(?) discontinuous.
do		NE					do	Kaolinized F-Q-M wall zone; Q core. Poorly exposed.
do		NE	SE		Concordant	Mica gneiss	do	Kaolinized F-Q-M pegmatite; accessory biotite, garnet.
do	12 T.	NE	Vertical		do	do	do	Pl-Q-M-B pegmatite, medium grained; accessory garnet.

BLACK MOUNTAIN-BOWLENS CREEK AREA—Continued

Yancey County—Continued

Tabular	4-7 T, >200 L, >150 D.	NE	Variable	SW	Partly concordant.	Peridotite and interlayered biotite and hornblende gneiss.	Weathered (150 ft).	Pl-Q-M-B wall zone, fine to medium grained; Pl-M-B intermediate zone, coarse grained, discontinuous; Q core, discontinuous. Zoning not well developed and generally asymmetric. Pegmatite cut by faults locally.
Irregular pipe.	1-7 T, >400 D.	NE	NW	W	do	Mica gneiss		Pl-P-Q-M pegmatite, fine to medium grained; accessory garnet. Pipelike body formed where 2 thin tabular pegmatites coalesce along center of incline.
Lens	1-15 T.	NW	NE		Concordant	Biotite schist	Weathered (40 ft).	Pl-Q-M-B wall zone, medium to coarse grained; Q core.
Irregular	5-35 T.	NE	NW	SW	Partly concordant.	Mica gneiss	Unweathered	Q-Pl wall zone, medium grained; Pl-Q-M core(?), coarse grained.
Lens	1-8 T.	NE	Vertical		Concordant	Mica gneiss	Weathered	Pl-Q-M-P wall zone, coarse grained, discontinuous; Pl-P-Q-M intermediate zone, fine to medium grained; P-Q intermediate zone, discontinuous; Q core, discontinuous; accessory pyrite, garnet, biotite, pyrrhotite, tourmaline.
Tabular	1-4 T.	NE	SE	SW	Discordant	Biotite gneiss		Kaolinized F-Q-M wall zone, medium to coarse grained; accessory garnet, biotite, allanite; Q core.
Lens	0.5-4 T, >30 L.	NE	SE		Concordant	Mica gneiss	Unweathered	Q-Pl-M pegmatite; accessory biotite, garnet, kyanite, pyrite, pyrrhotite, apatite.
Tabular, lenses.	1-4 T.	NE	SE		do	Biotite gneiss	Weathered	Pl-Q-M pegmatite, fine to medium grained; accessory sericite, garnet, biotite, allanite.
Lenses	1-2 T.	NW	NE		do	Mica gneiss	Weathered (20 ft).	Pl-Q-M pegmatite, coarse grained.
do	1-1.5 T.	NE	NW		do	Kyanite gneiss	Weathered	F-Q-M pegmatite, fine to medium grained.
Tabular	4-6 T.	NW	Variable		do	Interlayered biotite and hornblende gneiss.	Unweathered	Pl-Q-M-B pegmatite, medium to coarse grained.
do	0.5-1.5 T.	NE	NW		Concordant	Mica gneiss		F-Q-M pegmatite, medium grained.
do	40 T.	NE	NW	NE	do	do		Pl-P-Q-M-B pegmatite, graphitic texture common; accessory tourmaline, garnet, thulite.
Tabular pinch and swell.	1-4 T.	NE	NW		do	do	Unweathered	Pl-Q-M-B pegmatite, fine to medium grained; accessory garnet, kyanite. Similar pegmatite prospect 500 ft northeast.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>BLACK MOUNTAIN-BOWLENS CREEK AREA—Continued</b>						
<b>Yancey County—Continued</b>						
497	Milt Lewis prospects.....	USGS.....	1952.....	4 prospect pits, average 8 deep.	Ruby, small.....	
515	Low No. 1 mine.....	USGS.....	1943-44.....	Cut 40 long, 18 deep.....	Light brown, "A" structure, ruled, bent, cracked, green mottled, small.	Small sheet.....
516	Low No. 2 mine.....	USGS.....	WWII(?).....	Cut 18.....	Light brown, ruled, cracked, moderately locky.	.....do.....
491	McCurry mine.....	USGS, CMC.....	1943-44.....	2 cuts 30 and 70, adit 12, shaft 20, prospect pits.	Green, bent, ruled, stained.....	.....do.....
531	McKinney mine.....	DMEA.....	Pre-WWII(?) 1952-54.....	Cut 150 long, 15 deep; inclined shaft 26, drift 40.	Ruby, moderately cracked, small.....	.....do.....
514	Flem McPeters mine.....	USGS.....	Pre-WWII.....	5 adits in area 175 long.....	Reddish brown, moderately stained, bent, locky, tangled.	
528	Newman mine.....	USGS, CMC.....	1943.....	Cut 25.....	Ruby, ruled, cracked, bent, green, mottled, small.	
522	Crip Ogle prospect.....	DMEA.....	1880, WWII, 1956-57.....	Cut 25 long, 5-30 deep; shaft 60, drifts 81.	Reddish brown, bent, ruled.....	Small sheet.....
523	Francis Ogle mine.....	USGS, CMC.....	1942-43.....	Cut 25 long, 15 deep.....	Ruby, locky, cracked, bent, stained.....	.....do.....
530	Palen Ridge prospect.....	DMEA.....	1956-57.....	Cut 20 long, 10 deep; shaft 35.	Ruby, clear, ruled.....	.....do.....
499	Parker mine.....	USGS.....	Pre-WWII, 1943.....	Cut 65 long, 35 deep.....	Light green, hard, cracked, clay stained..	Small sheet (1943).....
512	S. W. Presley (Presnell) mine.....	USGS, DMEA.....	1938-39, 1953.....	2 adits, cut 60, inclined stope 100 long, 18 high; inclined shaft 62, drifts 90.	Ruby, minor ruled, small.....	Large sheet (1938-39).....
510	Potato Chip prospect.....	USGS.....	(?).....	2 shallow trenches 76, incline 12.	Reddish brown, moderate "A" structure, bending, cracking.	
525	Rathbone (John House Cove) mine.....	USGS.....	Pre-WWII, 1944.....	8 pits and cuts, largest 50 long, 25 deep.	Ruby, hard, stained.....	Small sheet (1944).....
506	Ray (Wray) mine.....	Sterrett (1923, p. 279), USGS, OF.....	1869-85, 1914-20, 1931-32, 1942-44.....	Cuts, shafts, stopes, 20-200 deep for 650 along strike.	Ruby, moderate "A" structure, ruling, bending.	Large sheet.....
507	Little Ray (Pat) mine.....	DMEA.....	1955-57.....	Cuts, 3 shafts, stopes, drifts 60-130 deep, 660 along strike.	Greenish brown, moderate "A" structure, bending, ruling. Concentrated in south plunging rolls.	Moderate sheet.....
501	Sol Ray mine.....	USGS, CMC.....	1905, 1943.....	Cut 42 long, 12 deep; prospect pit.	Greenish brown, biotite intergrowths, bent, cracked, small.	Small sheet.....
524	Jim Riddle mine.....	USGS, DMEA.....	1885, 1940, WWII, 1955.....	Cut 100 long, 10-50 deep, adit 150.	Greenish brown and pale ruby, moderate "A" structure, ruling, stain, mineral inclusions.	Moderate sheet.....
495	Leroy Roland mine.....	USGS.....	1953.....	Pit 15 deep.....	Ruby, hard, stained, locky, small.....	
509	Willis Shanty mine.....	USGS, DMEA.....	1935, WWII, 1955-56.....	Narrow inclined stopes, 3 shafts, adit, drifts for 250 along strike, 105 deep.	Reddish brown, stained, minor ruling...	Moderate sheet.....
513	John Silvers mine.....	USGS.....	1890, 1938-40, 1943-44, 1950's.....	2 cuts 40 to 80 long, 30 deep, incline 30, prospect pits.	Greenish brown, bent, ruled, mineral inclusions.	.....do.....
527	Snake Den mine.....	USGS.....	1943, 1953-54.....	4 cuts 20-40 long, 460 along strike, 2 short adits.	Ruby, hard, moderate ruling, bending, stain.	.....do.....
492	Tantrough mine.....	USGS, OF.....	Pre-WWII, 1943-44.....	3 shafts, 45-90 deep, adit 35, cut, drifts 190.	Reddish brown, moderate biotite intergrowths, minor stain. Concentrated in southwest plunging shoots.	Moderate sheet (WWII).....
508	Fred Thomas mine.....	USGS.....	1940.....	Cut 30 long, 10 deep; adit 15		Small sheet.....
505	Westall mine (West of Bowlens Creek).....	USGS.....	WWII.....	Bench cut and prospect pits. Several hundred feet along strike.	Brownish green, concentrated along footwall.	
502	Mark Young mine.....	USGS.....	1880, 1920-25, 1943-44, 1957.....	Cut 110 long, inclined stope 40, prospect pits.	Light brown, cracked, bent, small.....	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

BLACK MOUNTAIN-BOWLENS CREEK AREA—Continued

Yancey County—Continued

Lenses	1-4 T, 30 L				Concordant	Biotite gneiss		F-Q-M pegmatite, medium grained.
Tabular	10 T	NE	Vertical		do	Mica gneiss		Pl-Q-M pegmatite, fine to medium grained; accessory biotite, sericite, garnet. Pegmatite has 4 ft gneiss inclusion.
do	1 T, >18 L	NE	NW		do	do	Unweathered	Pl-Q-M pegmatite, fine to medium grained; accessory sericite, garnet. Kaolinized F-Q-M pegmatite, medium grained.
do	0.5-1 T	NW	SW		do	do	Weathered	Pl-Q-P-M wall zone, medium grained; accessory garnet; Q core, discontinuous.
do	1-3 T, >100 L, 12 D	NE	SE		do	Biotite gneiss	Weathered (20 ft)	Q-Pl-P-M pegmatite; accessory garnet, sulfides.
do	1-4 T	NE	NW		do	Interlayered biotite and hornblende gneiss		
do	8 T(?)	NE	Vertical		do	Mica gneiss	Unweathered	Pl-Q-M pegmatite, fine to medium grained; accessory garnet, kyanite.
do	3-5 T, >100 L	NE	SE		Discordant	Biotite gneiss	do	Pl-Q-M wall zone, fine to medium grained; accessory garnet, tourmaline, sericite, sulfides; Q core, discontinuous. Pegmatite cut by several faults.
do	3-5 T	NE	SE		do	Hornblende gneiss	Weathered	Pl-Q-M wall zone, medium grained; accessory garnet, allanite; Q core, discontinuous.
Lens	0-3 T	NE	SE		do	Mica gneiss	Unweathered	Pl-Q-M pegmatite, medium grained; accessory sericite.
Tabular	6 T, 45 L	NE	SE		Concordant	do	Weathered	Kaolinized F-Q-M pegmatite, medium grained.
Pipe	3-12 T	NE	NW	SW	do	do	Weathered (30 ft)	Pl-Q-P-M pegmatite, medium to coarse grained; accessory apatite, garnet, tourmaline, beryl, biotite.
Lenses	1-8 T	NE	NW		do	Mica schist		Pl-Q-M pegmatite, fine to medium grained; accessory sericite, biotite.
Tabular	Several bodies 0.5-2 T	NW	Steep		Partly concordant	Mica gneiss		Pl-Q-M pegmatite, fine to coarse grained.
Irregular, tabular	0.5-60 T	NE	NW	SW	do	do	Weathered (20 ft)	Pl-Q-P-M pegmatite, coarse grained; accessory biotite, tourmaline, garnet, beryl, autunite, thulite, columbite-tantalite.
Warped, tabular	2-5 T	NE	SE	S	Partly concordant	Biotite gneiss	Weathered (15 ft)	Pl-Q-P-M pegmatite, medium to coarse grained; accessory garnet, tourmaline, apatite, beryl. 2 pegmatites mined or prospected.
Tabular	4 T, 100 L	NE	SE		Concordant	Mica gneiss	do	Pl-Q-M pegmatite, fine to medium grained; accessory garnet, biotite, allanite.
Branching, tabular	2-6 T	NW	Variable		Discordant	do	Weathered (20 ft)	Pl-Q-P-M wall zone, medium grained; accessory biotite, garnet, allanite; Q core discontinuous.
Tabular	6-10 T	NE	NW		Concordant	Biotite gneiss		P-Pl-Q-M-B pegmatite.
Pinch and swell	0.1-5 T	NE	NW	SW	do	do	Weathered (20 ft)	Q-Pl-M pegmatite, medium to coarse grained; accessory garnet, kyanite.
Pinch and swell, irregular	1-11 T	NW	SW	SW	Partly concordant	Mica gneiss	Unweathered	Pl-Q-M pegmatite, medium to coarse grained; accessory garnet. Several similar pegmatites mined or prospected.
Lenses	1-4 T	NE	SE		Discordant	Biotite gneiss		Pl-Q-M pegmatite, fine to coarse grained; accessory sericite, apatite, garnet, sulfides. Several pegmatites mined or prospected along fault.
Tabular	3-6 T	NE	NW	SW	Concordant	Hornblende gneiss; biotite alteration		Pl-Q-M wall zones, medium to coarse grained; accessory biotite, allanite, garnet, apatite; Q core, discontinuous. Numerous gneiss inclusions.
Lenses(?)	1-3 T	NW	SW		Concordant(?)	Mica gneiss	Weathered (10 ft)	F-Q-M pegmatite, fine to coarse grained. Poorly exposed.
Pinch and swell	0.1-3 T	NW	SW		Concordant	Biotite gneiss		F-Q-M pegmatite.
Tabular	8-10 T(?)	NE	Vertical		Discordant	Mica gneiss	Unweathered	Pl-P-Q-M pegmatite, fine to coarse grained, accessory garnet, biotite, sericite, columbite.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>MICAVILLE AREA</b>						
<b>Yancey County</b>						
569	Kirby Allen mine.....	USGS.....	1934, WWII.....	Pit 14 diameter, incline 35...	Light brown, reeved, bent, biotite in- clusions, small.	Small sheet (WWII).
552	Anglin mine.....	USGS.....	1910, int to 1925, 1936.	12 shafts 50-140 deep, adit, large stopes, in line 350.	Light green, "A" structure, moderately stained, concentrated along quartz core.	Large sheet(?).....
577	Autrey (Linzie Autrey) mine.	Olson (1944, p. 63-65).	1935-38, 1940, 1944.	Incline 380, stoped.....	Ruby, minor "A" structure, bending, ruling, stain, biotite intergrowths.	>150,000 lb sheet..
575	Ayles Creek (Allis Creek, Aley) mine.	USGS.....	1890, int to 1944...	Cut 600 long, 30 deep; shafts inclines, drifts, partly de- stroyed by cut, 80-90 deep.	Ruby, ruled, bent, reeved, minor stain. Brownish green, "A" structure, con- centrated near quartz core.	Moderate sheet....
571	Ayles Creek North mine.	USGS.....	WWII, 1950.....	Cut 100 diameter, 80 deep; several caved adits and shafts.	Ruby, hard, bent, cracked, stained.....	.....
546	Barger (Spruce Pine Mica Co. No. 21) mine.	Urban (1932), USGS, OF.	1925-31, 1941-44, 1956-62.	Stoped incline 525, drifts, stopes, inclines, shafts, in area 150 by 500.	Green to brownish green, minor bend- ing, stain, locky; small.	>200,000 lb sheet..
544	Bartlett mine.....	USGS, OF.....	1900, 1943-44.....	2 shafts, incline 80, adit 90, drifts, crosscuts.	Brownish green, clear.....	Small sheet (WWII).
543	Bee Ridge mine (North)...	USGS.....	1928, int to 1943; 1952-56.	Cut 180 long, 15-40 deep, drifts 80.	Ruby, biotite intergrowths, moderate bending, ruling.	Large sheet.....
532	Bee Ridge spar mine (South).	USGS.....	Pre-WWII, 1950's.	Cut 350 long, 150 deep, open roomlike stopes.	Ruby, biotite intergrowths.....	Feldspar, some mica(?).
556	Lower Bee Spar mine.....	USGS.....	Pre-WWII.....	6 small cuts in line 600.....	Ruby, bent, ruled.....	Scrap mica, feldspar.
557	Upper Bee Spar mine.....	USGS.....	Pre-WWII.....	Several adits, shallow cuts..	Ruby, bent, broken.....	.....do.....
563	Nelson Boone mine.....	USGS.....	1931-32, 1942-43...	Several cuts 30-60 long, 5-20 deep, adit, shaft, stope.	Reddish to greenish brown, mineral inclusions, ruled, cracked.	Small sheet (WWII).
578	Bowditch mine.....	USGS.....	Pre-WWII.....	2 adits, caved.....	Green, ruled.....	Scrap mica, feldspar.
542	Branch mine.....	USGS.....	1880-90, 1925, 1933-36.	Cut 60 long, 50 deep(?).....	Brown, biotite intergrowths, stained; "A" structure mica associated with quartz pods.	Large sheet.....
547	Branch Ridge mine.....	USGS.....	1940.....	12 adits, drifts in belt several hundred feet long.	Light brown, small.....	Moderate sheet(?)..
543	Buckeye mine.....	USGS.....	1895, int to WWII.	2 cuts 15 deep, incline 30, and adit in line 150.	Brown, ruled, bent, stained; green, wedge "A" structure, concentrated near quartz pods.	Moderate sheet....
554	Carroll mine.....	USGS.....	Pre-WWII.....	Cut, caved adit.....	Green.....	Feldspar.....
553	Vance Carroll mine.....	USGS, CMC.....	1928, 1938, 1943...	Cut, several shafts 40-50 deep, drifts, stopes, incline.	Ruby, moderately cracked, locky, stained.	Small sheet (1943)..
559	Cedarelliff mine.....	USGS.....	Pre-WWII.....	2 cuts.....	Greenish brown, "A" structure.....	Small sheet, feldspar.
574	Clinchfield mine.....	USGS.....	Pre-WWII.....	Cut 300 long, 40 deep.....	Scrap.....	Feldspar.....
545	Coy prospect.....	USGS.....	.....	Shaft 60(?), cut.....	Green, small.....	Scrap.....
566	Goog Rock mine.....	USGS, DMEA, OF.	1912-14, 1916, 1923-24, 1927-40, 1944, 1955-56.	2 parallel narrow opencuts 220-420 long, 40-160 deep, incline 405, drifts 40.	Brown, "A" structure, stained, com- monly locky.	Large sheet (1925-39), feldspar.
573	Grape Hollow mine.....	USGS.....	Pre-WWII.....	Series of cuts, 400.....	Brown, ruled.....	Feldspar.....
562	Mills Griffith (Griffin) mine.	USGS.....	1935, 1943-45.....	Cut 55 diameter, 55 deep, several shafts, small cuts, stope in area 100 by 600.	Ruby, ruled, concentrated in wall zone; green, "A" structure, stained, concen- trated along core margin.	Moderate sheet, feldspar, quartz, beryl (minor).
570	Smart Griffith mine.....	USGS.....	1944.....	Shaft 20, several cuts in area 50 by 100.	Small, cracked.....	Small sheet(?).....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

MICAVILLE AREA—Continued

Yancey County—Continued

Tabular(?)	6 T	NE	SE		Discordant(?)	Mica gneiss	Weathered	Kaolinized F-Q-M pegmatite; accessory biotite, garnet. Poorly exposed.
Irregular, flattened pipe.	1-8 T, avg 4	NE	NW	SW	Partly concordant.	do	Weathered (140 ft).	Kaolinized F-Q-M wall zone; Q core. Poorly exposed.
Irregular, tabular.	20-25 T	NE	SE	NE	do	Interlayered hornblende and biotite gneiss.	Unweathered	Pl-Q-M pegmatite, fine to coarse grained; accessory garnet, biotite, vermiculite, apatite, pyrite, chalcopyrite, pyrrhotite, kyanite. Pegmatite faulted locally.
Tabular	12 T	NE	NW		Concordant	Biotite schist	Weathered	Pl-Q-P-M pegmatite; accessory garnet; schist inclusions.
Irregular tongues.	4 T, >300 L	NE	SE	SW	Partly concordant.	Mica gneiss	Weathered (30 ft).	Pl-Q-P-M pegmatite, medium grained; accessory garnet, columbite, epidote. Q-M pegmatite (burr rock) locally abundant.
Lenses		NE	SE		Concordant	do	Weathered (50 ft).	Pl-Q-M pegmatite; accessory garnet. Most of pegmatite mined away.
Sinuuous, tabular.	2-6 T, >255 L	NE	Variable	SW	Partly concordant.	do	Unweathered	Pl-P-Q-M wall zone, medium to coarse grained; accessory biotite, garnet, apatite, beryl; Q core.
Tabular		NE			do	Interlayered hornblende and biotite gneiss.	do	Pl-P-Q-B-M wall zone, medium to coarse grained; accessory garnet; F-Q core, some graphic texture.
Tabular		NE	SE		Concordant	Hornblende gneiss.		P-Pl-Q-M pegmatite, fine to medium grained, graphic texture; accessory biotite, vermiculite, garnet.
Irregular	20 T	NE	SE		Partly concordant.	Biotite gneiss.		Pl-Q-M pegmatite, fine grained; Pl-P-Q-M core, medium to coarse grained; accessory sericite, biotite, garnet.
Tabular	6-10 T	NE	SE		Concordant	Hornblende gneiss.		P-Pl-Q-M pegmatite; accessory garnet. Poorly exposed.
Lenses	0.1-6 T, avg 4	NE	SE		do	Mica gneiss		Pl-Q-M pegmatite; accessory biotite, vermiculite, garnet.
Lenses, tabular bodies.	10-12 T	NE	SE		Partly concordant.	do		F-Q-M pegmatite.
Tabular	3-4 T	NW				Hornblende gneiss.		Pl-Q-M pegmatite; accessory vermiculite, epidote, garnet.
Tabular, branching.	50 T	NE			Concordant	Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed.
Tabular	50 T	NE	SE		Concordant	Mica gneiss		F-Q-M pegmatite.
Lenses	5-35 T, 400 L, 140 D.	NE	SE	SW	Concordant	Interlayered hornblende and biotite gneiss.	Weathered (60 ft).	Q-Pl-P wall zone(?); P intermediate zone(?); Q core, discontinuous; accessory muscovite, vermiculite, garnet.
Tabular		N	W		do	Hornblende gneiss.	Unweathered	P-Pl-Q-M pegmatite.
Irregular, arcuate.	3-40 T, >600 L	N	E	N	Partly concordant.	Mica schist		Kaolinized F-Q-M pegmatite.
		NW				Interlayered biotite and hornblende gneiss.		Pl-P-Q-M-B wall zone, medium to coarse grained; accessory thulite, calcite, garnet; Q core, discontinuous. 2 parallel lenses, sinuous in cross section.
						do		P-Pl-Q-M pegmatite, accessory garnet, pyrite.
							Weathered	Pl-Q-M wall zone, medium to coarse grained; Pl-Q-P outer intermediate zone, medium grained; accessory garnet, muscovite, biotite; P-Q-Pl middle intermediate zone, coarse grained; P-M inner intermediate zone, coarse grained, discontinuous; Q core, discontinuous; accessory beryl, pyrrhotite, pyrite, tourmaline.
								Kaolinized F-Q-M pegmatite, poorly exposed.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>MICAVILLE AREA—Continued</b>						
<b>Yancey County—Continued</b>						
541	Hector mine.....	USGS, DMEA...	1890's, 1953-60....	Cut 200 long, 20-30 deep, several shafts (southwest), open stope 200 and incline 100 (northeast). Workings about 600 along strike.	Green, "A" structure, moderately stained, bent, ruled.	Moderate sheet (1950's).
560	Hensley Laurel (Charley Young) mine.....	USGS.....	Pre-WWII, 1944..	Cut 120, inclined stope 100..	Brown-brownish green, reeved, ruled, cracked, minor stain.	Small sheet.....
555	Higgins mine.....	USGS.....	Pre-WWII.....	Many slumped pits, several adits, in line 400.	Green, "A" structure, concentrated along core margin.	.....
561	Charles Hyatte mine.....	USGS.....	1943.....	2 pits, cut 40, shaft 30.....	Light green, cracked, bent, concentrated along quartz core.	Small sheet.....
576	Laws prospect.....	DMEA.....	WWI, 1955.....	Adit and stope 95 long, 30-40 high; shaft 15, drift 80.	Ruby, ruled, biotite intergrowths.....	Small sheet (1955).....
564	Josh McCurry mine.....	USGS.....	1943.....	Shaft 15, numerous pits, cuts, trenches in area 100 by 200.	Brown, hard, biotite intergrowths, bent, cracked.	Small sheet.....
568	Shurb McKinney (Water-hole) mine.....	USGS, DMEA...	1941, 1955.....	Cut with open inclined stope 60 long, 40 deep; shaft 65, drift 63.	Green, moderately ruled, stained, cracked.	Moderate sheet (WWII), small sheet (1955).
535	Pete prospect.....	DMEA.....	1957.....	3 shallow cuts in line 140, incline 60, drift 80.	Ruby, tied, stained, cracked.....	Small sheet.....
550	Presnell (Presley) mine.....	USGS, DMEA, Dahners and McIntosh (1948), O.F.	1872, 1917 int to 1940, WWII, 1952.	Narrow cuts and open stopes, 500 long, 110 deep. Shaft 55, drift 50 to NE.	Ruby, hard, moderate biotite intergrowths, tied, lanky, ruled.	Large sheet.....
539	Amos Presnell Flukens (Clear) mine.....	USGS, DMEA...	Pre-1920, 1953-54..	4 adits, several shafts, stopes, shallow cuts in line 400.	Brown, "A" structure, stained, bent, ruled.	Small sheet (1953).....
549	John Nelse Presnell mine.....	USGS.....	1943.....	Cut 20.....	Light brown, ruled, cracked, biotite inclusions, lanky.	.....
548	Charles Robinson mine.....	USGS, DMEA, O.F.	1900, int to 1925, 1942-44, 1953-58.	Cuts, several shafts, large stopes, drifts in area 700 long, 180 deep.	Light green, minor stain.....	Large sheet, scrap.
567	John Shehan (Gouge, Ollis Statton) mine.....	USGS.....	1905, 1907, 1941-44, 1956.	Numerous cuts, inclines, stopes, shafts in area 150 by 300 and 90 deep.	Brownish green, moderate stain, mineral inclusions, reeved, cracked.	Large sheet (WWII).
572	Smith mine.....	USGS.....	1939.....	Series of pits and cuts.....	Green, hard, cracked, stained, small.....	.....
565	South Toe River mine.....	USGS.....	WWII.....	Cut 85.....	Light brown, "A" structure, lanky, cracked, small.	Small sheet.....
533	Spar Slope mine.....	USGS.....	Per-WWII.....	Cut, prospect pits.....	Mineral inclusions.....	Sheet(?) feldspar..
541	Sparks mine (200 ft southwest of the Hector mine).....	USGS.....	Pre-WWII.....	Small cuts, caved shafts and underground workings.	Green, "A" structure, clear.....	.....
540	Ed Sparks (Cox) mine.....	DMEA.....	1957-58.....	Cut 100 long, 15 deep; inclined shaft 57, drifts 92.	Green, "A" structure, stained.....	Small sheet.....
558	Styles-Fouts mine.....	USGS.....	Pre-WWII.....	Numerous pits 25 deep in line 200.	Ruby, small.....	Feldspar.....
538	Tolley Bent mine.....	USGS, O.F.....	1880, 1917-20, 1925-26, 1942-43, 1955-57.	Several shafts, pits and stopes 350 along strike, 100 down dip.	Green to brown, color zoned, hard, tied, cracked, bent.	Large sheet.....
536	Ed Woody prospect.....	USGS.....	Pre-WWII.....	Large area stripped.....	Stained, scrap.....	Scrap.....
551	Tom Woody (Edge) mine.....	USGS.....	1943.....	Cut 60 long, 20 deep; shaft 27.	Light brown, ruled, stained, tied, small.	Small sheet.....
<b>CELO AREA</b>						
<b>Yancey County</b>						
631	Alley Cut mine.....	USGS.....	Pre-WWII.....	Series of narrow cuts 800 long 15 deep, drifts, shafts, adits.	Brown, moderately stained, bent, cracked.	.....
593	Henry Allen mine.....	USGS.....	1920, int to 1944..	Incline 60, cut, adit.....	Brown, hard, green mottled, bent, stained. Brownish green, "A" structure, hard.	.....
655	Ed Banner mine.....	USGS.....	1941, 1944.....	2 cuts 50-80 long, 15-25 deep, shallow shafts, drifts.	Light brown, moderately ruled, cracked, bent.	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

MICAVILLE AREA—Continued

Yancey County—Continued

Tabular	5-14 T, >500 L	NE	SE		Concordant	Mica gneiss	Weathered (40 ft)	Pl-P-Q-M wall zone, medium to coarse grained; accessory biotite; Q core.
do	>10 T	NE	SE		do	do		Pl-Q-P-M pegmatite; accessory biotite, garnet.
do	8-10 T	NE	NW		Concordant	Interlayered hornblende and biotite gneiss.	Weathered	Kaolinized P-Q-M wall zone, medium to coarse grained; Q core.
		NE	SE		Concordant(?)	Mica gneiss	do	Kaolinized Pl-Q-M wall zone, medium to coarse grained; Q core.
Lens	1-5 T	N	W	N	Concordant	Biotite gneiss	Weathered (10 ft)	Pl-P-Q-M pegmatite, coarse grained; accessory biotite, garnet. Pegmatite pinches out in lower drift level.
		NE			Concordant(?)	Mica gneiss	Weathered	Kaolinized F-Q-M pegmatite; accessory biotite.
Tabular	3-4 T	NE	SE		Concordant	Mica gneiss hanging wall; granite foot wall.		Pl-Q-P-M pegmatite, fine to medium grained; accessory sericite, biotite, garnet, apatite. Quartz on dump may be part of Q core. Pegmatite grades into granite on foot wall.
do	3-8 T	NW	NE		do	Hornblende gneiss, biotite alteration.	Weathered (20 ft)	Pl-P-Q-M-B pegmatite.
Pinch and swell, irregular	3-15 T	NE	SE	SW	Partly concordant	Mica gneiss	Unweathered	Pl-P-Q-M wall zone, medium to coarse grained; P-Q intermediate zone, graphic texture common; accessory biotite; Q core, discontinuous; accessory sericite, garnet, apatite, sulfides. Three partly connected pegmatites mined, others prospected.
Tabular	10-15 T	NE	Variable		do	Interlayered biotite and hornblende gneiss.	Weathered (60 ft)	Pl-P-Q-M pegmatite.
		NE				Mica gneiss		Pl-Q-M pegmatite, medium grained; accessory biotite, garnet, sericite.
Tabular, lenses	1-10 T	NE	Variable	SW	Partly concordant	do	Weathered (60 ft)	Pl-Q-P-M pegmatite, medium to coarse grained; accessory apatite, garnet, beryl, allanite, uranium minerals.
Lenses	1-40 T	NE	SE	SW	do	do	Weathered (40 ft)	Pl-Q-M pegmatite, fine to medium grained; accessory biotite, vermiculite, sericite, garnet.
		N				do	Weathered	Pl-Q-M pegmatite; accessory sericite, garnet, biotite. Poorly exposed.
Tabular	6-7 T	NE	Vertical		Concordant	Hornblende gneiss		Pl-Q-M pegmatite, fine to medium grained; accessory garnet, biotite, apatite, sericite.
do					Discordant	do		Pl-Q-M wall zone; accessory vermiculite, garnet; P-Q core, graphic texture. Large gneiss inclusion.
		NE	SE		Concordant(?)	Mica gneiss		F-Q-M pegmatite, poorly exposed.
Tabular	5 T, >65 L, 50 D, 30 T	NE	SE		Partly concordant	Mica schist	Weathered (50 ft)	Pl-P-Q-M wall zone, medium to coarse grained; Q core.
do						Hornblende gneiss		P-Pl-Q-M pegmatite, coarse grained.
Lenses	1-15 T	NE	SE	S	Concordant	Interlayered biotite and hornblende gneiss, biotite alteration.		Pl-Q-P-M pegmatite, fine to coarse grained; accessory garnet, biotite, apatite, pyrite, allanite, thulite, chalcopyrite, epidote, sericite.
							Weathered	F-Q-M pegmatite, poorly exposed.
Tabular	3-4 T	NE	SE		Concordant(?)	Mica gneiss	do	Pl-Q-M pegmatite; accessory sericite, garnet, biotite. Poorly exposed.

CELO AREA—Continued

Yancey County—Continued

Lenses		NE	SE	SW		Mica gneiss	Weathered	F-Q-M pegmatite.
Tabular	3-5 T	NW	SW		Concordant	Biotite gneiss		Pl-Q-M pegmatite, medium grained; accessory garnet, apatite, biotite.
Irregular	1-6 T	NE	NW		Partly concordant	Hornblende gneiss		Pl-Q-M pegmatite, medium to coarse grained.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>CELO AREA—Continued</b>						
<b>Yancey County—Continued</b>						
632	Black Dixie mine.....	USGS.....	1914-17, 1937-40, 1942, 1944.	Cut 100, incline 100.....	Yellowish-brownish green, stained.....	Moderate sheet.....
582	Blackjack Ridge mine.....	USGS.....	Pre-WWII.....	2 cuts, each 300, adits, pits, in line 1,000.	Brown, mostly scrap.....	Scrap.....
589	Blackwelder mine.....	USGS.....	WWII.....	Cut 50 long, 30 deep; shaft 12.	Green, ruled, haircracked, stained, "A" structure, small.	Small sheet.....
583	Blake (Boomer Tom Young) mine.	USGS, OF.....	1870, 1900, 1923- 25, 1930, 1942- 47.	Numerous cuts, adits, in- clines, stopes in area 400 by 500.	Light green to brownish green, commonly stained, minor "A" structure, ruling.	Moderate sheet.....
645	Blalock Rock mine.....	USGS.....	1890, WWII.....	Cut 125, pit 25.....	Green, "A" structure, cracked, small..	Small sheet (WWII).
592	Blevins-Thomas mine.....	USGS.....	1905, 1943-44.....	Cut 160, shaft 25, adit 80.....	Green, "A" structure, moderately locky, cracked, quartz inclusions, common green mottled.	Moderate sheet.....
585	Joe Boone mine.....	USGS.....	WWII.....	Small cut.....	Green, "A" structure, concentrated near quartz core.	Small sheet.....
636	Branch mine.....	USGS.....		Shaft 18, 2 prospect pits.....	Green, cracked, small.....	do.....
626	Brown Creek mine.....	USGS.....	1933, WWII.....	Cut 40 long, 20 deep; shaft 35, drift.	Brownish green, hard, "A" structure, stained, minor locky, clay stain.	do.....
651	Cecil Burgin mine.....	USGS.....	1935, 1942.....	Pits, cuts, shaft 12, drift.....		
614	Burton (Peterson) mine.....	USGS.....	1890, WWI, 1942.....	Shaft 30, incline 70.....	Light green, reeved, stained, cracked, small.	Moderate sheet.....
627	Champion mine.....	USGS.....	WWII.....	Cut 18 long, 10 deep with incline to northeast.	Greenish brown, hard, "A" structure, tied, cracked, small.	
599	Cora mine.....	USGS.....	WWII.....	Cut 75, small stope 20.....	Ruby, biotite intergrowths, quartz inclusions, ruled, reeved, bent, cracked.	Small sheet.....
629	Creson mine.....	USGS.....	1885, 1944.....	Cut 90, 5 shafts 10-45 deep.	Ruby, hard, biotite intergrowths, tied, cracked, minor reeved, ruled.	Small sheet (1944).
643	Dink Rock mine.....	USGS.....	1890, WWI.....	Incline 170.....	Greenish brown, stained.....	Moderate sheet (1917).
615	Edge mine (near Fawn Mountain).	USGS.....	Pre-WWII.....	Series of cuts, trenches, short adits, pits.	Brown, cracked, moderately stained, small.	
653	Edge mine (northeast of Harvard School).	USGS.....	Pre-1900, 1940.....	Several adits, pits, shaft in line 125.	Stained.....	Scrap, sheet (?), feldspar.
652	John Edge mine.....	USGS, OF, CMC.	1931, 1943-44.....	2 inclines 65-120.....	Green "A" structure, minor stained.....	Small sheet (1943-44).
612	Fawn Knob (Hall and Young) mine.	USGS, CMC.....	1920-25, 1943.....	2 shafts, incline, series of pits and cuts in area 50 by 100.	Green, "A" structure, quartz inclusions, cracked, small.	Small sheet.....
598	Flukens Ridge mine (near Butler Gap).	USGS, CMC.....	1925-26, 1929-31, 1937-38, 1940, 1943.	Several adits, cuts, shaft 68, drifts.	Brown, clay stained, cracked.....	Moderate sheet.....
633	Frogeye mine.....	USGS, CMC.....	1924-26, 1931, 1936, 1943.	Several cuts, shafts, about 50 deep.	Brownish green, stained, small.....	Small sheet (1943).
609	Gibbs mine.....	USGS, OF, Sterrett (1923, p. 273).	Pre-1906, 1922 int to 1939, 1943-44.	2 inclines; Big Gibbs in- cline 500, Little Gibbs incline 425.	Greenish brown, moderately stained, cracked, ruled, locky.	Large sheet.....
607	Gibbs Spar mine.....	USGS.....	Pre-WWII.....	Cut 80 long, 25 deep; other cuts in line 250.	Greenish brown, small.....	Scrap, feldspar.
648	Elmyra Gibbs mine.....	USGS, OF.....	1890, 1933, 1937- 38, 1943-44.	7 shafts 40-90 deep, in- clines, stopes in area 100 by 350.	Brown, stained.....	Large sheet.....
649	Old Gibbs (Washout, Bland, Gibbs Clay) mine.	USGS.....	1924-26, 1933-35.....	Cut 125 long, 75 deep; sev- eral adits.	Reddish brown, minor stain, biotite in- tergrowths, cracked.	Moderate sheet, clay, scrap.
625	Gilley mine.....	USGS, CMC.....	1885, 1943.....	Pit 25 diameter with in- cline 115(?).	Green, "A" structure, minor stain.....	Small sheet (1943).
579	Gimbel mine.....	USGS.....	Pre-WWII.....	Cut 80 long, 15 deep; adit, underground workings.	Ruby, minor stained.....	Sheet, feldspar.....
630	Joe Goodin mine.....	USGS.....	Pre-WWII.....	2 small cuts.....	Brownish green.....	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

CELO AREA—Continued

Yancey County—Continued

Lenses	1-20 T	NE	SE	SW	Concordant	Mica gneiss	Unweathered	PI-Q-M pegmatite, medium grained; accessory biotite, vermiculite, garnet, allanite, epidote, sericite. Pegmatite cut by aplite dike.
Irregular		NW				Granite, interlayered hornblende and biotite gneiss.	Weathered	PI-Q-P-M pegmatite, medium grained; accessory biotite, vermiculite. Irregular masses in fine-grained pegmatite or granite.
Tabular	6 T	NE	SE		Concordant	Mica gneiss		PI-Q-M pegmatite; accessory garnet, apatite, sericite.
Irregular, tabular	5-30 T	NE	SE	S		Granite and interlayered biotite and hornblende gneiss.	Weathered (25 ft.)	PI-Q-M wall zone, medium grained; PI-Q-B core, coarse grained. Several pegmatites present both in granite and gneiss.
Tabular	6 T, 150 L	NE	Vertical		Concordant	Mica gneiss		P-Q-M pegmatite, fine to medium grained; accessory sericite, garnet.
Tongue	5-20 T	NE	SE	SW	do	Biotite gneiss		PI-Q-M wall zone, medium grained; Q core, discontinuous.
Tabular(?)	>8 T	NW					Weathered	PI-Q-M wall zone; Q core.
Tabular	5 T(?)	NE	Steep				do	P-Q-PI-M wall zone; accessory garnet; Q core.
Lens	15 T	NW	SW		Concordant	Hornblende gneiss.	do	PI-Q-M wall zone, medium grained; accessory tourmaline; Q core, discontinuous. Other workings on similar pegmatite, southeast and southwest.
Tabular		N	Vertical		do	Biotite gneiss	do	F-Q-M wall zone; Q core. Poorly exposed.
do	4 T	NW	SW		do	Mica gneiss		PI-Q-M pegmatite, fine to medium grained; accessory sericite, garnet.
		NE	SE		do	Hornblende gneiss.	Unweathered	PI-Q-M pegmatite; accessory sericite, garnet, allanite, epidote.
Irregular, lens	4-6 T	NE	NW	SW	do	Mica gneiss	do	PI-Q-M-B pegmatite, medium grained; accessory sericite, garnet, tourmaline.
Tabular	12-15 T	N	W		do	Hornblende gneiss.		PI-Q-M-B wall zone, medium grained; accessory garnet, sericite; Q-PI core, medium to coarse grained.
Tabular, lens	1-20 T	NE	NW	SW	do	Interlayered hornblende and biotite gneiss.		PI-Q-P-M pegmatite, medium grained, graphic texture common; accessory garnet, epidote.
Tabular	100 T(?)	NE	SE		do	Mica gneiss	Weathered	F-Q-M pegmatite, contains gneiss inclusions.
do	8-15 T	NW	SW		do	do		PI-Q-M pegmatite, medium grained; accessory vermiculite.
Irregular, lenses	2-4 T	NW	SW		Partly concordant.	do	Unweathered	PI-Q-M-P pegmatite, medium to coarse grained; accessory garnet, thulite.
	5-6 T	NW	SW			Mica gneiss, granite.	Weathered	Kaolinized F-Q-M pegmatite; accessory biotite, sericite, garnet.
Tabular(?)		NE	NW		Concordant	Mica gneiss	do	PI-Q-P-M pegmatite, medium to coarse grained; accessory garnet, vermiculite.
	20-25 T	NE	NW	SW	Concordant(?)	do	Weathered (40 ft.)	PI-Q-M pegmatite.
Irregular	6-15 T	NE	NW	SW	Partly concordant.	do		PI-Q-M pegmatite, coarse grained; accessory garnet, apatite, epidote, thulite. Contains numerous gneiss pendants.
Tabular	60 T	NE	Steep		Concordant	Interlayered hornblende and biotite gneiss.		PI-P-Q-M pegmatite; accessory garnet.
Irregular, pinch and swell	2-20 T	N	W	SW	Discordant	Interlayered biotite and hornblende gneiss; biotite alteration.	Weathered (60 ft.)	PI-P-Q-M pegmatite; accessory garnet, epidote. Most mining followed long pipeline bodies of pegmatite.
Tabular	50 T	NW	SW		Partly concordant.	Mica gneiss	Weathered	PI-P-Q-M-B pegmatite; accessory vermiculite, garnet.
do	6-12 T	NE	SE			Granite	do	Kaolinized F-Q-M wall zone; Q core.
Pinch and swell	15 T (avg)	NW	SW		Concordant	Hornblende gneiss.		P-PI-Q-M-B pegmatite, fine to coarse grained.
Tabular	30 T	NW	SW		do	do		P-PI-Q-M wall zone, medium to coarse grained, graphic texture; accessory garnet; Q core, discontinuous.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>CELO AREA—Continued</b>						
<b>Yancey County—Continued</b>						
603	Fannie Gouge (Spruce Pine Mica Co. No. 10) mine	Urban, 1932; USGS.	1903, 1912, 1925-32, 1938, 1943.	Incline 800, irregular stopes.	Green, "A" structure, moderate biotite intergrowths, ruled, stained.	>200,000 lb sheet...
622	Henry Grindstaff mines: No. 1	USGS	Pre-WWII	4 adits, cuts in line 250	Greenish brown, clay stained, mostly scrap.	
646	No. 2	USGS	Pre-WWII	2 series of cuts and adits 300 long and 300 apart.	Greenish brown, stained	
644	No. 3	USGS	1905, 1937	Series shallow pits, drifts, shaft 25 for 200 along strike.	Greenish brown, cracked, tied, ruled	
647	No. 4	USGS	1940	Pit, incline, drift	Green, cracked, tied, "A" structure, small, scrap.	Scrap
597	Gurley mine	USGS	Pre-WWII	Caved pits 35 diameter	Brown, clay stained, cracked	
619	Hall mine	USGS	Pre-WWII	Inclines, shafts, drifts in area 100 by 200.	Brown, stained, cracked, bent	
590	Cleveland Hall mine	USGS	1900, 1914, 1918, 1938, 1940, 1944.	Cuts, inclines, stopes, adits, for 500 along strike.	Green, reeved, minor stained	Moderate sheet (1944).
595	Shelby Hall mine	USGS	1943	Inclined shaft 18	Ruby, "A" structure, haircracked, small.	
602	Ike Hensley mine	USGS	1939, 1943	Cut 60	Brown, hard, moderately cracked, ruled, stained, mottled.	
606	Hilliard mine	USGS	1905, 1918, 1925, 1930-31.	10 adits, caved shafts in area 60 by 200.	Reddish brown, biotite intergrowths	Moderate sheet
581	Ray Howell mine	USGS	1943-44	Pit 35 diameter, 30 deep, cut 25.	Light brown, "A" structure, ruled, cracked.	do
634	Irby Cut mine	USGS	1880, 1943	Irregular cuts, inclined stopes in area 100 by 250.	Brownish green, minor stained	
613	Lighted Rock mine	USGS, CMC	1905, 1925, 1942-43.	3 cuts 30-80 long, 5-20 deep, shaft 30 deep.	Green, "A" structure, stained, cracked, bent.	Moderate sheet (1942-43).
654	Gaston McDowell mine	USGS	1940	Adit 150, stopes, shaft, pits.	Brown, "A" structure	
640	McIntosh mine	USGS	1906	Irregular cuts in area 100 by 300, adit 150.	Brownish green, "A" structure, herring bone, garnet inclusions.	
584	Arvin McKinney mine	USGS	1943	Cut 200 long, 20 deep; drifts.	Green	Moderate sheet
587	W. A. McKinney (Sport Heaton) mine.	USGS, DMEA	1943-44, 1954-55	Incline 75, drifts 80	Greenish brown, biotite intergrowths, moderately stained, bent, ruled, cracked.	Moderate sheet (1954-55).
588	W. A. McKinney prospect.	USGS	1938-39	Incline 30, stripped area	Green, "A" structure, hard, small	Small sheet, scrap.
586	Negro Bob mine	USGS	1944	4 shafts 30-60 deep, drifts.	Green	Small sheet
580	Newdale mine group	USGS	Pre-WWII	8 adits, numerous pits in area 1,500 by 5,000.		
605	Poll Hill mine	Sterrett (1923, p. 274), USGS, OF.	1900, 1905, 1917 int to 1939, 1943-44, 1958.	Numerous cuts, pits, shafts, adits, 3 inclines 350-800 long, in area 500 by 900.	Brownish green, moderately stained	>460,000 lb sheet...
608	Red (Bennett) mine	USGS, DMEA	Pre-WWII, 1953-54.	3 cuts, shaft 30, drifts, adit 20 in line 350.	Reddish to yellowish brown, "A" structure, stained, bent, ruled.	Moderate sheet (1953-54).
624	Robinson Jr. prospect	USGS	WWII(?)	Pit 12	Green, "A" structure, haircracks	
604	Corb Robinson (Old Flukens) mine.	USGS	1885, int to 1928, 1944.	Numerous cuts, pits, adits, inclined stope in area 200 by 200.	Brownish green, hard, stained, mineral inclusions, cracked.	Moderate sheet (1944).
600	Rock mine	USGS, DMEA, OF.	1909, 1943-44, 1954-56.	Cut 100, incline 90, drifts on 3 levels.	Greenish brown, "A" structure, bent, locky, cracked, moderately stained.	Large sheet
650	Sally Knob mine	USGS	1910, 1930-31, 1936	3 cuts in line 75	Greenish brown, stained	do
635	Shakerig mine	USGS	Pre-WWII	Irregular cuts, underground workings.	Brownish green, bent, cracked, ruled	
642	Shuford (Wiley Blevins) mine.	USGS, DMEA	1920, 1942-43, 1953	Cut 150 long, 10 deep, several small pits, adit.	Ruby, hard, moderately stained, bent, cracked, small	Small sheet

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite		Attitude			Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

CELO AREA—Continued

Yancey County—Continued

Pinch and swell.	4-20 T.	NE	NW	SW	Partly concordant.	Mica gneiss.	Unweathered.	Pl-Q-M wall zone, coarse grained; perthite intermediate zone, coarse grained, discontinuous; Q core. Accessory biotite, sericite, epidote thulite, garnet, apatite, monazite, cyrtolite, uraninite, clarkite, gummitite, uranophane, autunite, torbernite, calcite.
Tabular(?)	50 T.	NE			Concordant.	do.	Weathered.	Pl-Q-P-M pegmatite, graphic texture common; accessory thulite, epidote.
do.	15 T.	NE			do.	do.		Pl-Q-M pegmatite, 2 parallel bodies mined.
Lens.	5-12 T.	NE	NW	SW	do.	Biotite gneiss.	Weathered.	Pl-Q-M wall zone; Q core.
Tabular.		NE	NW		do.	do.		M-Pl-Q border zone, fine grained; Q-Pl wall zone medium to coarse grained; Q core, discontinuous. Pegmatite cut by aplite dike.
Tabular(?)	5 T.	NE	NW		do.	Mica gneiss.	Weathered.	F-Q-M pegmatite, poorly exposed.
Pods.	2-4 T.	NE	NW		Partly concordant.	do.		Pl-Q-M pegmatite, several bodies worked.
Tabular.	0.5-1 T.	NW	SW		Concordant.	do.		Pl-Q-M pegmatite, medium to coarse grained; accessory garnet, thulite.
do.	6 T.	NE	Vertical		do.	do.		Pl-Q-M pegmatite.
		NE	SE		Discordant.	Interlayered hornblende and biotite gneiss.	Weathered.	Kaolinized F-Q-M pegmatite; accessory biotite; poorly exposed. 2 pegmatites reported.
Lens(?)	20 T, >40 L.	NE	SE		Concordant.	Mica gneiss.		Pl-Q-M pegmatite, fine to medium grained; accessory biotite, sericite, garnet.
Lenses.	1-20 T.	NE	SE	SW	Partly concordant.	do.		Pl-Q-M pegmatite, medium grained; accessory biotite, vermiculite, garnet, allanite, epidote, sericite. Cut by aplite dike.
	40 T(?)	NE	SE			Granite.	Weathered (20 ft).	Pl-Q-M pegmatite; accessory garnet, biotite.
Tabular.	4-7 T.	NW	SW		Partly concordant.	Interlayered hornblende and biotite gneiss.		Pl-Q-P-M pegmatite, coarse grained; accessory biotite, beryl, tourmaline, garnet.
		NE	SE		Concordant(?)	Mica gneiss.	Weathered.	F-Q-M pegmatite, cut by aplite dikes.
Irregular.						Granite.	do.	F-Q-M pegmatite masses in granite.
Tabular, pipe.	>45 T.	NE	SE	SW	Concordant.	Mica gneiss.	do.	Pl-P-Q-M-B wall zone, coarse grained; P-Q intermediate zone, coarse grained; Q core. Accessory garnet, thulite, epidote.
						Granite, mica schist.	Weathered.	F-Q-M pegmatite in granite. Poorly exposed.
Tabular.	5 T.	NW				do.	do.	F-Q-M pegmatite, poorly exposed.
Irregular.						Granite, mica gneiss.	do.	Numerous bodies of kaolinized F-Q-M pegmatite, poorly exposed.
Irregular, lenses, pinch and swell.	4-7 T.	NE	SE	SW	Partly concordant.	Mica gneiss.		Pl-Q-M-P pegmatite, medium to coarse grained; accessory garnet, biotite, apatite, epidote, calcite. Mining followed discontinuous lenses in 3 parallel zones.
Tabular.	35-50 T, 3,500 L(?).	NE	NW	SW	Concordant.	Biotite schist.	Weathered (10 ft).	P-Pl-Q-M pegmatite, medium to coarse grained; graphic texture common in interior part; accessory biotite, vermiculite, garnet, apatite, pyrite.
		NE					Weathered.	Kaolinized F-Q-M wall zone; Q core(?), poorly exposed.
Elongate lens.	6 T.	NW	SW	SW	Partly concordant.	Mica gneiss.	do.	Pl-Q-M pegmatite, fine to coarse grained; accessory biotite, sericite, garnet, apatite, allanite.
Irregular, lenses.	1-20 T.	NE	NW	SW	do.	Mica schist.	Unweathered.	Pl-Q-M pegmatite, medium to coarse grained; accessory garnet, apatite, biotite, tourmaline.
Tabular.	10 T.	NW	SW		do.	Interlayered biotite and hornblende gneiss.		Pl-P-Q-M pegmatite; accessory allanite, garnet, samarskite, thulite.
		NE			Concordant(?)	Mica gneiss.	Weathered.	Pl-Q-M pegmatite, poorly exposed. Locally cut by aplite.
Lenses.	1-2 T.	N	W			Granite, mica gneiss.	do.	F-Q-M pegmatite, medium to coarse grained.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		

## SPRUCE PINE DISTRICT—Continued

## CELO AREA—Continued

## Yancey County—Continued

628	Silvers mine.....	USGS.....	Pre-WWII.....	2 series of workings, 500 along strike.	"A" structure, ruled.....	
637	Sleepy Hollow mine.....	USGS.....	1880, 1930, 1943-44.	Pits, 4 adits and under-ground works.	Brownish green, "A" structure, herring bone, garnet inclusions.	Small sheet (1943-44).
601	Speck mine.....	USGS.....	1915-20.....	5 cuts, 2 are 60 long.....	Light brown, moderately stained, biotite intergrowths.	Sheet, feldspar.....
611	Spider mine.....	USGS.....	1912-14, 1925, 1927, 1929-31.	Incline 250, small cuts, pits, adits.	Brown, commonly stained, ruled, bent.....	Large sheet.....
610	Floyd Thomas mine.....	USGS, CMC.....	1930, 1943.....	Shaft 20, adit, drift.....	Green, "A" structure, stained.....	Small sheet.....
617	Washburn (James Gouge) mine.	USGS, CMC.....	1885, 1936-37, 1943.	Incline 80, cut 30.....	Greenish brown, bent, stained, small.....	Small sheet (1943).....
618	Water mine.....	USGS.....	1943.....	Cut 35, shaft 12.....	Light brown, sand holes, small.....	Moderate sheet(?).....
620	Weld prospect.....	DMEA.....	1956-58.....	Cut 60, inclined shaft 53, drift 60.	Green, moderately bent, cracked.....	Small sheet.....
638	Whim mine.....	USGS.....	Pre-WWII, 1943.....	Shaft 40, cuts and shallow shafts, drifts.	Brownish green, "A" structure, mineral inclusions.	
639	White mine.....	USGS.....	1906.....	Several opencuts, pits, shallow shafts and drifts.	Brownish green.....	
641	Whiteface mine.....	DMEA.....	Pre-WWII(?) 1954.	Cut 600, shafts, inclined stope, drifts.	Green, stained, bent, ruled.....	Moderate sheet (1954).
621	Willis Rock mine.....	USGS.....	WWII.....	Cut 25, pit 15.....	Light green, "A" structure, cracked.....	Small sheet.....
656	Woody's Ridge mine.....	USGS.....	Pre-WWII.....	Cut, shaft(?) in southwest end of cut.	Light brown, stained, ruled.....	Feldspar.....
623	Charlie Young mine.....	USGS.....	Pre-WWII.....	3 cuts in line 100.....	Brownish green, "A" structure, mineral inclusions.	Scrap, feldspar.....
596	Thad Young mine.....	USGS.....	1942-43.....	Several pits, shaft 60, in area 100 by 400.	Greenish brown, tied, stained, ruled.....	Moderate sheet.....
616	Wilt Young mine.....	USGS.....	1922, 1925-26, 1937, WWII.	Cuts, shallow underground workings.	Brown, small.....	Moderate sheet, scrap.
594	Zeph Young mine.....	USGS.....	1875, int to 1938, 1943.	Lower incline 300, upper incline and stope 200 long, 40 high.	Brownish green, cracked, locky, stained, mineral inclusions.	
591	Little Zeph Young mine.....	USGS.....	1916, 1927-28, 1938 int to 1944.	Cuts, inclines, drifts in area 50 by 200.	Brown, hard; brownish-green "A" structure, stained, cracked.	Large sheet.....

## SOUTH TOE RIVER AREA

## Yancey County

664	Bill Autrey mine.....	USGS, OF.....	Pre-WWII.....	Pits, shafts, adits for 350.....	Ruby, moderate "A" structure, commonly bent, cracked, ruled, clay stain.	
672	Carson Rock mine.....	USGS, DMEA.....	1870-75, 1896-97, 1922, 1932 int 1939, 1942-45, 1952-55.	Several inclines, shaft, stopes, drifts in area 100 by 250.	Ruby, "A" structure, moderately stained, bent, ruled, biotite intergrowths, sulfide inclusions.	Moderate sheet.....
670	Clear Creek mine.....	USGS.....	Pre-WWII.....	Cut, prospect pits for 100 along strike.	Reddish brown, "A" structure.....	Small sheet.....
668	Clear Creek Ridge mine.....	USGS.....	Pre-WWII.....	3 cuts in line 300.....	do.....	Sheet, feldspar.....
666	Colberts Creek (Woodley Knob) mine.	USGS.....	1943.....	Cut 55 long, 25 deep.....	Ruby, moderately cracked, ruled, reeved, bent.	Small sheet.....
663	Colbert Ridge mine.....	USGS.....	Pre-WWII.....	8 adits in belt 150.....	"A" structure, ruled.....	
674	Rob Deyton mine.....	USGS.....	1943-44.....	Cut 30 long, 20 deep.....	Brownish green, ruled, bent, biotite intergrowths, small; yellowish green, "A" structure, mottled, stained.	Small sheet(?).....
657	House Rock prospect.....	USGS.....	1895.....	Adit 50, pit.....	Reddish brown.....	Small sheet.....
660	Klondike prospect.....	USGS.....	1890, 1910, 1944.....	Incline 30.....	Brown, reeved, ruled, minor stain.....	Small sheet (1944).....
661	Locust Ridge (Sid Critts) mine.	USGS.....	1890, 1935, 1938, 1945.	Cut 40 long, 15 deep, with incline 35.	Green, "A" structure, locky, bent, stained, concentrated along hanging wall. Brown cracked, small, concentrated along footwall.	Small sheet (1945).....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

CELO AREA—Continued

Yancey County—Continued

Irregular, pinch and swell.	1-6 T	NE	NW		Partly concordant.	Hornblende gneiss; biotite alteration.		P-Q-P1-M pegmatite. Several bodies present.
		NE	SE		do	Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed.
Irregular, lenses.		NE	NW		Concordant	do		P1-P-Q-M pegmatite; accessory biotite, vermiculite, garnet, epidote, allanite.
Irregular	1-30 T	NE	SE		Partly concordant.	Biotite gneiss		P1-Q-P-M pegmatite; accessory epidote, garnet, allanite.
Tabular	3 T	NE	SE			Granite	Weathered	Kaolinized F-Q-M pegmatite, poorly exposed.
Lens	1-14 T	NE	Vertical	SW	Concordant	Mica gneiss	Weathered (40 ft).	Kaolinized F-Q-M pegmatite, fine to medium grained; accessory biotite, sericite, garnet.
Tabular	6 T	NE	SE		do	do	Weathered	Kaolinized F-Q-M pegmatite.
do	3-7 T	N	W			Granite	Unweathered	P1-Q-M wall zone, coarse grained, discontinuous; P-P1-Q-M core(?), course grained; accessory garnet.
		NE	NW		Concordant(?)	Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed.
		NE	SE		do	do	do	Do.
Lenses	1-5 T	E	S		Concordant	Biotite schist	Weathered (20 ft).	P-Q-P1-M pegmatite, coarse grained; accessory biotite, garnet.
Tabular	10 T	NE	SE		do	Mica gneiss		P1-Q-M pegmatite, fine to medium grained; accessory garnet.
do	35 T	NW	SW		do	Hornblende gneiss; biotite alteration.		P-P1-Q-M pegmatite, coarse grained; accessory pyrite, thulite.
do		NE	NW		do	Mica gneiss		P-P1-Q-M pegmatite, coarse grained; accessory vermiculite, allanite garnet, epidote, thulite.
Tabular(?)	10 T	NW	SW		do	do	Weathered	P1-Q-M pegmatite, fine to medium grained, accessory garnet, apatite, biotite, sericite.
do	100 T(?)	NE	SE		do	do	do	Kaolinized F-Q-M pegmatite, poorly exposed.
Tabular, pinch and swell.	1-12 T	NE	Variable	SW	do	do		P1-Q-P-M pegmatite, medium grained; accessory garnet, apatite, thulite, sericite. 2 large pegmatite bodies probably joined.
Tongue, pinch and swell.	3-8 T	NW	SW	SW	Partly concordant.	do		P1-Q-M wall zone, medium to coarse grained; accessory garnet, sericite; Q core, discontinuous.

SOUTH TOE RIVER AREA—Continued

Yancey County—Continued

Tabular		NW	SW		Partly concordant.	Mica gneiss	Weathered	P1-Q-M wall zone, medium grained; accessory garnet, biotite; Q core.
do	2-13 T	NE	SE	SW	Concordant	do	Unweathered	P1-M border zone, fine grained; P1-Q-M wall zone, coarse grained; Q core. Accessory biotite, sulfides, tourmaline, kyanite, garnet. Several pegmatites present, 2 western ones mined.
do	8 T	NE	SE		do	do		P-P1-Q-M pegmatite, medium grained; accessory garnet.
do	10 T	N	E		Discordant	do		Q-P-P1-M pegmatite, some graphic texture; accessory biotite, vermiculite, sulfides. 3 pegmatites present.
do	1-6 T	NE	NW		do	do		P1-Q-M pegmatite, medium grained; accessory biotite, sericite, garnet.
Branching, tabular.		N	Variable		Partly concordant.	Hornblende gneiss.		P-Q-P1-M pegmatite, graphic texture common; accessory vermiculite, sulfides.
Irregular, pipe.	15 T	NE	SE	SW	Concordant	Mica gneiss		P1-Q-M wall zone, coarse grained; accessory tourmaline, biotite, sericite, pyrrhotite, apatite, garnet; Q core.
Tabular	4 T	NE	NW		Concordant	Interlayered biotite and hornblende gneiss.		P1-Q-M pegmatite, medium grained.
do	1-4 T	NW	SW		do	Interlayered hornblende and biotite gneiss.		P1-P-Q-M-B pegmatite, medium grained.
do	1-6 T	NW	SW		do	Mica gneiss		P-P1-Q-M pegmatite; accessory biotite, garnet.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>SOUTH TOE RIVER AREA—Continued</b>						
<b>Yancey County—Continued</b>						
671	Middle Ridge mine.....	USGS.....	1905, WWI, 1943..	Open stope 80 long, 20 deep.	Pinkish buff, hard, cracked, ruled, bent; green, "A" structure, stained.	Small sheet (1943).
673	George Moon mine.....	USGS.....	1943.....	Cut 15 diameter, 20 deep....	Light brown, "A" structure, ruled, small, concentrated near footwall.	-----
675	Murphy mine.....	DMEA.....	1936, 1957.....	Incline 93.....	Light brown, soft, "A" structure, stained. Ruby, hard, biotite intergrowths.	Small sheet (1957).
669	Sawnee Hill mine.....	USGS.....	Pre-WWII.....	Small cut, incline 15, adit 60.	Reddish brown, "A" structure.....	-----
665	Westall mine.....	USGS, DMEA, OF.	1890, 1917 int to 1943, 1952-53.	Cut with incline 130, 2 adits, drifts, stopes, in area 100 by 450.	Cinnamon brown, ruled, cracked, "A" structure, biotite intergrowths.	Large sheet.....
662	R. D. Westall mine.....	DMEA.....	1940, 1954-55.....	Adit 100, incline 50, drift 56.	Ruby, cracked, ruled, stained.....	Small sheet (1954).
667	Whitson mine.....	USGS.....	Pre-WWII.....	4 shafts 26-40 deep, adit, irregular underground works.	Reddish brown, clay stained.....	-----
659	Joe Young mine.....	USGS.....	1890, 1925, 1943-44.	Incline 30.....	Light brown, ruled, reeved, stained.....	Small sheet.....
658	Joe Young prospect.....	USGS.....	1944.....	Pit 10 deep.....	Ruby, bent, cracked, stained.....	do.....
<b>CRABTREE CREEK AREA</b>						
<b>Yancey County</b>						
683	Baucombe Rock mine.....	USGS.....	1923, WWII.....	Cut 100, adit 60.....	Brownish green, tied, cracked, bent, concentrated in wall and intermediate zones; green, wedge "A" structure, concentrated near core.	Moderate sheet, feldspar.
679	Buckeye mine.....	USGS.....	Pre-WWII.....	3 cuts 30 deep.....	Small.....	Feldspar(?).....
683	Carolina Mineral Co. No. 20 mine.	USGS.....	1915, 1922, 1936, WWII.	Cut 580 long, 20-110 deep....	Brownish green, tied, cracked, bent, concentrated in wall and intermediate zones; green, wedge "A" structure concentrated near core.	Large sheet, scrap, feldspar.
677	Cox Knob mine.....	USGS.....	WWII.....	Cut 20 long, 20 deep.....	Green, "A" structure, haircracked, bent, biotite intergrowths.	-----
684	Eagle Bluff mine.....	USGS.....	WWII.....	Cut 220 long, 30 deep.....	Green, wedge "A" structure.....	Small sheet, feldspar.
682	Fairview Spar mine.....	USGS.....	Pre-WWII.....	Cut 20.....	Green, "A" structure, cracked.....	Scrap feldspar.....
676	Huskins prospect.....	USGS.....	1954.....	2 trenches 10 deep.....	Greenish brown, cracked, tied, moderately stained, ruled. Small.	-----
681	James mine.....	USGS, OF.....	1870-80, 1941-43.....	Numerous pits, cuts, adits, drifts, shafts in area 150 by 500.	Greenish brown, "A" structure, clay stained.	Small sheet (WWII), scrap.
680	Laurel Branch mine.....	USGS.....	1944.....	Cut 50 long, 8 deep.....	Greenish brown, "A" structure, cracked, stained.	Small sheet.....
678	Josh Young mine.....	USGS.....	Pre-WWII.....	Shallow cuts and caved adits in area 75 by 100.	Greenish brown, "A" structure.....	-----

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

SOUTH TOE RIVER AREA—Continued

Yancey County—Continued

Irregular, flat pipe.	3-10 T.	NE	SE	SW	Discordant	Mica gneiss		P1-Q-M pegmatite, fine to medium grained; accessory tourmaline, garnet, apatite, biotite, sericite. Quartz muscovite "burr rock" abundant locally.
Tabular	2-6 T.	NE	SE		Concordant	do		P1-Q-M pegmatite, fine to medium grained; accessory biotite, garnet, sericite.
Irregular, pipe.	5-10 T.	NE	NW	SW	do	Interlayered biotite and hornblende gneiss.		P1-Q-M wall zone, accessory sericite, biotite; Q core.
Tabular	4 T.	NE			do			Q-P1-M wall zone; accessory garnet; Q core(?).
Irregular, pipe.	10-35 T.	NE	NW	SW	Discordant	do		P1-Q-M wall zone, fine to medium grained; P1-Q-P intermediate zone, fine to medium grained; Q core. Accessory biotite, beryl.
Tabular	2-4 T.	NW	SW		Concordant	Mica gneiss	Weathered	P1-Q-M wall zone; Q core.
do	6 T.	NE	SE		Discordant	do	do	Kaolinized F-Q-M wall zone; Q core.
do	2-4 T.	NW	SW		Concordant	Biotite gneiss		P1-Q-M pegmatite, fine to medium grained; accessory biotite, garnet, sericite, tourmaline.
do	1-3 T.	NW	SW		do	Mica schist		P1-Q-P-M pegmatite.

CRABTREE CREEK AREA—Continued

Yancey County—Continued

Irregular, tabular.		NE	SE	S	Partly concordant.	Mica gneiss	Unweathered	P1-Q-P border zone, fine grained; accessory biotite, muscovite, garnet; P-Q-P1-M wall zone, fine to coarse grained; Q-P core or fracture filling. Mine is in same large pegmatite as Carolina Mineral Co. No. 20.
Tabular						do		P-P1-Q-M pegmatite, medium to coarse grained; graphic texture common; accessory vermiculite, garnet, thulite.
Irregular, tabular.	>100 T, >600 L.	NE	SE	S	Partly concordant.	do	Weathered (10 ft).	P1-Q-P border zone, fine grained; accessory biotite, muscovite, garnet; P-Q-P1-M wall zone fine to coarse grained; P-Q-P1-M intermediate zone, coarse grained; Q-P core or fracture fillings. Accessory garnet, sericite, zoisite, allanite, siderite, samarskite, uranium minerals, hyalite, copper sulfides. Cut by aplite dikes. Contains gneiss septa.
Tabular(?)		NW				Mica schist		P1-Q-M pegmatite, fine to medium grained; accessory sericite, biotite.
Tabular	50 T, >400 L.	NW	NE		Partly concordant.	Mica gneiss	Weathered (10 ft).	P1-Q-P-M wall zone, fine to medium grained; Q-P core, coarse grained, may be fracture fillings.
do	15 T.	NE	NW		Concordant	Biotite gneiss		P1-P-Q-M pegmatite, coarse grained graphic texture common.
do	15-20 T.	E	N		do	Mica schist	Weathered (10 ft).	P1-Q-M-B pegmatite, medium grained; accessory garnet.
do	3-15 T.	NE	SE		Discordant	Granite, mica gneiss.	Weathered	P1-P-Q-M wall zone; accessory garnet, thulite, uranophane; Q core, discontinuous.
do	10 T.	NE	SE		Concordant	Mica gneiss		P1-Q-M border zone, fine grained, discontinuous; P1-P-Q-M wall zone, medium grained; accessory garnet, sericite; Q core.
Tabular(?)	3 T.	NE	SE		do	Interlayered biotite and hornblende gneiss.		P-P1-Q-M pegmatite, fine to medium grained; graphic texture common; accessory garnet.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 3	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>SPRUCE PINE DISTRICT—Continued</b>						
<b>CRABTREE CREEK AREA—Continued</b>						
<b>Mitchell County</b>						
697	Barnes mine.....	USGS.....	Pre-WWII.....	Series of cuts 700 long.....	Green, wedge "A" structure.....	Scrap, feldspar.....
704	Bearden (Bear Rock, Murphy Falls) mine.	USGS.....	Pre-WWII, WWII.	Cut 100.....	Green, "A" structure.....	Small sheet (WWII).
701	Carolina Mineral Co. mine: No. 3.....	USGS.....	Pre-WWII.....	Cut and open stope.....	Green, "A" structure, garnet inclusions, bent.	Feldspar.....
700	No. 6.....	USGS.....	1937.....	Cut 150.....	Green, "A" structure, moderately stained.	Small sheet, feldspar.
693	No. 29.....	USGS.....	1935-37.....	Cut 150 long, 20-40 deep.....	Green, moderate "A" structure, bent, minor stained.	Moderate sheet, feldspar.
688	Chestnut Flats mine.....	USGS.....	1920 int to 1940.....	Cut 50 long, 20 deep; in-clines 40-50 deep.	Brown.....	Moderate sheet.....
685	Wood Cox mine.....	USGS.....	1929-30, 1933-35, WWII.	Cut 150 long, 50 deep, drift 80.	Green, stained, ruled.....	do.....
691	Crabtree Mountain Em-erald mine.	USGS.....	1894, 1906.....	Incline, flooded. Small pits.	None.....	Beryl.....
703	Crabtree No. 1 (Wildcat) mine.	USGS.....	1921 int to 1944.....	Cut 100 long, 80 deep, open stope 90.	Green, "A" structure, haircracks, minor ruled.	Moderate sheet, feldspar.
686	Field mine.....	USGS.....	Pre-WWII.....	Cut 125 long, 25 deep.....	Green, "A" structure, stained, ruled.....	Sheet feldspar.....
706	Glenn mine.....	USGS.....	Pre-WWII.....	Large cut and adit.....	Green, "A" structure, stained, small.....	Sheet(?), feldspar.....
689	Gopher mine.....	USGS.....	1884, 1918, 1939, 1943-44.	Small cuts and shafts for 500, incline 160.	Ruby, small.....	Small sheet (1943-44).
702	Hall and Boone mine.....	USGS.....	1940.....	Cut 150 long, 30 deep.....	Wedge "A" structure.....	Scrap, feldspar.....
698	Harlan mine.....	USGS.....	Pre-WWII.....	Cut and connecting stope 100 long, 25 deep.	Green, "A" structure, concentrated near quartz masses and gneiss inclusions.	Scrap, feldspar.....
696	Hollifield mine.....	USGS.....	Pre-WWII, WWII.	Irregular cuts for 700 along strike.	Green "A" structure.....	Sheet, feldspar; small sheet (WWII).
687	Hootowl mine.....	Olson (1944, p. 56-58, map, fig. 3, p. 57).	1937-39, WWII.....	Cut and stopes 500 long, 250 wide, 150 deep.	Green, "A" structure, stained, ruled, concentrated near gneiss inclusions.	Large sheet, feldspar.
705	McKinney mine.....	USGS; map in Cameron and others (1949, p. 72).	1924 int to 1962.....	4 large cuts 300-650 long, 175 deep, with open stopes.	Green, "A" structure, stained, garnet inclusions.	Scrap, feldspar, samarskite.
707	Murphy Rock mine.....	USGS.....	1890-95, WWI, 1930 int to 1940, 1942-43.	Several cuts, short adits, long connected stopes, in-cline in area 100 by 580.	Brown to brownish green, "A" struc-ture, bent.	Large sheet.....
695	Phillips mine.....	DMEA.....	1938, 1954.....	Cut 50 long, 4 deep.....	Green, "A" structure, stained.....	Small sheet.....
692	Horace Phillips prospect.....	DMEA.....	1955.....	2 cuts 70-80 long, 5-15 deep.....	Green, "A" structure, moderate stain.....	None.....
690	Self (Waycaster) mine.....	USGS.....	1936-38.....	Cut 70 long, 20 deep; adit, pits.	Green, small, ruled, bent.....	Moderate sheet.....
694	Silvers Ridge mine.....	USGS.....	Pre-WWII.....	Several caved adits.....	Light green, "A" structure, moderately stained.	.....
699	George Young mine.....	USGS.....	1938-40.....	Cut 150 long, 30 deep.....	Green, "A" structure.....	Moderate sheet, feldspar.

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

SPRUCE PINE DISTRICT—Continued

CRABTREE CREEK AREA—Continued

Mitchell County—Continued

Tabular(?)								P-Pi-Q-M wall zone, coarse grained; Q core. Poorly exposed.
Tabular	50 T	E				Granite		Pi-P-Q-M pegmatite, medium to coarse grained; graphic texture common; accessory garnet, thulite. Pegmatite and granite cut by quartz veins.
Tabular(?)								P-Pi-Q-M pegmatite, medium to coarse grained.
do								P-Pi-Q-M pegmatite, graphic texture common; accessory garnet thulite, vermiculite.
Tabular		NE	SE			Biotite gneiss		P-Pi-Q-M pegmatite, medium to coarse grained; graphic texture common; accessory garnet, thulite, epidote. Thin inclusions of biotite schist.
Pinch and swell.	4-8 T	NE	SE		Partly concordant.	Biotite gneiss		Pi-Q-M pegmatite, medium to coarse grained; accessory garnet, beryl. 3 bodies mined.
Tabular	35 T	NE	NW		Concordant	Hornblende gneiss; biotite alteration.		Pi-P-Q-M pegmatite; accessory garnet; gneiss inclusions.
Tabular(?)	8 T	NE	SE		do	Biotite schist		F-Q-B pegmatite, fine grained; accessory tourmaline, beryl, garnet, pyrite.
Tabular	15-30 T	N	W	S	Gradational	Granite and biotite gneiss.		P-Pi-Q-M wall zone, coarse grained; accessory garnet, copper sulfides, uranium minerals(?); Q core, discontinuous.
do		NE	NW		Concordant	Interlayered biotite and hornblende gneiss.		Pi-Q-M wall zone, coarse grained; accessory garnet, samarskite, uraninite, autunite, torbernite, gummitz; P-Q core, coarse grained.
do		NE	NW		Discordant	Mica gneiss		Pi-Q-M wall zone; accessory garnet, pyrite, thulite, sphalerite; P-Q core, coarse grained; graphic texture. Cut by quartz veins.
do	8-10 T	NE	NW	NW	Partly concordant.	do		F-Q-M pegmatite.
		NE						P-Q-M pegmatite, fine grained; graphic texture; accessory garnet, thulite.
Tabular		N	W		Concordant	Interlayered hornblende and biotite gneiss.		Pi-Q-M-P wall zone, medium to coarse grained; accessory garnet; P-Q core, coarse grained. Contains gneiss inclusions. Several similar bodies nearby.
do		NE			Concordant(?)	Mica gneiss		F-Q-M pegmatite, coarse grained; graphic texture.
Irregular		NE	NW		Discordant	Interlayered hornblende and biotite gneiss. Biotite alteration.		P-Pi-Q-M pegmatite, medium to coarse grained; graphic texture; several quartz veins cut pegmatite.
		N	Steep		Partly concordant.	Mica gneiss	Unweathered	Pi-Q-M wall zone, medium grained; Pi-Q-P intermediate zone, coarse grained; P-Q core, coarse grained; accessory samarskite, garnet, beryl, sphalerite, pyrite, chalcopyrite, columbite, allanite, thulite, epidote, apatite, covellite. Numerous quartz veins.
Irregular, pinch and swell.	3-4 T	NE	NW			Granite		Pi-P-Q-M pegmatite, fine to medium grained; several bodies present.
Irregular	7 T	NE	SE	SE	Partly concordant.	Granite, biotite gneiss.	Unweathered	P-Pi-Q-M pegmatite, accessory garnet. Pegmatite near contact of granite and gneiss.
		NE				Granite		P-Pi-Q-M pegmatite, fine to medium grained; accessory garnet.
Tabular	1-2 T	NW	NE		Concordant	Interlayered hornblende and biotite gneiss.	Unweathered	Pi-Q-M pegmatite; accessory tourmaline, garnet.
Tabular(?)		NE	SE		do	Mica gneiss		P-Q-Pi-M wall zone; accessory garnet, thulite; Q core.
	>30 T							P-Q-Pi-M pegmatite; accessory garnet, thulite.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 4	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>BUNCOMBE DISTRICT</b>						
<b>Buncombe County</b>						
79	Alejohtner deposit	USGS	1945	Small pits, auger holes for 850.	Fine grained	Scrap
44	Alexander mine	Hunter and Hash (1949, p. 23-27)	1917-18, 1943-46, 1948	Cut 90 long, 10-25 deep; shafts, drifts.	Ruled, clay stained	Halloysite, sheet
26	Austin prospect	CMC	1943	Several shallow pits	Light brown, cracked, minor stained, bent.	
73	Bassett prospect	CMC	1942	Small cut	Ruby, "A" structure	
95	Big Cove mine	USGS, OF	1915-23, 1932 int to 1943, 1952	Cuts, pits, adits, drifts, stopes, in area 100 by 500.	Greenish brown	Small sheet(?)
66	Black Mountain prospect	DMEA	1956-58	Cut 50, adit 45, shaft 70, drifts 100.	Ruby, minor "A" structure, cracked, stained.	Small sheet
43	Blankenship prospect	CMC	1938	Cut 25 long, 12 deep	Clear, small	
47	Brown prospect	CMC	1943	Small cut	Clear, "A" structure	
36	Bushy Mountain mine	CMC	1900, WWII	Adit, shaft 25	Light reddish brown, concentrated near quartz core.	
63	Bushy Ridge prospect	CMC	1943	Cut 40 long, 15 deep	Pale reddish brown, small	
71	Burco (Mott) mine	USGS, CMC	1890, 1942-44	Caved cut 50, incline 90, shaft 36, drifts.	Ruby, ruled, cracked, bent	Small sheet (1942-44)
80	Burton prospect	CMC		2 cuts, shaft 25, incline 55	"A" structure, small	
94	Cathey prospect	CMC		Several small pits	"A" structure, clay stained, near pods of quartz.	
62	Cedar Cliff prospect	CMC	1942-43	Cut 40, inclined shaft, shaft 35, drifts, caved adit.	Ruby, stained, biotite intergrowths	
57	Chestnut Cove mine	CMC, USGS	Pre-WWII, 1943	Cut 40, inclined shaft, shaft 35, drifts, caved adit.	Ruby, bent, locky, cracked	Small sheet (1943)
29	Chrome Spar (Goldsmith) mine	USGS		Cut 200 long, 20-30 deep	Small, bent, ruled	Feldspar
59	Coggins Home mine	USGS, CMC	1918, 1943	Cut 60 long, 10-20 deep, 2 shafts, adit.	Ruby, "A" structure, cracked, clay stain, concentrated near quartz core.	Small sheet (1944)
32	Corner Rock mine	USGS	WWII	Cut 250 long, 30-40 deep	Ruby, bent, cracked, stained	Moderate sheet
30	Corner Spar (Arrowood) mine	Hunter and Hash (1949, p. 20-23), USGS	1934 int to 1941, 1947 int to 1962	Several cuts 40-60 diameter, 40 deep, shaft 40.	Greenish brown, "A" structure, bent, ruled.	Scrap, halloysite, feldspar.
89	Corrigher prospect	CMC	1942	Pit	Small, scrap	
52	H. W. Creasman prospect	CMC	1943	Cut	Stained	
85	E. W. Davis prospect	CMC	Pre-WWII	Caved pits and cuts	Pale green, scrap	
88	De Loi prospect	USGS		Shallow trenches and adits for 300 along strike.	Light green, "A" structure, stained, bent, locky at southeast end; ruby, hard, clear, small at northwest end.	
64	Frady prospect	CMC	Pre-WWII	Adit 60, drift 40, shaft	Light reddish brown, small	
42	Graveyard prospect	CMC		Cut	Light brown, clear, concentrated near quartz core.	
69	Hardin prospect	CMC		Small pit	Green, scrap	
27	Hensley prospect	CMC	1943	Cut	Pale reddish, brown, concentrated near footwall.	
48	H. A. Hipps prospect	CMC, USGS	1943	Cut 40 long, 12 deep	Pale reddish brown, cracked, stained, bent.	
72	Hurst prospect	CMC	1943	Cut	Ruby, small	
92	Montie O. Kelly prospect	CMC	1942-43	Several pits	Ruby, clear, small, concentrated near quartz core.	
70	Knox prospect	CMC	Pre-WWII	Prospect pits	Ruby with light green borders, "A" structure, cracked, concentrated near quartz core.	
53	F. D. Kuykendall prospect	CMC	Pre-WWII	Shallow shaft, 2 cuts	Ruby, small	
65	Lake Eden (Black Mountain College) mine	CMC	1943	Shallow pits, shaft	Ruby, small, concentrated near quartz core.	Small sheet
33	Little Butte Gap prospect	CMC	1943	Trench	Ruby, stained, small	do
55	S. Long prospect	CMC		Cut	Ruby, small	
56	Longs Branch prospect	CMC	1943	Cut	Ruby, small, concentrated near core	
84	Lora Lee Mathews prospect	CMC	Pre-WWII	Shallow trenches	Ruby	
68	McCoy Cove prospect	CMC	Pre-WWII, WWII	3 adits 40-50 long, pits	Ruby, small	Small sheet (WWII)
75	Dr. C. M. McCracken prospect	CMC	1942	Prospect pits	Pale green, "A" structure, small	
83	H. D. McDowell prospect	CMC	1943	Cut	Ruby, small	
78	W. M. Mills prospect	CMC	1942	Cut 30 long, 6 deep	Pale green, stained	
25	Mitzes (C. C. Ledford) mine	CMC, USGS	1910-11, 1928-29, 1943-45	Cut 100 long, 30 deep; 2 drifts.	Ruby, moderately stained, cracked, bent, locky, biotite intergrowths.	Moderate sheet (1943-45)
77	Moser Cove (A. M. Moser) prospect	CMC	Pre-WWII	Shallow opencuts	Bent, cracked, concentrated near quartz core.	
51	Mountain Meadow (H. Cary) prospect	CMC	1942-43	Cut 30 long, 10 deep	Pale green, "A" structure, clear, concentrated near core; ruby, small in wall zone.	Small sheet
86	W. T. Morris prospect	CMC	Pre-WWII	Prospect pit	Ruby, cracked, clay stained	
87	R. R. Morton prospect	USGS		3 prospect trenches	Small	Scrap

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

BUNCOMBE DISTRICT—Continued

Buncombe County—Continued

Pods.....						Mica schist		Pl-Q-M pegmatite. Schist mostly muscovite or sericite and quartz.
Lens.....	60 T, 380 L.	NE	SE		Discordant	Mica gneiss	Weathered (45 ft).	F-Q-M wall zone; P intermediate zone, discontinuous; Q core, discontinuous. Mica schist inclusions. F-Q-M pegmatite.
Irregular.....	2-5 T.	NE	NW		do.	Mica schist		
Irregular.....	1-35 T.	NE	SE		Partly concordant.	Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed. F-Q-M wall zone; accessory garnet; Q core, discontinuous. Gneiss inclusions common.
Irregular, tabular.	10-20 T.	NW	SW		Discordant	do.	Weathered (20 ft).	Pl-Q-P-M wall zone, medium to coarse grained; accessory biotite, garnet; Q core. F-Q-M pegmatite.
Tabular.....	Thin					Mica schist	Unweathered	Do.
do.	10 T.					Mica gneiss	Weathered	F-Q-M wall zone; Q core.
do.	6-8 T.				Concordant(?)	Mica gneiss		
Tabular(?)		NE	Steep		do.	Mica schist	Unweathered	F-Q-M pegmatite. Numerous schist inclusions.
Irregular.....	1-8 T.	NE	SE		Concordant	Mica gneiss	Weathered	Pl-Q-M pegmatite, medium to coarse grained.
	Thick	NE	Vertical			Biotite gneiss	Weathered	F-Q-M pegmatite. F-Q-M wall zone; Q core, discontinuous.
Tabular(?)		NE	NW		Concordant	Mica gneiss	do.	Pl-Q-M-B wall zone; Q core.
do.	5 T.	NW	SW		do.	Biotite schist		Pl-Q-P-M wall zone; accessory garnet, biotite; Q core, discontinuous.
Lens.....				S		Dunite	Weathered (30 ft).	P-Pl-Q-M-B wall zone; accessory garnet; Q core, discontinuous. Poorly exposed.
	10 T.	NW			Discordant	Biotite gneiss	Weathered	F-Q-M wall zone; Q core.
Tabular.....	10-30 T.	NE	NW		Partly concordant.	Mica gneiss	Weathered (20 ft).	Kaolinized Pl-P-Q-M pegmatite, medium to coarse grained; accessory sericite, garnet, biotite, apatite.
do.	40 T, 390 L.	N-NW	E-NE			Dunite	Weathered (40 ft).	Pl-Q-P-M wall zone, medium grained; accessory biotite, garnet; P intermediate zone, coarse grained; Q core, discontinuous.
	5 T.	NW	NE					F-Q-M pegmatite, poorly exposed.
		NW	SW		Concordant(?)	Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed.
		NE	Steep		do.	Mica schist	do.	F-Q-M pegmatite, poorly exposed. Abundant quartz float may be from quartz core.
							do.	F-Q-M pegmatite, poorly exposed. Do.
Lenses.....	4-5 T.							F-Q-M pegmatite.
Tabular.....	6-8 T.	NE	NW		Concordant	Mica schist	Weathered	Pl-Q-P-M pegmatite; accessory garnet. Prospect owned by E. O. Donald in 1943.
do.	Thin				Discordant	do.	Weathered	F-Q-M wall zone; Q core(?).
Tabular(?)	1-3 T.	NE				Mica schist	do.	F-Q-M pegmatite. F-Q-M wall zone; Q core.
Tabular.....	Thin	NE	NW		Concordant(?)	Mica gneiss		Do.
							Weathered	F-Q-M pegmatite.
Tabular.....	2 T.	N	Vertical		Discordant	Mica gneiss		F-Q-M wall zone; Q core.
do.		NE				Diorite(?)	Weathered	Pl-Q-M pegmatite, medium grained; accessory biotite, garnet.
do.		NE				Mica schist	do.	F-Q-M pegmatite. F-Q-M wall zone; Q core.
Tabular.....	Thin							Float fragments of muscovite. No pegmatite exposed.
		NE	SE		Concordant(?)	Mica schist	Weathered	F-Q-M pegmatite.
		NE	NW		do.	do.		Pl-Q-M pegmatite.
		NE	SE		do.	do.		F-Q-M pegmatite. Do.
Tabular.....	20 T.	NE	SE		Concordant	Hornblende gneiss.	Weathered	Q-Pl-M-B pegmatite. Many gneiss inclusions.
		NE				Mica schist	do.	F-Q-M wall zone; Q core.
Tabular.....	5 T(?)	E			Concordant(?)	do.	do.	Do.
do.					Discordant	do.	do.	F-Q-M pegmatite.
		NW				Kyanite schist	do.	Q-F-M pegmatite, poorly exposed. Quartz-muscovite (burr rock) pegmatite abundant on dumps.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 4	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>BUNCOMBE DISTRICT—Continued</b>						
<b>Buncombe County—Continued</b>						
34	New Balsam Gap (Aber-nathy Watershed) mine.	Sterrett (1923, p. 184-186), CMC.	1895, 1943-44.	Cut 60, adit and stope 95.	Ruby, moderate "A" structure, stained, locky, cracked.	Small sheet (1943-44).
37	Old Pumphouse deposit.	CMC.			Ruby, clear.	
74	Patton Cove (C. P. Grimes) mine.	CMC.	1942-44.	Cut 40 long, 12 deep.	Ruby, "A" structure, minor stain.	Small sheet.
40	Pink Fox prospect.	CMC, USGS.	1870, 1943.	Cut 20, adit 20.	Ruby, biotite intergrowths, ruled, bent, cracked.	
28	J. P. Proffitt prospect.	CMC.		Pit 12 deep.	Small.	
41	Effe Revis prospect.	CMC.		Small pit.	Ruby, clear, clay stained.	
50	Ethel Rice heirs prospect.	CMC.		Shallow pits, open-cut.	Ruby, small.	
90	Riddle and Hipps mine.	USGS.	1953.	Cut.	Ruby, bent, cracked, stained, in hang-ing wall zone; green, wedge "A" structure, stained concentrated along core.	
49	Riverview (Fox) prospect.	CMC.	1944.	Prospect pit.	Ruby, small.	
35	Rock Stand mine.	USGS, CMC.	1915, 1944-45.	Cut and adit.	Ruby, moderately stained, small.	Moderate sheet.
91	W. T. Sharp mine.	CMC.	WWI, WWII.	Adit 75, cut, shaft.	Ruby, clear, bent, cracked, small.	Small sheet (WWII).
54	Shoat prospect.	CMC.	1943.	Cut, small pits.	Ruby, clear, concentrated near core.	
81	Shortz prospect.	CMC.	1942.	Small pit, trench.	Ruby, biotite intergrowths, small.	
45	Sluder mine.	USGS.	WWI, 1943-44.	Cut 45, 2 shafts 40-50, old stopes.	Ruby, locky, clay stained.	Small sheet (1943-44).
93	Kenneth Smathers prospect.	CMC.		3 small cuts.	Stained.	
60	Stevens mine.	CMC.	1943.	Cut 14 long, 20 deep, short drift.	Ruby, locky, clear.	Small sheet.
31	Stocksville (J. M. Buckner) mine.	CMC, USGS.	1920, 1943.	Cut.	Ruby, biotite intergrowths, bent, stained.	
67	Sunset Drive prospect.	CMC.	1942.	Adit.	Ruby, small.	
61	Swannanoa (Beede Smith) mine.	USGS, OF, DMEA.	1900, 1910-15, 1925, 1942-44, 1952 int to 1957.	Cut 100 long, 60 deep, adit 300, winze 40, drifts 80, stopes.	Ruby, moderate "A" structure, minor stained.	Moderate sheet, scrap, feldspar.
58	Tipton mine.	USGS, CMC.	1890, 1931, 1943-44, 1950's(?).	Cut 140 long, 30 deep; incline 46, adit 76.	Ruby, "A" structure, cracked, stained, bent.	Moderate sheet (1943-44).
82	Hattie Bell Underwood prospect.	CMC.	Pre-WWII.	2 pits.	Small, scrap.	
38	A. Weaver mine.	CMC.	1943.	Cut.	Ruby, stained, concentrated near core.	
46	C. B. Wells Spar mine.	USGS.	1950's.	Cut 200 long, 20-30 deep.	Small, scrap.	Feldspar.
96	L. L. West prospect.	CMC.	1938-40.		Ruby.	Small sheet.
76	A. M. White prospect.	CMC.	Pre-WWII.	Shallow cut.	Small, reeved, cracked.	
39	Jeter Wilson prospect.	CMC.	Pre-WWII.	Cut.	Scrap.	
<b>McDowell County</b>						
17	Mahogany prospect.	CMC.	1943-44.	Several shallow cuts.	Ruby, cracked, small.	Small sheet.
14	Old Mill Creek mine.	CMC.	1939.	Caved adit.	Clear, soft, cracked, small.	
19	Pinnacle Ridge mine.	CMC.	1938, 1943.	Cut 60, short adit.	Ruby, ruled.	
13	Pritchard Creek mine.	CMC.	1919, 1934, 1941, 1944.	Cut, adit 60.	Ruby, bent.	
15	Sourwood Gap prospect.	CMC.	1940.		Small, cracked, bent.	
18	Thomas mine.	CMC.	1943.		Ruby, clear.	
16	Thunder Knob mine.	USGS.	1944-45.	Cut, incline 85, 2 connecting adits.	Ruby, bent ruled locky.	
<b>Madison County</b>						
100	Woodtin Capp prospect.	CMC.	Pre-WWII.	Pits.	Ruby, small.	
98	Carter mine.	USGS.	1950's, 1962.	Cut 100 long, 30 deep; adit and stope to northeast.		Quartz, feldspar.
97	Sam Cox mine.	USGS.	1940's.	Cut 100.		Feldspar.
101	Dallas L. Riddle (J. F. Teague) prospect.	CMC.	1942.	Pit.	Brown, "A" structure, bent, cracked, concentrated along core margin.	
99	Robinson mine.	USGS.	1930-40.	Cut 200 long, 30 deep.		Feldspar.
102	Lum Sprouse (Reeves) mine.	CMC.	1928, 1942.	Several cuts, pits.	Bent, locky, cracked, biotite inter-growths.	Feldspar, scrap.

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

**BUNCOMBE DISTRICT—Continued**

**Buncombe County—Continued**

Irregular tongue.	1-8 T	NE	NW	SW	Discordant	Biotite gneiss	Unweathered	Pl-P-Q-M pegmatite; accessory biotite, garnet.
Pinch and swell.		NE	NW		do	Mica gneiss		F-Q-M pegmatite.
Lens	3-10 T	NE	SE		Concordant(?)	do	Unweathered	Pl-Q-P-M pegmatite; accessory garnet, biotite.
Tabular	10 T	N	W		Discordant	do	Weathered	F-Q-M pegmatite, medium to coarse grained; accessory biotite.
do	6 T	NE			do	Mica schist		Pl-Q-M pegmatite; accessory garnet, biotite.
Lens		NE	NW		Concordant(?)	Mica gneiss	Weathered	P-Q-M pegmatite.
Tabular	>10 T	NE	SE			do	do	do
								F-Q-M wall zone; Q core.
Tabular(?)		NE	Vertical		Concordant	Mica gneiss	do	Kaolinized F-Q-M pegmatite.
Lenses	1-5 T	NE	NW	SW	do	Mica gneiss, schist.		Pl-Q-M pegmatite, medium to coarse grained; accessory garnet, biotite, allanite. 3 lenses present.
	5 T	NE	SE					F-Q-M pegmatite.
Tabular	2-3 T	NE	Vertical					F-Q-M wall zone; Q core, 2 more bodies to west.
do		NE	SE		Concordant(?)	Mica schist	Weathered	Pl-Q-M pegmatite; accessory garnet, biotite.
do	4-6 T	N	Vertical		Concordant	Mica gneiss	do	F-Q-M wall zone; Q core, discontinuous.
		NE			Concordant(?)	Mica schist, gneiss.		F-Q-M pegmatite.
Tabular	4-5 T	NE	SE		Concordant	Mica gneiss		Pl-Q-M wall zone; Q core.
Lens	1-5 T	NE	SE		do	do	Unweathered	F-Q-B-M pegmatite, medium grained.
						Mica schist		Adit intersected sheared zone in pegmatite and schist.
Lens	3-25 T, 100 L	NW-W	SW-S	S	Discordant	Chlorite schist; biotite alteration.	Weathered	Pl-Q-P-B-M wall zone, medium to coarse grained; P-Q-Pl intermediate zone, coarse grained; Q core. Accessory apatite, garnet, tourmaline, beryl.
Pinch and swell.	1-12 T	NE	NW		do	Dunite-mica schist.	do	Pl-Q-M wall zone; accessory biotite, vermiculite; Q core.
							do	F-Q-M pegmatite, poorly exposed.
Tabular	15 T, >200 L	NE			Concordant(?)	Mica gneiss	Unweathered	F-Q-M wall zone; Q core.
		NW	NE		Partly concordant.	do	do	P-Q-B-M wall zone, coarse grained; Q core, discontinuous.
Tabular		NE	SE		Concordant	Mica schist	Weathered	F-Q-M pegmatite, poorly exposed.
		NE	NW		Concordant(?)	Mica gneiss	do	F-Q-M pegmatite, poorly exposed.

**McDowell County—Continued**

Lenses	1-5 T				Concordant(?)	Biotite gneiss		F-Q-M pegmatite. Several bodies prospected.
Lenses	0.1-2 T	NE			Concordant	Interlayered biotite and hornblende gneiss.	Weathered	F-Q-M pegmatite, poorly exposed.
Tabular		NE	SE		do	Mica gneiss		F-Q-M pegmatite. Series of lenses.
do	Thin				Discordant	do		Pl-Q-M pegmatite.
Tabular	4-8 T	NE	SE		Concordant	Interlayered biotite and hornblende gneiss.		F-Q-M pegmatite, poorly exposed.
								Pl-Q-M-P pegmatite; accessory garnet.
								Pl-Q-M pegmatite, fine to medium grained; accessory biotite, sericite.

**Madison County—Continued**

	18 T	NE					Weathered	Pl-Q-P-M pegmatite. A nearby pegmatite contains mica that is bent, stained and cracked.
Tabular	>15 T	NE			Discordant	Mica gneiss	Unweathered	F-Q-B wall zone, coarse grained; Q core.
do		NE	Steep				Weathered (10 ft).	P-Q-M wall zone; Q core.
		NE						F-Q-M wall zone; Q core.
Lenses	200 L	NE	NW		Partly concordant.	Mica schist	Weathered	F-Q-B wall zone, medium to coarse grained; Q core. Biotite partly altered to vermiculite.
	4-6 T	NE						F-Q-M-B pegmatite.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 4	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		

## BUNCOMBE DISTRICT—Continued

## Yancey County

22	Bear Ridge mine.....	USGS.....	1943-44.....	Cut 45 long, 12 deep.....	Light brown, cracked, bent; light green, "A" structure, cracked.	Small sheet.....
24	Joe Burleson prospect.....	USGS.....		Pit.....	Light brown, minor stained.....	
21	Hillbilly (Hillville) mine.....	USGS.....		2 adits, slope 35 long, 12-16 high.....	Reddish brown, "A" structure, biotite intergrowths, bent.	
20	Muscet mine.....	USGS, CMC.....	1905, 1942-43.....	Cut 40 long, 20 deep; in-cline 32.....	Pale green to light brown, "A" structure, locky, cracked, stained.	Small sheet (1942-43).
23	Sturgell mine.....	USGS.....	1915, 1920's, 1944.....	Cut 70 long, 4-35 deep.....	Medium brown, hard, reeved, bent, cracked, stained.	Small sheet (1944).

## WOODLAWN DISTRICT

## McDowell County

7	Black Oak mine.....	CMC.....	1913, 1942-43.....	Cut, adit.....	Ruby.....	Small sheet (1942-43).
8	J. D. Denney prospect.....	CMC.....	1943.....	Cut.....	Ruby, clear, small.....	Small sheet.....
9	Good Brothers prospect.....	CMC.....	1943.....	Cut.....	Dark green, stained.....	do.....
6	Will Gouge mine.....	USGS, CMC.....	1914, 1943.....	Cut, drift, incline 25.....	Greenish brown, moderately stained, haircracked.	Small sheet (1943).
1	Honeycutt prospect.....	CMC.....	Pre-WWII.....	Pit 8.....	Clear, small.....	
4	Lowery prospect.....	CMC.....	Pre-WWII.....	Prospect pits.....	do.....	
5	McBee prospect.....	CMC.....			Scrap.....	
6	Middle prospect.....	CMC.....	WWII.....	Small pit.....	Green.....	Small sheet.....
11	Old Tom Creek prospect.....	CMC.....	Pre-WWII.....	Trench.....	Clear.....	
3	Rock mine.....	CMC.....	1902, 1940.....	Cut.....	Flat "A" structure, concentrated near core.	
10	Sam Silvers mine.....	CMC.....	1894.....	Several cuts, 2 adits 30.....	Clear, broken.....	
12	Wildacres prospect.....	CMC.....	Pre-WWII.....	Several pits.....	"A" structure.....	
2	Wiseman prospect.....	USGS.....	1958.....	Cut 150 long, 50 deep, incline 75.....	Green, "A" structure, bent, ruled.....	Small scrap.....

Local-ity No. on pl. 5	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		

## FRANKLIN-SYLVA DISTRICT

## Haywood County

13	Bear Pen prospect.....	USGS.....	1952-53.....	Trench 100, shaft 50, prospect pits.....	Ruby, clear, moderate "A" structure, ruling, small.	Moderate scrap.....
15	Big Ridge mine.....	Sterrett (1923, p. 194), Olson (1946, p. 23-32). OF.	1867-1945, 1950's.....	Adits, drifts, and stopes in area 300 by 650, 200 vertical.	Ruby to greenish brown, common mineral inclusions, bent, stained, cracked, ruled, minor biotite intergrowths.	>621 tons sheet and punch.
15	Upper Big Ridge (Buchanan) mine.....	USGS.....	1944.....	2 adits, 6 pits and cuts.....	Light brown, biotite intergrowths, bent.	Small sheet.....
10	Burnett prospect.....	USGS.....	1944.....	Small pit.....	Small, not abundant.....	
3	Champion Fibre Co. prospect.....	USGS.....	WWII(?).....	Shaft 35, short drifts.....	Light ruby, "A" structure, bent, reeved, ruled, clay stained.	Small sheet.....
19	Gibson mine.....	USGS.....		Cut 25 long, 15 deep, with small caved stope.	Light ruby, "A" structure, mostly scrap, concentrated along footwall.	
21	Grassy Knob (Revis) prospect.....	DMEA.....	1952-53.....	Adit 100.....	Ruby, hard, clear, tied, bent, small.....	None.....
12	Holt prospect.....	USGS.....	1953.....	Adit and drifts 150.....	Ruby, biotite intergrowths, bent, stained.	Small scrap.....
22	Little East Fork (Arrowood) mine.....	USGS, OF, DMEA.....	WWI, WWII, 1952.....	4 cuts, 3 adits, 2 prospect pits in area 150 by 200.	Ruby, "A" structure, biotite intergrowths, cracked, bent.	Large scrap, small sheet.
4	Charles B. Medford prospect.....	USGS.....	1916, 1957.....	Cut 45, adit 15.....	Ruby, bent, cracked, ruled, stained.....	Moderate scrap (1957).
1	Frank Medford prospect.....	USGS.....		Prospect pit 10 long.....	Rum, moderate "A" structure, commonly stained, small.	Small sheet.....
11	Roy Medford (Nicks Creek) mine.....	USGS, OF.....	1942-44.....	Cut 40 diameter, 10 deep, 2 short adits.	Ruby, clear, cracked, ruled, small.....	Small sheet.....
5	Fred Nicols prospect.....	USGS.....	1938.....	3 small prospect pits.....	Rum, bent, cracked, small.....	Small, mostly scrap.

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

BUNCOMBE DISTRICT—Continued

Yancey County—Continued

Lens	2-4.5 T	NE	SE		Discordant	Hornblende gneiss		Pl-Q-M pegmatite, medium grained; accessory biotite, sericite, garnet.
Tabular	2-3 T				do			F-Q-M wall zone; Q core.
Pipe	16 T	NE	SE	SW	Concordant	Mica gneiss		Q-Pl-M pegmatite; accessory garnet, biotite, sulfides.
Tabular	8-12 T	NE	Variable		do	do	Unweathered	Pl-Q-M wall zone, medium grained; accessory garnet, biotite, sericite, apatite; Q core.
do	7 T	NW	SW		do	Hornblende gneiss		Pl-Q-M pegmatite, medium to coarse grained; accessory sericite, garnet, biotite.

WOODLAWN DISTRICT—Continued

McDowell County—Continued

	2-3 T							F-Q-M pegmatite.
Lens	0.3-1 T	NE	NW		Concordant(?)	Mica schist		Pl-Q-M pegmatite; accessory biotite, garnet.
Tabular	1 T	NE	SE					F-Q-M pegmatite.
								Pl-Q-P-M pegmatite; accessory garnet, biotite.
								F-Q-M pegmatite, 2 bodies exposed.
								F-Q-M pegmatite.
								Pl-Q-P-M pegmatite.
								F-Q-M pegmatite.
								Do.
								F-Q-M wall zone; Q core.
Lenses	1-10 T	NE			Concordant	Mica gneiss	Weathered	F-Q-M pegmatite.
		NW	SW		Concordant	Mica schist	Weathered (70 ft)	3 quartz-tourmaline veins; 2 F-Q-M pegmatites; Q-F-M pegmatite; accessory graphite, chalcopyrite.
								Pl-F-Q-M pegmatite, medium to coarse grained, gneissic texture; accessory garnet, epidote.

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Haywood County—Continued

Tabular	3-10 T, 100 L, 45 D.	E	S		Concordant	Biotite gneiss	Partly weathered (30 ft).	Pl-Q-M wall zone, medium grained; accessory garnet; Q core.
Irregular dome	2-25 T, avg 8; 500 by 700 area.	Long axis of dome strikes N. 55° E.			Discordant	Biotite gneiss, locally granite, footwall.	Unweathered	Pl-Q-M-B pegmatite, coarse grained; accessory apatite, ankerite, bedensbergite, microcline, pyrrhotite. Locally cut by granite dikes.
Tabular	5 T, 200 by 300 area.	NE	NW		do	Biotite gneiss	Partly weathered.	F-Q-M-B wall zone, coarse grained, granite core. Mine is 250 ft north of main Big Ridge mine.
						Mica gneiss	Weathered	F-Q-M pegmatite.
Tabular	10 T in cut.	NE	SE		Concordant	do	Unweathered	Kaolinized F-Q-M wall zone; Q core.
Small lenses	1-5 T, 20 L (largest).	NE	Vertical		do	Biotite gneiss	do	F-Q-M border zone, fine grained, thin; P-Pl-Q-M-B wall zone, coarse grained; Q core.
Lens	2-8 T	NE	SE		Partly concordant	do	do	Pl-Q-M pegmatite, medium grained; accessory biotite, garnet, pyrite.
Tabular	6-25 T, >160 L, >70 D.	NE	NW		do	do	Partly weathered.	P-Pl-Q-M-B pegmatite, fine grained; accessory allanite, sericite.
Lens	4-7 T, 45 L	NE	SE		Discordant	do	Weathered (20 ft), saprolite.	F-Q-M-B wall zone, coarse grained; P-Q-M-B core, coarse grained; quartz fracture fillings.
Tabular	4 T in cut, quartz float 200 along strike.	NE	Vertical		Partly concordant	Biotite, granite gneiss	Unweathered	Kaolinized Pl-Q-M pegmatite; accessory beryl, biotite.
Tabular	1-3 T, >60 L	NW	SW		Discordant	Biotite gneiss	Partly weathered.	P-Q-M wall zone; accessory biotite; Q core.
do	2 T, several bodies.	NE	SE		Concordant	do	Unweathered	Pl-Q-M wall zone; accessory pyrite; Q core, discontinuous.
								F-Q-M wall zone, medium grained; F-Q core, medium grained.

TABLE 4.—Summary description of mica mines and

Mine or prospect					Description of muscovite	Production
Local-ity No. on pl. 5	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Haywood County—Continued</b>						
8	Poston East prospect	DMEA	1953	Trench 65	Ruby, mineral inclusions, hard, bent, moderate stained.	Small scrap
7	Poston West prospect	DMEA	1953	3 cuts, adit 20	Ruby, hard, clear, biotite intergrowths, bent.	None
16	Putnam (Gray) mine	USGS, OF	1917, 1920's WWII, 1950's.	Cut 150, 5 caved adits, prospect pits.	Ruby, hard, biotite intergrowths, tied, bent, ruled, stained.	Moderate sheet (WWII).
16	Upper Putnam prospect	USGS	WWII	Cut 60 long, 25 deep	Rum, mineral inclusions, ruled	Small sheet
9	Old Sharp mine	DMEA	1953-54	Cut 40, shaft 30, 4 drifts 50	Ruby, moderate "A" structure, hard, bent, stained.	do
20	Shining Rock mine	Sterrett (1923, p. 196), DMEA.	1900, 1953-54	Cut 40, shaft 40, drift 54	Ruby, "A" structure, hard, bent, ruled	do
18	Shiny mine	Sterrett (1923, p. 195), USGS.	1900, 1912-13	Cut 250, stopes 25-50 deep	Rum, clear, ruled, bent	Large sheet, scrap(?)
17	Spruce Ridge mine	Sterrett (1923, p. 195), USGS.	1905	50 cuts 25 deep, in area 350 by 500.	Ruby, clear, moderately ruled, stained, small.	Moderate sheet(?)
23	Stringfield mine	Osion (1952, p. 31)		Cut 20, drift 50	Brown, minor "A" structure, commonly bent, stained.	
2	Truelove Mountain mine	USGS		Cut 175, 3 prospect pits	Rum, moderate "A" structure, ruled	Moderate sheet(?)
6	I. T. Wells prospect	Sterrett (1923, p. 195), USGS.	1900's, 1930's	Cut 30, several prospect pits	Light green, "A" structure, ruled, stained.	Small sheet
14	W. T. Wilson prospect	USGS	WWII	2 small cuts	Rum, reeved, ruled, clay stain, concentrated near hanging wall.	do
<b>Jackson County</b>						
Mine or prospect					Description of muscovite	Production
Local-ity No. on pl. 5 or 6	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
50	Abbs Creek mine	USGS	1938	2 cuts 12-30 long, 8-12 deep	Light brown, "A" structure, clear, ruled	
49	Abbs Creek prospect	USGS		Small prospect pit	Green, stained	
40	Aiken mine	USGS	1944	Cut 20 long, 15 deep, 3 pits	Ruby, stained, small	Small sheet
83	Frank Allison mine	USGS	1943	Shaft 25, drift 30	Light brown, bent, cracked, small	Small scrap
125	Laura Allison prospect	USGS	1943	2 small pits	"A" structure	Small sheet
110	Bob Ashe mine	USGS	1942, 1944	Small cut, drift 30	Ruby, clear, small	do
164	Oscar Ashe mine	USGS	1941	Small pits and adits for 150 along strike.	Greenish brown, garnet intergrowths, stained, bent, ruled.	
46	Bald Ridge mine	USGS	Pre-WWII	5 pits for 150, deepest 10	Light brown, cracked, stained	
134	Betts Gap mine	USGS	Pre-WWII	Several cuts and adits for 150.	Light brown, ruled, clay stained	
132	Betty's Creek No. 1 mine	USGS, OF	1942-45, 1954-60 int.	Large cut, caved adit 110, several other adits in area 50 by 100.	Ruby, bent, ruled	Moderate sheet (WWII).
135	Betty's Creek No. 3 mine	USGS	WWII(?), 1953-55	Small cut, several adits, incline 50, drifts 80.	Ruby, ruled, bent	Small sheet
149	Big East Fork mine	USGS, OF	1900, WWI, 1939-40, 1944.	Shallow cut 200, adit and stope 100, 4 shafts and stopes 30 to 150(?) deep.	Light brown to greenish brown, bent, moderate "A" structure, quartz inclusions, stained.	Moderate sheet (1944).
27	Big Flint (Grassy Ridge) mine	Olson (1946, p. 26-28), OF.	1932-44	3 large opencuts, 3 adits, drifts, stopes in area 250 by 350.	Ruby, cracked, ruled, stained	Moderate sheet (WWII); large scrap (1932-44).
29	Blackjack mine	USGS	1941	Cut 35 long, 20 deep; other pits in line 300 long.	Light brown, biotite intergrowths, bent, ruled.	
33	Blanton prospect	USGS	1942	Prospect pit	Light brown, biotite intergrowths, small	Small sheet
161	Bowers mine	Olson (1946, p. 32-33), OF.	1899 int to 1945, 1958.	Cut 150, inclines, stopes in area 100 by 150, 140 deep.	Ruby, cracked, bent, minor "A" structure, lanky, biotite intergrowths, concentrated in rolls on hanging wall.	Moderate sheet (WWII).
130	Bryson mine	USGS	1934, 1942-44	3 cuts, incline, drift	Ruby, moderate "A" structure, commonly cracked, ruled.	Small sheet
78	C. D. Bryson mine	Sterrett (1923, p. 207), USGS.	Pre-WWII	Cut with adit; small prospect pits.	Light brown, cracked, stained	
118	C. V. Bryson (Vance Bryson) mine	USGS	1910, int to 1941	Shallow cuts, adits for 500	Light brown, clear, small, bent, ruled. Green, "A" structure, stained.	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Haywood County—Continued

Tabular	1-4 T, >65 L	NE	SE		Concordant	Biotite gneiss	Unweathered	Q-P-Pl-M pegmatite; accessory apatite, biotite, pyrite.
Lens	1-8 T	NW	NE		do	do	Saprolite	F-Q-M pegmatite; accessory biotite.
Anticlinal, tabular	Main body >12 T, 150 L; north body 8 T, 100 L.	NE	SE	SW	Discordant	do	Partly weathered.	F-Q wall zone, fine grained; accessory muscovite, biotite; P-Q-Pl-B-M core, medium to coarse grained; cut by granite dikes.
Tabular	25 T	NW	NE		do	do	do	Kaolinized F-Q pegmatite, medium to coarse grained; accessory muscovite mostly along footwall. Prospect 500 ft north of Putnam mine.
Lens	1-10 T, 100 L, 30 D.	NW	NE		do	do	Unweathered	P-Q-Pl-M wall zone, medium grained; accessory apatite, biotite, pyrite, chalcopyrite; Q core.
Irregular	3-8 T, 100 L, 40 D.	NW	SW		do	Interlayered biotite, and hornblende gneiss.	Partly weathered (40 ft)	Kaolinized Pl-Q-P-M wall zone, medium grained; Q core.
Pinch and swell	2-6 T, >280 L, >50 D.	N	W		Concordant	Biotite gneiss	Unweathered	P-Pl-Q-M pegmatite, medium to coarse grained; accessory garnet, pyrrhotite.
Irregular	Possibly several bodies, size unknown.	NW	Vertical		Discordant	do	Partly weathered.	F-Q-M pegmatite, poorly exposed; associated with fine-grained granite. Quartz float suggests Q core.
Lenses	1-5 T	NE	NW		Concordant	do	do	F-Q-M-B wall zone, fine grained; Q core. Several en echelon lenses.
Tabular	8-10 T, >175 L	NE	SE		do	do	Weathered	F-Q-M pegmatite; massive quartz on dump suggests Q core.
Tabular(?)	5 T	NE	NW		do	do	Saprolite	F-Q-M wall zone; Q core. Wallrock contains kyanite.
do	5 T (only partly exposed).	NE	SE		Discordant	do	Weathered	Kaolinized F-Q-M pegmatite. Wallrock contains kyanite.

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

Jackson County—Continued

Tabular	30 T	NE	Vertical		Discordant	Mica gneiss		P-Pl-Q-M-B wall zone, Q core. Gneiss inclusions.
	Thin							F-Q-M pegmatite, poorly exposed.
Tabular	7 T	NE	Steep					F-Q-M pegmatite.
		NE						F-Q-M pegmatite, cut by many fractures.
Tabular	13 T							F-Q-M pegmatite.
do	3-5 T	NW	SW		Discordant	Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed. 2 other pegmatites, 1 with Q core, prospected to north.
Tabular	25 T	NE	NW			do	Partly weathered.	P-Pl-Q-M pegmatite, medium grained; accessory garnet.
Lens, branching (?)	8-20 T	NW	Vertical		Partly concordant.	Interlayered hornblende and biotite gneiss.	Weathered	P-Pl-Q-M wall zone; accessory biotite, garnet; Q core.
Branching, irregular	2-10 T	NW	SW	SE	Discordant	Interlayered hornblende and biotite gneiss.	do	F-Q-M wall zone; accessory garnet; Q core, discontinuous.
do	2-4 T	NW	SW	NW	Partly concordant.	Biotite gneiss	do	Pl-Q-M pegmatite.
Tabular	3-8 T, 500 L, 300 D.	NW	SW	NW	Discordant	do		P-Pl-Q-M wall zone, accessory garnet, pyrrhotite; Q core, accessory biotite.
Irregular, tabular(?)	350 T, >375 L	NE	NW		do	do	Partly weathered.	F-Q-M-B wall zone, fine to coarse grained; Q core. Many gneiss inclusions near walls.
Tabular bodies.	1-20 T	NW	SW		Partly concordant.	Mica gneiss		F-Q-B-M wall zone; Q core. Large gneiss inclusions in main pegmatite.
Irregular	8 T	NW	NE		do	do	Weathered	F-Q-B-M wall zone, medium grained; accessory garnet; Q core.
Irregular, lens	2-30 T	NW	SW	W	Discordant	Biotite gneiss	Unweathered	Pl-Q-M wall zone, medium to coarse grained; accessory garnet, pyrite, pyrrhotite, biotite; Q core with minor perthite.
Irregular	4-15 T	NW	NE		do	do		P-Pl-Q-B-M wall zone; Q core.
Tabular	5-6 T	NE	Vertical		Discordant(?)	Mica gneiss	Weathered	F-Q-M wall zone; Q core. Several pegmatites prospected. Poorly exposed.
Tabular, branching.	3-7 T, 500 L	NE	NW		Partly concordant.	do	do	F-Q-M wall zone; Q core, discontinuous.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Jackson County—Continued</b>						
37	Diller Bryson mine.....	USGS.....	1900.....	Cuts, 3 adits in area 500 long.	Light brown, reeved, ruled, stained.....	
155	Buchanan (Dream) mine..	USGS, OF, DMEA.	1944-45, 1955-56.....	Cut 200, 3 adits, stopes, shaft 74, drifts 100.	Ruby to greenish-brown, bent, ruled, minor stain.	Moderate sheet (WWII).
39	Buchanan prospect.....	USGS.....	Pre-WWII.....	3 small cuts, caved adit.....	Light brown, clear.....	
124	B. C. Buchanan prospects.	USGS.....	Pre-WWII.....	Cut 40, several pits.....	Brown, moderate "A" structure, commonly stained.	
93	Henry Buchanan prospects.	USGS.....	Pre-WWII.....	Several crosscuts, prospect pits.	Light brown, ruled, cracked, clay stained.	
94	Marsden Buchanan prospect.	USGS.....	1942.....	2 cuts, 20 short adit.....	Brown, "A" structure, ruled, cracked, concentrated along footwall of core.	
96	Pole Buchanan mine.....	USGS.....	1942.....	Pits, crosscuts, drifts, trenches, 200 long, 50 deep.	Ruby, clear.....	Small sheet, mostly scrap.
159	Ramsey Buchanan mine..	USGS.....	1942.....	2 cuts and adit in line 150 along strike.	Ruby, minor stained, ruled.....	
95	V. O. Buchanan prospect..	USGS.....	1952.....	Prospect pit 10 deep.....	Ruby, bent, cracked, stained.....	
76	Buck Knob mine.....	Sterrett (1923, p. 207), USGS.	Pre-1910, 1940, WWII.	Cut 80, shallow pits, adits, shaft for 250 along strike.	Brown, minor stained, small.....	Small sheet (WWII).
60	Buckeye Gap mine.....	USGS.....	Pre-WWII.....	Cut 35 long, 8 deep, pit.....	Green, "A" structure, stained.....	
165	Bumgarner mine.....	USGS.....	Pre-WWII, 1943-44.	2 cuts 20-40, pit, crosscut, stopes.	Ruby, small.....	Small sheet (WWII).
63	Buzzard Roost mine.....	USGS.....	1895, 1900, 1914, 1944.	Cut 40 long, 30 deep.....	Dark brown, minor stained, locky, ruled.	Small sheet (1944).
151	"C" (Puncheon Camp) mine.	USGS.....	1938, 1940, 1942, 1944.	Cut 25, 2 adits, stope, drift in area 50 by 100.	Ruby to drak brown, commonly stained.	Small sheet.....
103	Cabe mine.....	USGS.....	1900, 1942.....	Cut 12 deep, 3 shafts, drifts for 100 along strike.	Light brown, clear, ruled, bent, small.....	do.....
81	Casey (Ashebrook) mine..	USGS.....	1942-44, 1955.....	3 cuts 12-35 long, 6-20 deep.	Ruby to light greenish brown, ruled, bent, minor stained.	do.....
31	Cashie Branch mine.....	USGS.....	1930.....	Cut, shaft, adit.....	Broken, bent, reeved.....	
68	Cedar Cliff mine.....	Sterrett (1923, p. 210), USGS.	Pre-1910, WWII.....	Cut 60 long, 5-15 deep.....	Ruby, stained.....	Small sheet.....
45	Choga (Chogey) mine.....	USGS.....	Pre-WWII.....	2 cuts 25-35 long, 4-6 deep, 2 adits, drifts.	Light brown, ruled, stained, small.....	
143	Hardy Clark No. 1 prospect.	USGS.....	1943.....	Cut 21 long, 8 deep.....	Green to greenish brown, cracked, bent, ruled.	
143	Hardy Clark No. 2 prospect.	USGS, DMEA.	1942-44, 1956.....	Cut 140 long, 15 deep; adit 29.	Ruby, bent, ruled, stained.....	Small sheet.....
100	Clouse mine.....	USGS.....	Pre WWII, WWII.	Cut 50 long, 15 deep; stope 20, pit 15.	Ruby, wedge "A" structure, stained.....	Small sheet (WWII).
145	Collins mine.....	USGS.....	WWII.....	Cut 100, drift 75, shaft 30, stope.	Green and ruby, ruled, cracked, mineral inclusions, soft.	do.....
138	Engle Cope mine.....	Olson (1946, p. 34, 36), DMEA, OF.	1934-37, 1943-45, 1953-56.	Cuts, shafts, incline, adit, stopes, drifts for 500 along strike, 100 deep.	Light brown, green mottling, minor "A" structure, commonly bent, ruled, soft, concentrated along hanging wall and foot wall.	Large sheet (WWII), mod-ate sheet (1953-55).
176	Corbin Knob prospect.....	USGS.....	Pre-WWII.....	Cut 15, several prospect pits.	Ruby, small.....	
111	Coward mine.....	USGS, DMEA.	1895, int to 1945, 1955-56.	4 cuts 10-80 long for 200 along strike. Adit 125, stope, winze 35, drift 10.	Ruby to greenish brown, ruled, bent, moderately stained.	Small sheet (WWII).
120	Cox (Cox and Davies) mine.	Olson (1946, p. 33-35), DMEA, OF.	1868, 1896, 1916 int to 1944, 1953-54.	Many shallow pits and cuts, 800 along strike, 2 cuts 80-100, stopes, shaft 35, drifts.	Ruby, minor biotite intergrowths, commonly bent, ruled, cracked, stained.	Moderate sheet (WWII, 1954).
84	Davis prospect.....	USGS.....	Pre-WWII.....	2 trenches, pit, 60 on strike.	Ruby, clay stained, cracked, bent.....	
150	Dead Timber Ridge mine.	USGS.....	Pre-WWII, 1952.....	Series of trenches, pits, adits for 1,300 along strike.	Light brown, "A" structure, bent, ruled, cracked, stained.	
107	Early Deets mine.....	USGS.....	Pre-WWII, 1942.....	Several small cuts, 2 adits, shaft 15, extend 150.	Light brown, clay stained, cracked, bent, ruled.	
105	Dietz (Candler-Keener) mine.	USGS.....	1943-44.....	Cut, 3 adits, shaft 35, and shallow trench in area 400 long.	Brown, minor stained, concentrated near core.	Small sheet.....
90	Jeannie Dietz (Deets) mine.	USGS, OF.....	Pre-WWII, 1942-43.	4 cuts, adit 160, in area 60 by 200.	Light brown, hard, ruled, stained.....	
91	Jeannie Dietz prospect.....	USGS.....	Pre-WWII.....	Shallow pits and adits in line 175.	Light brown, "A" structure, scrap.....	Clay, sheet(?).....
36	W. G. Dillard (Black Rock Stock Farm) mine.	USGS.....	1900, int to 1942.....	Several cuts, crosscuts, shafts, small stopes in area 150 by 300.	Light brown, reeved, biotite inter-growths.	Large scrap, small sheet (1942).
35	W. G. Dillard prospects..	USGS.....	Pre-WWII.....	Numerous small cuts and prospect pits.	Light brown, ruled, small.....	
101	Double Gap mine.....	USGS.....	Pre-WWII.....	2 cuts, 2 shafts 15-25, adit 23, drifts.	Greenish brown, stained, wedge "A" structure, on footwall side of core; brown moderately stained, on hanging-wall side of core.	
157	Eaglespread mine.....	USGS.....	1944.....	Many shallow pits.....	Light brown, small.....	Small sheet.....
148	East Fork prospect.....	USGS.....	WWII.....	Shallow cuts, 2 crosscuts 50-85, extend 250 along strike.	Brown, stained, ruled, bent, clay stained.	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Jackson County—Continued

Tabular	1-4 T	NW	NW		Discordant	Biotite gneiss		F-Q-M wall zone; Q core, discontinuous.
do	7-10 T	NW	SW	NW	Partly concordant	do	Weathered (50 ft)	Pl-P-Q-M wall zone, medium to coarse grained; Q core.
Pinch and swell	5 T	NW	Vertical		Discordant	Mica gneiss	Weathered	F-Q-M-B wall zone; Q core.
Irregular	6-7 T	NW	Vertical		do	Biotite gneiss		F-Q-M wall zone; Q core.
Tabular	10 T	NE	Vertical		Concordant	Mica gneiss	Weathered	F-Q-M wall zone; Q core. 2 other prospects on similar bodies nearby.
do	10 T	NE	SE		do	do	do	F-Q-M wall zone; Q core.
Irregular	4 T	NW	SW		Partly concordant	do	do	Do.
Tabular, lens	1-8 T	NW	SW		Discordant	Biotite gneiss	do	Pl-Q-M wall zone; Q core.
Tabular(?)	2 T	NE	NW		Concordant	Mica gneiss	do	F-Q-M pegmatite.
Tabular	4-5 T	NE	Vertical		Concordant	do	do	F-Q-M wall zone; Q core.
do	6 T	NW	Vertical		Discordant	do	do	Do.
do	8 T	NE	SE		Partly concordant	do	do	F-Q-M pegmatite; locally gneissic texture.
do		NE	NW		do	Mica gneiss	Unweathered	P-Q-M-B wall zone; Q core.
do	4-6 T	NW	NE		Discordant	Biotite gneiss		M-F-Q wall zone; P-Q-Pl-B-M intermediate zone; Q core.
Pinch and swell	1-4 T	NE	SE		Partly concordant	Mica gneiss	Weathered	F-Q-M wall zone; Q core.
Tabular, branching	2-7 T, several bodies.	NE	NW		Discordant	Biotite gneiss	Unweathered	Q-garnet-sericite border zone; B-Q-F wall zone; M-F-Q intermediate zone; Q core, discontinuous.
Pinch and swell	6-8 T						do	F-Q-M pegmatite, poorly exposed.
do	2-4 T	NE	NW		Discordant	Mica gneiss	do	Q-F-M wall zone; accessory biotite; Q core discontinuous.
do	Thick	NW(?)			Discordant(?)	do		P-Pl-Q-M-B wall zone; Q core. Poorly exposed.
Lens	3 T	NW	NE		Concordant	Biotite gneiss	Weathered	Q-F-M wall zone; Q core.
Pinch and swell	2-6 T	NW	Gentle		Partly concordant	do	do	F-Q-M wall zone; Q core.
Tabular	17 T	NE	SE		do	Mica gneiss	Unweathered	F-Q-M wall zone, fine to medium grained; accessory biotite; Q core.
do	3-5 T	NW	NE		Concordant	Biotite gneiss	Weathered	Pl-Q-M wall zone, medium grained; accessory sericite, garnet, sulfides, allanite; Q core.
Irregular, tabular, pinch and swell	2-15 T, 1,000 L(?)	NE	NW		Partly concordant	do	Unweathered	Pl-Q-M wall zone, medium to coarse grained, accessory sericite, garnet, pyrrhotite; Q core, discontinuous.
Irregular	5 T	NE	Vertical		Discordant	do		Q-P-M pegmatite, medium grained.
Tabular, pinch and swell, branching	2-5 T, >185 L, >110 D.	NW	SW		do	do	Weathered (30 ft)	Pl-P-Q-M wall zone, medium to coarse grained; accessory biotite, garnet, pyrite, pyrrhotite, apatite, allanite; Q core, discontinuous. Pegmatite emplaced in fault zone.
Anticlinal, tabular	7-12 T	NE	SE	SW	Partly concordant	Mica gneiss	Weathered (20 ft)	Pl-P-Q-M wall zone; accessory apatite, garnet, biotite; P-Q intermediate zone, coarse grained; Q core (north body); Pl-P-Q-M pegmatite (south body).
Tabular	3-5 T	NE			Discordant	do	Weathered	F-Q-M wall zone; Q core.
Branching, tabular	2-8 T	NW	SW		do	Biotite gneiss	do	P-Pl-Q-M wall zone; Q core. Possibly several bodies prospected.
do	Several feet T	E	N(?)		do	Mica gneiss	do	Poorly exposed. F-Q-B-M pegmatite.
Lens	1-6 T	NW	Vertical		Partly concordant	do	Weathered (25 ft)	F-Q-M wall zone; Q core.
Pinch and swell	0.5-7 T	NE	SE		do	do	Weathered	Pl-Q-M wall zone, medium grained; accessory garnet; Pl-Q-M core, fine to medium grained.
Tabular(?)	>5 T	NW	Vertical		do	do	do	F-Q-M wall zone; Q core.
Irregular to tabular	Small bodies 1-4 T, main body larger.	NW	NE		Discordant	do	do	P-Pl-Q-M wall zone, accessory biotite; Q core. Several small unzoned pegmatites prospected.
do		NW	NE		Partly concordant	Mica gneiss	Weathered	F-Q-M wall zone; Q core. Many small poorly exposed pegmatites prospected.
Tabular	25 T	NE	SE		do	do	do	F-Q-M wall zone; Q core.
do								
Pinch and swell	Thick 3-10 T	N	W		Partly concordant	Biotite gneiss	Weathered	F-Q-M pegmatite, poorly exposed. F-Q-M wall zone; Q core.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Jackson County—Continued</b>						
117	East Laport mine.....	USGS.....	Pre-WWII, WWII.	series of cuts and shafts 35 apart for 250 on strike.	Light brown, bent.....	Small sheet (WWII).
166	Ebb mine.....	USGS.....	Pre-WWII.	Series of small cuts, short adits, for 250.	Light brown, clear, clay stained.....	Clay(?).....
51	Far TopField prospect.....	USGS.....	Pre-WWII.	Small pit, short adit.....	Green, "A" structure, stained.....	Scrap.....
140	Fay mines: No. 1.....	USGS.....	1885, 1944.....	Cut 60 long, 30 deep; adit 15.	Green to greenish brown, bent, cracked, stained.	Small sheet (1944).
140	No. 2.....	USGS.....	1944.....	13 shallow cuts, adit 40.....	Light brown, biotite intergrowths, bent, small, ruled, cracked.	Scrap.....
140	No. 3.....	USGS.....	1944-45.....	Cut 30 long, 24 deep.....	Brown, minor biotite intergrowths, bent, commonly cracked, ruled.	Small sheet.....
140	No. 4.....	USGS.....	1944-45.....	Cut 30 long, 30 deep.....	Brown, minor "A" structure, biotite intergrowths, commonly bent, cracked.	do.....
146	Judge Ferguson mine.....	Sterrett (1923, p. 205, 206), USGS, OF.	Pre-1906, 1944.....	Cut 150 long, 20 deep; 2 adits 225, winze 55, drifts, stopes. Mined to depth of 100(?)	Ruby, "A" structure.....	Small sheet (1944).
92	Frady mine.....	USGS, OF.....	1885, int to 1945.....	Several adits, stopes, drifts, shafts, cuts, pits in area 100 by 500.	Brown to greenish brown, ruled, bent, cracked, concentrated along footwall more than hanging wall.	Large sheet.....
163	Gradin (L. C. Presley Buchanan's Old) mine.....	USGS, Sterrett (1923, p. 204-205).	Pre-1910, 1935.....	Cut 270 long, 30 deep, 4 adits, small pits in area 200 by 600.	Light brown, clear, locky.....	
114	Graveyard Ridge mine.....	USGS.....	1920, 1944.....	Several pits, crosscut.....	Small.....	Small sheet.....
160	Gregory mine.....	Sterrett (1923, p. 203-204), USGS, OF.	Pre-1910, 1925, 1943-44.	Cut 80, 2 adits, drifts, stope in area 50 by 180.	Green, "A" structure, stained, ruled, bent, tied, concentrated along footwall; brown, concentrated along hanging wall.	Small sheet (1943-44).
147	Hall mine.....	DMEA.....	1955-56.....	Cut 50, adit 30.....	Ruby, bent, minor stained.....	Small sheet.....
104	Higdon mine.....	USGS.....	Pre-WWII, 1942.....	Adit 40, stope and drifts, 2 shafts, small pits, adit 20 in area 60 by 200.	Brown, bent, ruled.....	
129	Holland No. 1 prospect.....	DMEA.....	1955-56, 1960.....	Cut 300 long, 15-30 deep, caved drift, 82.	Ruby, cracked, bent, stained.....	Small sheet, moderate scrap.
128	Holland No. 2 mine.....	DMEA.....	1955-56.....	Cut 140 long, 25 deep, 2 adits, shaft 30, drift 70.	Ruby, cracked, bent, ruled, stained, concentrated near walls. Green, concentrated near core.	Moderate scrap, small sheet.
56	Aaron Hooper mine.....	USGS.....	WWI.....	Cut 50 long, 25 deep.....	Light brown, stained, tied, ruled, concentrated near hanging wall and gneiss inclusions.	
64	L. E. Hooper (Duke Stephens) mine.....	USGS.....	Pre-WWII, 1941.....	Shaft 80, with stope, 2 short drifts; shaft 30.	Dark brown, biotite inclusions, minor ruled.	
43	Hoyle mine.....	USGS.....	1944.....	Cut 55.....	Ruby.....	Small sheet.....
34	A. J. Hoyle prospect.....	USGS.....	1955.....	2 small cuts.....	Ruby, bent, stained, small.....	do.....
153	Jasper mine.....	USGS, OF.....	1905, 1943-45.....	Cut 50 long, 20 deep, shaft 75, 3 crosscuts, stope.	Light brown, hard, clear, biotite intergrowths, quartz inclusions, moderately bent, ruled, cracked, reeved.	Large sheet (1943-45).
154	Jesse mine.....	USGS, OF.....	1943-44.....	Cut 40, shaft 15, drift 70.....	Light brown, moderately reeved, tied, common bent, cracked.	Small sheet.....
156	Joe mine.....	USGS.....	1944.....	9 adits, 3 shafts, extensive underground workings in area 400 long.	Brown, tied, minor reeves, biotite intergrowths.	Small sheet, clay.....
127	Jones prospect.....	USGS.....	1956.....	Cut 150 long, 10 deep.....	Greenish brown, "A" structure, bent, locky, stained.	
25	Judaculla Field prospect.....	USGS.....	Pre-WWII.....	Prospect pits.....	"A" structure, stained, scrap.....	
141	Kolb (Upper Clark) mine.....	USGS, OF, DMEA.	1928, 1943-44, 1957.	Cut 50 long, 20 deep, shaft 50, drift 80, stopes.	Ruby, ruled, bent, stained.....	Moderate sheet.....
30	W. T. Lee prospect.....	USGS.....	1930's.....	Cut 25.....	Brown, bent.....	Small sheet.....
152	Locust Ridge mine.....	USGS.....	Pre-WWII, 1943-45.	Cut 40 long, 20 deep, shaft 40, crosscut 24, shaft 24.	Ruby, "A" structure, color banded, concentrated along hanging wall of core; ruby stained, concentrated along footwall of core.	
122	Long Branch mine.....	USGS, OF.....	1894, 1907-10, 1912-15, 1942-44.	Cuts, adits, inclines, drifts, large stopes in area 100 by 300.	Brown to greenish brown, bent, cracked, ruled, minor "A" structure.	Moderate sheet (1942-44).
112	John Long No. 1 (Flukens) mine.....	Sterrett (1923, p. 206), USGS.	Pre-1910.....	2 adits, 3 shafts, small cuts, stopes in area 60 by 280.	Brown, clay stained, small, concentrated near core.	
113	John Long No. 2 mine.....	Sterrett (1923, p. 206-207), USGS.	Pre-1910, 1942, 1944.	2 narrow cuts, 40 long, 25-35 deep, crosscut 60.	Brown.....	Small sheet (WWII).
142	Lower Kolb prospect.....	USGS.....	1943.....	Cut 20 long, 12 deep.....	Greenish brown, cracked, bent, minor "A" structure, common stain.	
126	J. R. McMahan prospect.....	USGS.....	WWII.....	Cut 110 long, 2 adits and cut on separate body to north.	Ruby, "A" structure, biotite intergrowths, stained, bent, ruled.	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Jackson County—Continued

Irregular	18 T	NE	NW		Partly concordant	Biotite gneiss	Weathered	M-Q-F wall zone; F-Q-B-M intermediate zone; Q core, discontinuous.
	20 T	NE	NW		do	do	do	F-Q-M-B pegmatite.
	2 T				do	do	do	F-Q-M pegmatite; accessory garnet.
Irregular	8-15 T	NE	Vertical		Discordant	do	do	F-Q-M pegmatite, medium grained; quartz veins common; gneiss inclusions common. Pegmatite cut by faults.
Tabular, lenses(?)	2-8 T	NW	SW		do	do	do	F-Q-M wall zone; Q core. Several parallel bodies present.
Pinch and swell	4-9 T	NW	NE		do	do	do	Pl-Q-M wall zone; Q core.
Tabular, branching	6 T	NW	NE		do	do	do	F-Q-M wall zone; Q core. Gneiss inclusions.
Tabular	12 T	NE	Vertical		Discordant	do	do	F-Q-M wall zone; Q core, discontinuous.
do	Main body 6-9 T, >500 L, >140 D; northeast body 7 T.	NW	Vertical		do	do	do	Pl-M-Q wall zone, coarse grained; accessory garnet; P-Pl-Q-M intermediate zone, coarse grained; Q core; accessory biotite altered to vermiculite. Cut by many faults.
Irregular, branching	65 T (main mass).	NW			Partly concordant	Mica gneiss	Weathered	Pl-Q-M-B wall zone; Q core.
Tabular, lens	5-20 T	NW	SW	NW	Discordant	Interlayered hornblende and biotite gneiss		F-Q-M pegmatite, poorly exposed. Pl-Q-M wall zone, medium grained; M-F-Q intermediate zone, coarse grained; Q core, discontinuous; accessory garnet, apatite, pyrite.
Lens, branching	1-2.5 T	NE	SE		Concordant	Biotite gneiss	Unweathered	Pl-Q-M wall zone, medium grained; accessory biotite, garnet, sericite, pyrite; Q core.
Tabular(?)	>20 T	NE	SE		Partly concordant	Mica gneiss		P-Q-M wall zone, fine grained; P-Q-M intermediate zone, coarse grained; Q core, discontinuous(?).
Irregular	5-20 T	NW	NE		do	do	Weathered	Pl-Q-M wall zone; Q core, discontinuous.
Tabular	3-5 T	NW	Variable		do	do	do	P-Q-M wall zone; Q core. Cut by low angle faults.
Irregular	20 T	NE	SE	SW(?)	Discordant	Biotite gneiss		P-Pl-Q-M-B wall zone, medium to coarse grained; Q core. Large gneiss inclusions.
Tabular	10 T	NE	SE		Concordant	do		Pl-B-M-Q pegmatite.
Pinch and swell	5 T	NE	Vertical			Mica gneiss		F-Q-M pegmatite; accessory garnet.
Tabular, branching	1-3 T	N	W		Partly concordant	Biotite gneiss		Pl-Q-M pegmatite. Q-M pegmatite (burr rock), fine grained, common.
Tabular	6 T	NE	NW	NE	Discordant	do		Pl-P-Q-M-B pegmatite; accessory pyrrhotite, garnet. Mica-rich pipe-like mass plunges north.
Tabular, branching	1-6 T	NW	SW		Partly concordant	do		Pl-Q-M wall zone; Q core.
Tabular	25 T	NE	SE		do	do	Weathered	F-Q-M-B pegmatite.
do	5-10 T	NW	Vertical		Partly concordant	Mica gneiss	do	F-Q-M wall zone; Q core discontinuous.
Irregular, lens	1-15 T	NW	Variable	SE(?)	Discordant	Interlayered biotite and hornblende gneiss	Unweathered	F-Q-M pegmatite, poorly exposed. Pl-Q-M-P wall zone, medium to coarse grained; accessory garnet, sericite, pyrrhotite; Q core, discontinuous.
Irregular, tabular	8 T, >70 L	NW	NE		do	Mica gneiss	do	Q-Pl-M-B wall zone; Q-P intermediate zone, coarse grained; Q core.
Tabular	12-14 T	NW	SW		do	do	Weathered	Q-F-M wall zone, medium grained; Q core.
Irregular, lens	4-12 T, avg 6	NW	SW	NW	Partly concordant	Biotite gneiss	Weathered (70 ft)	Pl-Q-M-P wall zone, medium grained; accessory garnet, pyrrhotite; Q core, discontinuous.
Branching, tabular	2-4 T	NE	Variable		Concordant(?)	Mica gneiss	Weathered (90 ft)	F-Q-M wall zone; Q core, discontinuous.
Lens	1-14 T	NE	NW		Concordant	do	Unweathered	M-F-Q wall zone; Pl-Q core; accessory pyrrhotite, biotite.
Tabular	8 T	NE	NW		do	do	Weathered	F-Q-M wall zone; Q core, discontinuous.
Lenses	1-15 T and 0-6 T	NE	NW		do	Mica schist	do	Pl-Q-P-M-B wall zone; Q core, south body; F-Q-M wall zone; Q core, discontinuous, north body. Cut by faults.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYVA DISTRICT—Continued</b>						
<b>Jackson County—Continued</b>						
77	Luce Mills prospect	USGS		Short adit, 2 pits	Brown, clay stained	Small sheet
123	Moore mine	USGS	Pre-WWII	Series of drifts and adits for 350 along strike	Light brown, bent, stained	
109	Charles Morgan prospects	USGS	Pre-WWII, 1944	Caved drifts, cuts, pits	Ruby	Small sheet (1944)
66	Moses Creek prospect	USGS	Pre-WWII	Adit 35, 2 cuts	Dark greenish brown, biotite intergrowths, stained, concentrated near core	
85	Moss (Adams) mine	Sterrett (1923, p. 201-203), USGS	1917, 1942-43	Series of narrow cuts 1.100 long, with short drifts and stopes, 40 deep	Ruby, minor stained, cracked, bent, clay stained	Small sheet (1942-43)
136	Murray Mountain (Murray Cove) mine	USGS, DMEA	Pre-WWII, 1942, 1954	Many shallow cuts, pits, adits, crosscuts in area 200 by 650	Light brown to greenish brown, clay stained, bent, ruled	Small sheet (1954)
108	Doc Nichols mine	USGS, OF	1905, 1917, 1943-45	Cuts, adits, shafts, stopes, drifts in area 300 by 500, 120 deep	Brown to greenish brown, ruled, bent, locky, biotite intergrowths, minor "A" structure, concentrated in wall zone and near core	Small sheet (WWII)
59	Andy Nicholson mine	Sterrett (1923, p. 211), USGS	Pre-WWII	2 cuts, 3 crosscuts, pits in belt 125 long	Brown, stained, small, scrap	
119	Norton prospect	USGS	1925	6 slumped pits	Ruby, small	
79	Oxner mine	USGS	Pre-WWII, 1944	Crosscut 108, shaft, adit	Brown to greenish brown, bent, cracked, small, concentrated near core	Small sheet (1944)
82	Painter mine	USGS	1905, 1910-12, 1915, 18, 1941-44, 1952	Extensive bulldozing and slump conceals old shafts, adits, stopes in area 200 by 600	Light brown to green, "A" structure, stained, ruled, cracked, bent, clay stained	Moderate sheet (1941-44), small sheet (1952)
71	Henry Parker mine	USGS	1935, 1940, 1944	Shaft 22, pit	Ruby	Small sheet (1944)
158	Jerome Parker mine	USGS	1904-05, 1941, 1944-45	Cut 140 long, 12 deep	Ruby, clear, ruled	Small sheet (1944-45)
72	Parker Knob mine	USGS	Pre-WWII	Cut 35 long, 10 deep, pits for 150 along strike	Brown, moderate "A" structure, stained	
98	Pine Ridge mine	USGS	1944	Small pit, 2 adits 30-35	Ruby, ruled, bent, small	Small sheet
47	Piney Mountain Creek (Bearwallow Fork) mine	USGS	1907, 1935-36	Cut 150 long, 25 deep, drift	Ruby, biotite intergrowths, locky, stained, concentrated along core and hanging wall	
74	Potato (Tater) Cove mine	USGS	Pre-WWII, 1944	Cut 100 long, 10 deep, 4 caved adits, pits in area 150 by 200	Ruby, moderately stained	Small sheet (1944)
88	Power Line propsects	USGS	Pre-WWII	Caved adits, pits	Light brown, mineral inclusions, ruled	
171	Bud Presley mine	USGS	1917	Cut 50, 2 shafts	Brown, clear, small, green, stained, locky	
167	Mack Presley mine	USGS	1943-44	Series of small pits, cuts, adits, crosscuts for 375	Light brown, "A" structure, minor stained, small, concentrated near quartz pods	Small sheet
58	J. B. Price mine	Sterrett (1923, p. 211-212), USGS	Pre-1910	Cut 40, shaft 35, 2 adits, connecting stope, trench	Grayish brown, "A" structure, cracked, bent, stained	
57	J. S. Prince (Ben Queen) prospect	USGS	1927	Several cuts and pits	Light brown, "A" structure	
54	Lewis Queen mine	Sterrett (1923, p. 212)	Pre-1910	Adit	Weathered	
55	Oscar Queen mine	USGS	1939	Cut 100 long, 15 deep, 2 shafts, drifts	Brown, wedge "A" structure, stained, scrap	Scrap
106	Raco mine	USGS	1942, 1944	Adit 140, drift and stopes 125, shaft 30	Ruby, moderately bent, ruled, stained	Moderate sheet
99	J. Radeker mine	USGS	1941	3 cuts 15-90 long, 5-15 deep in area 80 by 100	Brown, stained, bent, cracked	
38	Sally Reed mine	USGS	Pre-WWII, 1942	Cut 50 long, 30 deep; pits and trenches for 530	Brown, moderate "A" structure, biotite intergrowths, small	Feldspar, sheet (?)
116	Rhoda mine	USGS	1914-18, 1942	Cut 240 long, 10-30 deep; cut 100 long, 20 deep. Several shafts 60-70 deep, adits	Greenish brown, moderately "A" structure, commonly stained, small	Clay, sheet
26	Richland Balsam NW prospect	USGS	Pre-WWII	Cut 50 long, 6-8 deep	Light brown, "A" structure, bent, stained	
24	Richland Balsam prospect	USGS	Pre-WWII	2 small prospect pits	Dark brown, biotite intergrowths, small	
53	Dave Ridge mine	USGS	1938-39	Cut 30 long, 10 deep, shaft 20, drifts 30	Light brown, "A" structure, clear, concentrated near core	
173	Roarenhole (Sheep Knob) mine	USGS	1944	Shaft 22, 3 cuts 15-35 long	Ruby, "A" structure, cracks	Small sheet
174	Roaring Hole mine	USGS	1954, 1958	Cut 65 long, 25 deep; small stope 26	Ruby, small	do
168	Arthur Robinson prospect	USGS	1931, 1944	6 small pits and cuts	Light brown, cracked, warped	Small sheet (1944)
75	Rock mine	USGS	Pre-WWII	Cut 30	Light brown, minor "A" structure, clear	
28	Rocky Branch (McKay) mine	USGS	1942-44	2 cuts 30-40 long, 15-25 deep	Light brown, clear, ruled, small	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Jackson County—Continued

Pinch and swell.	1-6 T.	NE	SE		Concordant(?)	Biotite gneiss	Weathered	F-Q-M wall zone; Q core. Several pegmatites, poorly exposed.
		NE	Vertical	NE(?)	Concordant	Mica gneiss	do	F-Q-M wall zone; Q core.
Lens	1-4 T.	NE	NW		Concordant	Biotite gneiss	do	F-Q-M pegmatite. 3 pegmatites prospected.
Pinch and swell.	1-7 T.	NW	NE		Partly concordant.	do	do	F-Q-M wall zone; accessory biotite; Q core.
Pinch and swell, lenses.	2-8 T.	NW	SW		do	do	do	Q-P1-M wall zone; F-Q-M-B core, very fine grained (granite). Core cut by quartz veins.
Tabular	4-7 T.	NW	SW	NW	do	do	do	F-Q-M wall zone; Q core; several pegmatites explored. Generally cut by small faults.
Lenses(?)		NE	SE		Concordant(?)	Mica gneiss	do	Pl-Q-M wall zone; accessory biotite; Q core. 3 similar parallel bodies mined.
Lens	0.5-4 T.	NE	NW			Biotite gneiss	do	F-Q-M wall zone; Q core. Poorly exposed.
Pinch and swell.	2-15 T.	NW	SW		Partly concordant.	do	do	F-Q-M pegmatite, poorly exposed.
Tabular	5-6 T, >90 L.	NW	NE		Discordant	Biotite gneiss	Weathered	F-Q-M wall zone, medium grained; Q core.
Tabular, sills.	5 to 8 T.	NE	NW		Concordant	Mica gneiss	do	P-P1-Q-M wall zone; accessory biotite, garnet, tourmaline, pyrite; Q core.
Tabular	1-2 T.	NW	Vertical		Discordant	do	do	F-Q-M pegmatite.
do	20 T.	NE	SE		Concordant	Biotite gneiss	do	F-Q-M wall zone; Q core, discontinuous. Several bodies present.
do	10-12 T.	NE	SE		do	Mica gneiss	Weathered	F-Q-M wall zone, medium grained; accessory garnet; Q-F core, coarse grained.
do	10 T.	NE	SE		do	do	do	Pl-P-Q-M wall zone, fine to medium grained; Q core.
do	15 T.	NE	NW		do	Biotite gneiss	do	F-Q-M-B wall zone; Q core, discontinuous.
Tabular	25-50 T.	NE	SE		do	Mica gneiss	do	F-Q-M wall zone; Q core. Several pegmatites prospected for clay or mica.
	2-20 T.	NE	SE		Partly concordant.	do	do	P-P1-Q-B-M wall zone; Q core.
Lenses	2-4 T, 10 L.	NW	NE		Concordant	do	Unweathered	P-P1-Q-B-M pegmatite, coarse grained; many quartz pods.
Branching	8-T.	E	N		Discordant	Mica gneiss	Weathered	F-Q-M pegmatite, contains quartz pods and tabular gneiss inclusions. F-Q-M pegmatite.
Tabular	25-35 T.	NW	NE		Concordant	do	do	F-Q-M pegmatite. Large quartz masses may be discontinuous core. Q-F-M wall zone; Q core.
Lenses	East body 5-18 T, west body 1-15 T.	NW	NE		do	Biotite gneiss	do	F-Q-M wall zone; accessory biotite, apatite, pyrite, pyrrhotite; Q core.
Irregular-tabular.	20 T.	N	Vertical		Discordant	do	Weathered	P-Q-B-M pegmatite; west body contains Q core.
Lens	150 T.	NE	Vertical		Partly concordant.	Mica gneiss	do	Pl-P-Q-M-B wall zone, some graphic texture; Q core, discontinuous. Cut by granite dikes. Several bodies prospected.
Tabular	3-5 T.	NE			Discordant	do	do	F-Q-M wall zone, fine grained; Q core.
do	2-3 T.	NE			do	do	do	F-Q-M wall zone; Q core, discontinuous. Poorly exposed.
Lens	1-4 T.	NE	SE		Concordant	Biotite gneiss	do	F-P1-Q-M-B wall zone; accessory garnet; Q core.
		NW	SW		Discordant	do	do	F-P1-Q-M wall zone; Q core.
Irregular, branching.	1-8 T.	NW	SW	NW	do	do	Unweathered	P-P1-Q-M wall zone; Q core. Some very fine grained pegmatite or granite present in pegmatite.
	200 L.	NE	SE		do	do	do	Pl-Q-M pegmatite, cut by quartz fracture fillings.
Irregular	10 T.	NW	NE		Discordant	Mica gneiss, biotite granite.	do	F-Q-M pegmatite.
do	4-5 T.	NE	NW		do	Mica gneiss	do	Q-P1-M pegmatite; accessory garnet, pyrrhotite.
								F-Q-M pegmatite; accessory biotite.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Jackson County—Continued</b>						
121	Rogers mine.....	USGS.....	1935-36, 1941-42, 1944.	3 groups of pits and adits.....	Ruby, bent, ruled, stained.....	
87	Savannah prospects.....	USGS.....	Pre-WWII.....	Many small pits, shallow shaft, crosscut.	Light brown, clear, ruled, small.....	Clay, sheet(?).....
65	Sheep Mountain mine.....	Olson (1946, p. 47-49), OF.	1915-18.....	Cut 100 long, 75 deep; stope 65 long, adit 65.	Dark brown, reeved, stained.....	Sheet.....
67	Old Sheep Mountain mine.....	DMEA.....	Pre-WWII, 1953-54.	6 adits, 2 trenches 150 long, 10 deep; shaft 86, drifts.	Ruby, hard, clay stained.....	Small sheet.....
175	Shell Ridge (Shell Branch) mine.....	USGS.....	Pre-WWII, 1944, 1952-56.	Large cut 350 long, 200 wide, 80 deep, shafts, adits, drifts.	Ruby, commonly tied, bent, ruled, moderately stained.	Large scrap, moderate sheet.
162	Spence mine.....	USGS.....	Pre-WWII.....	Cut 50 long, 25 deep; stope 15.	Ruby, moderately stained.....	
70	D. H. Stephens No. 1 mine.....	USGS.....	1939, 1944, 1952-54.	Cut 40, stope, adits, trenches.	Light brown, biotite intergrowths, bent, cracked, green mottling.	Small sheet (1944).
69	D. H. Stephens No. 2 mine.....	USGS.....	1939, 1944.....	Cut 55 long, 25 deep, adit.....	Greenish brown, stained, small.....	
62	L. M. Stephens prospects.....	USGS.....	1952.....	2 trenches 65 long, 4 deep.....	Ruby, ruled, cracked, stained.....	
89	Stillwell mine.....	Olson (1946, p. 50, 52-53), OF.	1875-85, 1915-18, 1943-44.	8 adits, 2 shafts, pits, cuts, stopes in area 200 by 500, 130 deep.	Ruby, minor "A" structure, commonly bent, ruled.	Moderate sheet (1943-44).
32	Sugarloaf Creek mine.....	USGS.....	1932-34.....	Incline 30 wide, 40 deep.....	Light brown, minor stain.....	
44	Sugarloaf Mountain prospects.....	USGS.....	Pre-WWII.....	Adit, pits.....	Light brown, stained.....	
86	Texacole mine.....	USGS.....	1910, 1944.....	Shaft 36, drift.....	Light brown, cracked, small.....	
172	Tilley mine.....	Olson (1946, p. 53-54), OF.	1935, 1944.....	5 small cuts, inclined stope 200 long, 50 wide.	Brown to greenish brown, hard, quartz and sulfide inclusions, cracked.	Large sheet.....
41	Toy (Tustin, Moody) mine.....	Sterrett (1923, p. 200-201), USGS.	Pre-1905, 1928-40, 1944.	Series of adits, cuts, trenches for 1,000 across a ridge.	Light brown, minor stain, common "A" structure, ruled, clay stain to southeast. Concentrated near margin of core.	Moderate sheet (1944), large sheet (1928-40). Sheet(?) clay(?).....
42	Tustin mine.....	USGS.....	Pre-WWII.....	Cut 15-20 deep, shaft 30, Small cut.	Light brown, small.....	
133	Upper Betty's Creek mine.....	USGS.....	Pre-WWII.....	Several caved adits and inclines for 100.	Light brown, cracked, ruled. Green, wedge "A" structure, cracked, ruled.	
139	Upper Engle Cope prospect.....	USGS.....	1943.....	Series of cuts and adits for 150.	Greenish brown, ruled, cracked, warped, scrap.	
52	Upper Sugar Creek Gap prospect.....	USGS.....	1919.....	2 small pits.....	Light brown, clear, cracked.....	
144	Upper Woodard prospect.....	USGS.....		Several adits and drifts in area 25 by 40.	Light brown, moderately stained.....	
73	Wayhutta Clay (Weary Hut, Worry Hut) mine.....	Sterrett (1923, p. 207-208), USGS.	Pre-1910, 1944.....	5 caved drifts and cut in area 75 by 150.	Ruby, biotite intergrowths, ruled, cracked.	Small sheet (1944), clay.
80	Molly Watson (George Watson) mine.....	USGS.....	1895, 1944.....	Cut 120 long, 35 deep, cross- cut, stope, shaft.	Light brown, clear, concentrated near core.	Small sheet (1944).
131	West Betty's Creek mine.....	USGS.....	Pre-WWII.....	5 short adits, several shal- low shafts and pits.	Ruby, clear.....	
102	Wetmore prospect.....	USGS.....	1942.....	Adit 30, several pits.....	Light brown to green, "A" structure, bent, stained.	Small sheet.....
97	Wilkes mine.....	USGS.....	1943.....	2 cuts 35-50 long, 15-20 deep, 2 crosscuts, drifts, stopes in area 80 by 120.	Brown, reeved, stained, light green, stained.	Scrap.....
115	Bud Williams mine.....	USGS.....	1942.....	2 cuts, 65 long, 20 deep and 80 long, 30 deep. Pits and trenches.	Brown, hard, ruled, bent, stained.....	
137	Wilson mine.....	DMEA.....	1956-57.....	Cut 100, shaft 50, drift 73.....	Ruby, bent, cracked, small.....	Small sheet.....
170	Cleve Wilson mine.....	USGS.....	1927.....	3 cuts, shaft 20, drift 50.....	Ruby, minor stain, concentrated near core.	
169	Shirley Wilson mine.....	USGS, Of.....	1929 int to 1945.....	Cut, 3 adits, raises, stopes in area 100 by 400, 130 deep.	Light brown, hard, clear, bent, ruled.....	Large sheet, large scrap, feldspar.
61	Wood (Brown's Coward Mountain) mine.....	USGS (Sterrett, 1923, p. 211).	Pre-WWII.....	Cut 60 long, 6-15 deep.....	Brown to greenish brown, "A" struc- ture, stained.	
144	Tyler Woodard mine.....	USGS.....	WWII.....	Adit and drift 130, cuts, adits and crosscut in area 70 by 200.	Brown, stained, bent, cracked.....	Moderate sheet.....
48	Woods (Chastine Creek, Frady Creek) mine.....	USGS.....	Pre-WWII, 1943- 44.	Cut 150 long, 10-20 deep, 2 adits, pits.	Greenish brown, hard, biotite inter- growths, minor stained.	Small sheet (1944).

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Jackson County—Continued

	5-6 T	NE	SE		Concordant	Mica gneiss	Weathered	F-Q-M wall zone; accessory biotite; Q core. Several pegmatite, some cut by faults.
	>250 L(?)	NW			Discordant	do	do	F-Q-M wall zone; Q core. Several pegmatites prospected for clay, one for mica. Poorly exposed.
Branching, tabular.	3-20 T, >170 L, >120 D.	NE	Variable	SW	Partly concordant.	Biotite gneiss		Pl-B-Q-M wall zone, coarse grained; Q core, discontinuous.
Tabular	20 T	NW	NE		Concordant	do	Weathered	Pl-Q-P-M wall zone; Q core.
Irregular, tabular.	8-30 T	NE	Variable	NE(?)	Partly concordant.	Mica gneiss	Weathered (100 ft).	P-Pl-Q-B-M pegmatite, poorly exposed. 2 bodies mined.
Lens	4-8 T	NW	SW		Discordant	Biotite gneiss	Partly weathered.	F-Q-M-B wall zone; Q core. Biotite mostly along footwall; muscovite along hanging wall.
Tabular, branching.	2-5 T	NW	NE	SE	do	do	Weathered	Q-Pl-M pegmatite, medium grained; accessory garnet, biotite, pyrite.
Tabular	5 T	NW	SW	S	do	Mica gneiss		Q-F-M pegmatite, medium to coarse grained.
do	1-2 T	NE	SE		Concordant	Biotite gneiss	Weathered	F-Q-M pegmatite, fine to medium grained.
do	1-6 T	NW	Vertical		Partly concordant.	Mica gneiss	do	F-Q-M wall zone; Q core, discontinuous. 2 fine to medium-grained pegmatites to east.
do	1-2 T	NW	NE		Discordant	do	Unweathered	Q-F-M pegmatite, fine to medium grained; accessory biotite.
do		N	Vertical		do	do		F-Q-M pegmatite, cut by small faults. Several pegmatites prospected nearby.
Tabular	4-T average	N	W		Discordant	Biotite gneiss	Unweathered	F-Q-M pegmatite, poorly exposed. Q-Pl-M-B pegmatite, fine to medium grained; accessory garnet, pyrrhotite, apatite. Granite pods found in pegmatite.
do	1-4 T, thickens to northwest to 5-14 T.	NW	SW		do	do	Weathered	F-Q-M wall zone; Q core. 4 parallel bodies prospected.
Irregular	30 T	NW	SW		do	Mica gneiss	do	Pl-P-Q-M-B wall zone; Q core.
Tabular	2-4 T	NW	SW					F-Q-M pegmatite. Larger pegmatite contains brown mica, and a parallel one contains green mica.
do	6.5 T	NW	Vertical		Discordant	Biotite gneiss	Weathered	Q-F-M pegmatite, medium grained.
		NW				Biotite quartzite	do	F-Q-M pegmatite, poorly exposed.
							do	Do.
Irregular	60 T	NE	Vertical		Partly concordant.	Biotite gneiss	do	P-Pl-Q-M-B wall zone; Q core. Several parallel pegmatites to northwest.
do	7 T	NW			Discordant	Mica gneiss	do	F-Q-M wall zone, Q core. Poorly exposed.
	6-8 T	NE	SE			Interlayered hornblende and biotite gneiss.	do	F-Q-M pegmatite; accessory biotite, garnet. Poorly exposed.
Tabular(?)	0.5-4 T	NE	NW		Concordant	Interlayered biotite and hornblende gneiss.	do	P-Pl-Q-M pegmatite.
Tabular	8-15 T	NE	SE		Discordant	Biotite gneiss		F-Q-M wall zone; accessory garnet, sulfides; Q core.
Irregular, branching.	50 T	NE			do	Interlayered biotite and hornblende gneiss.		P-Pl-Q-M-B pegmatite.
Lens, pinch and swell.	1-4.5 T	N	W		Partly concordant.	Mica gneiss	Weathered (20 ft).	Pl-P-Q-M wall zone; Q core.
Tabular	10 T	NE	SE		Concordant	do	Weathered (30 ft).	P-Pl-Q-B-M wall zone; Q core.
Irregular	15-60 T	NW	Vertical		Partly concordant.	Interlayered biotite and hornblende gneiss.		Q-Pl-M wall zone, medium grained; Q-P core; accessory biotite, apatite. Cut by many small faults.
	35 T	NE	Vertical		do	Mica gneiss	Unweathered	Q-P-Pl-M-B wall zone; Q core.
Tabular	3-5 T	NW	NE		do	do	Weathered	F-Q-M wall zone; Q core.
do	8 T	NE	SE		Concordant	do	do	Q-F border zone, fine grained; M-F-Q wall zone, coarse grained; Q-P core.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Macon County</b>						
233	"A" mine.....	Olson (1946, fig. 5), USGS.	1868, 1900, 1936-44, 1952-53.	Cut 60 diameter, 50 deep, 5 adits 50-250 long, shafts, winzes, stopes in area 150 by 250.	Light brown to greenish brown, "A" structure, hard, bent, ruled, stained.	Small sheet (WWII, 1953).
306	Allman Cove mine.....	Olson (1946, p. 20-21), DMEA, OF.	1870, 1904, 1918, 1925-41, 1943-44, 1953-62.	Cut 450 long, 15-20 deep; 18 shafts 15-210 deep; stopes, drifts, crosscuts.	Ruby, moderately to commonly ruled, bent; moderate stain.	Large sheet, scrap.
279	Henry Ammons mine.....	USGS.....	1920's.....	2 adits 18 and 55.....	Dark greenish brown, stained.....	
301	Anderson (Reid) mine.....	USGS, DMEA.....	1920's, WWII, 1951-52.	2 cuts 100-170 long 15-35 deep, 9 shafts, 40-70 deep, adit 155, drifts.	Ruby, ruled, stained, small.....	Moderate sheet (?), large scrap.
405	Anderson prospect.....	USGS.....	1953.....	Trench 50 long, 12 deep.....	Ruby, bent, cracked, stained, small.....	
299	George Angel (Cabe; Moore; Bursleson River) mine.....	USGS.....	Pre-1900, WWI.....	Series of cuts 350.....	Ruby, bent, ruled, mineral inclusions, small.....	
232	Mel Angel prospect.....	USGS, Olson (1946, p. 47).	1942.....	Cut 25 long, 20 deep, drift 14.	Brown, ruled, small.....	Small sheet.....
265	Zeb Angel mine.....	USGS, DMEA.....	1890 int to 1945, 1955-56.	Pits, shafts, short adits 600 along strike, 20-50 deep.	Ruby, stained, cracked, bent, moderate "A" structure.	Small sheet (WWII, 1956).
264	Fred Arnold prospect.....	USGS.....	1942.....	Series of pits and shafts for 175, 20 deep, crosscut.	Ruby, stained, small.....	Small sheet.....
286	Walter Arnold prospects.....	USGS.....	1920, 1944.....	4 prospects in distance of 550 ft.	Brown and green, "A" structure, bent, ruled, small.	
373	Arrowwood mine.....	USGS.....	WWI, 1943-45.....	Narrow cut 112 long, 62 deep.	Ruby to greenish brown, mineral inclusions, cracked, bent, ruled. Concentrated along core.	Moderate sheet (1943-45).
414	Ash Flat mine.....	USGS, OF.....	1920, 1943-44.....	Cut 100 long, 20 deep, shaft 18, adit 30.	Green, "A" structure, minor bent, cracked, ruled, mineral inclusions.	Small sheet.....
244	Bailey mine.....	USGS.....	Pre-WWII.....	Several adits, cuts, shafts.....	Brown, stained.....	Clay(?).....
243	Bailey prospect.....	USGS.....	Pre-WWII.....	Cut 75.....	Brown, wedge "A" structure, stained, small scrap.	
314	Baird mines: No. 1 (Smith, Snow).....	USGS, OF.....	1870, 1905-06, 1943-44, 1958-59.	10 shafts, 2 crosscuts, drifts, stopes in area 100 by 350, 80 deep.	Ruby, bent, tied, biotite intergrowths, ruled, stained. Some green.	Moderate sheet (WWII).
313	No. 2 (Baird Cove).....	USGS, OF.....	1870, 1905-06, 1943, 1952-54, 1959-60.	10 shafts, drifts, stopes in area 100 by 200, 70 deep.	Green to greenish brown, "A" structure, tied, bent, ruled, concentrated near core. Ruby, biotite intergrowths, concentrated in outer wall zone.	Small sheet (WWII).
310	No. 5 (Clay No. 2).....	USGS, OF.....	Pre-WWII.....	3 adits, stopes, shaft 24 in area 100 by 200, 60 deep.	Brown to green, reeved, ruled, cracked, clay stained.	Clay.....
342	Clyde Bateman mine.....	USGS.....	1951.....	Incline 25.....	Ruby, hard, bent, cracked, biotite intergrowths.	Small sheet.....
295	G. W. Bateman prospect.....	USGS.....	1950.....	Shaft 24, incline 10.....	Ruby, clear, hard, bent, cracked.....	
287	Battle Creek prospect.....	USGS.....	1942.....	Small pit and 2 small trenches.	Stained, small.....	
357	Bearpen mine. Beasley mines:	USGS.....	Pre-WWII.....	Adit 50, shaft 30, drift.....	Light brown, clear, "A" structure, hard.....	
193	No. 1 (Bradley Butt).....	Olson (1946, p. 20, 22-23), OF.	1880-85, 1943-44.....	Main cut 140 long, 20-30 deep, slope; adit 75, west cut 40 long, 20 deep.	Ruby to green, "A" structure, bent, ruled, cracked.	Small sheet (WWII).
196	No. 2.....	Olson (1946, p. 22, 24-25), Dahners and McIntosh (1948), DMEA, OF.	1890 int to 1945, 1950-53, 1958-61.	Cut 200, 5 adits, stopes, drifts in area 200 by 400, 300 deep.	Brown, moderate "A" structure, mineral inclusions, bent, cracked, ruled. Concentrated in shoot near core on hanging wall.	Large sheet and scrap (WWII).
254	Bennett mine.....	DMEA.....	1953.....	Shaft 45, drift 50, several prospect pits.	Brown to greenish brown, bent, cracked, stained.	Small sheet.....
246	Berry mine.....	USGS.....	1941-44.....	Cut 525 long, 60 deep; shaft 35, drift 20.	Light brown to light green, biotite intergrowths, cracked, tied, bent, ruled.	Small sheet, scrap, clay.
308	Blaine (Jim Roper) mine.....	USGS.....	1900, 1944.....	10 shafts, 30 deep in belt, 300 long; adit 100.	Light brown, small concentrated near core.	Small sheet (1944).
222	Borrows Cut mine.....	USGS, Olson (1946, p. 41).	1899-1901.....	Cut 160 long, 10-20 deep.....	Light brown, clear, ruled.....	
278	Brawley mine.....	USGS.....	Pre-WWII.....	Adit 30, stopes 30 high.....	Dark brown, minor stain.....	
281	Broadtree Cove prospect.....	USGS.....	Pre-WWII.....	Adit 20.....	Greenish brown, stained.....	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Macon County—Continued

Irregular	15-60 T	NW	SW		Discordant	Biotite gneiss	Weathered	F-Q-M wall zone; Q core. Cut by many faults. Small gneiss inclusions common.
Irregular, branching	1-20 T	E	S		Partly concordant	Mica gneiss	Weathered (70 ft)	P-Pl-Q-M pegmatite, medium to coarse grained; accessory biotite, garnet, apatite, pyrite, allanite; Q-M pegmatite, fine grained (burr rock) common.
Irregular	3-10 T	NE	SE		Discordant	Biotite gneiss	Weathered	Pl-Q-M wall zone; accessory biotite; Q core, discontinuous.
Tabular, branching	5-25 T	NE	SE		do	Mica gneiss	do	F-Q-M wall zone; accessory biotite; Q core. Probably several pegmatites explored. Workings backfilled 1961.
Lenses	0.5-2 T	NE	NW		do	Biotite gneiss	do	Pl-Q-M pegmatite fine grained. Another pegmatite with Q core prospected to northwest.
Arcuate, tabular	4 T	NW	Vertical		do	Mica gneiss	do	P-Q-M wall zone, coarse grained Q core, discontinuous.
Irregular, branching, tabular	4-5 T	NW	Variable		do	do		Pl-Q-M pegmatite; accessory garnet, biotite, epidote, apatite.
	2-20 T	NW	Vertical		do	Biotite gneiss		F-Q-M wall zone; Q core, discontinuous. Similar body mined to southwest, few hundred feet.
Tabular	3-6 T	NW	Vertical		Concordant	Mica gneiss	Weathered	F-Q-M wall zone, coarse grained; Q core. Parallel body cut by cross-cut north of main works.
Lenses	1-4 T	NW	Vertical		do	do	do	F-Q-M wall zone fine grained; Q core. Poorly exposed. Several small bodies prospected.
Tabular	2-5 T, 155 L	NW	NE	N	Discordant	Biotite gneiss	Unweathered	Pl-F-Q-M wall zone, medium to coarse grained; Q core. Accessory biotite, garnet, pyrite.
Irregular	5-8 T	N	Vertical		do	Mica gneiss		Pl-Q-M pegmatite; accessory garnet. Locally, Q-M zones, fine grained (burr rock). Several bodies prospected.
		NE			do	Biotite gneiss	Weathered	F-Q-M wall zone; Q core. Poorly exposed.
Tabular	6 T	NW	Vertical		Concordant(?)	Mica gneiss		Q-M pegmatite, fine grained. No feldspar observed.
Tabular lenses	5-9 T	NW	SW	SE	Partly concordant	Biotite gneiss	Weathered (80 ft)	Pl-Q-M wall zone; accessory biotite, garnet, apatite; Q core, discontinuous.
Irregular	20-50 T	NW	SW		do	do	Weathered	Pl-Q-M-B wall zone; Q core. Heavy ground makes mining difficult.
Pinch and swell, branching(?)	1-15 T	NE	SE		Discordant	do	do	Q-F-M pegmatite; accessory biotite. Pegmatite sheared and faulted.
Tabular	3-4 T	NW	NE		do	do	do	P-Q-M-B pegmatite, medium to coarse grained.
	3-4 T	N	E		do	do	do	F-Q-M pegmatite, poorly exposed.
						Mica gneiss	do	Do.
	3-6 T	NE	SE		Discordant	Interlayered hornblende and biotite gneiss.	do	F-Q-M wall zone; Q core.
Irregular	West body, 1-12 T, main body 1-15 T.	E	S	SE	do	Biotite gneiss	Unweathered	Main body: Pl-Q-M wall zone; Q core. West body: Pl-B-Q-M wall zone; Pl-M-Q intermediate zone; Q core, discontinuous.
Tabular	2-12 T, 370 L	NW	SW	SE	do	do	Weathered (60 ft)	Q-F border zone, medium grained; M-F-Q wall zone, coarse grained; Pl-P outer intermediate zone, coarse grained; M-B inner intermediate zone, medium to coarse grained; Q core. Accessory garnet, sulfides.
do	4-6 T	NW	Vertical		do	do	Weathered	F-Q-M wall zone, medium to coarse grained; Q core. Gneiss inclusions common.
Irregular, branching	60 T, 525 L, 105 D.	NE	Vertical	SW	do	do	do	P-Pl-Q-M-B wall zone; Q-M-B intermediate zone, fine grained; Q core. Cut by granite dike.
Tabular	8-12 T	NW	SW		do	Mica gneiss	do	F-Q-M-B wall zone; Q core.
Tabular, arcuate, pinch and swell	2-5 T	Variable	N		do	Biotite gneiss	Unweathered	P-Pl-Q-M pegmatite. Cut by fault.
Pinch and swell	0.3-3 T	NE	SE	NE	do	Mica gneiss		F-Q-M pegmatite.
Tabular	4-T	NE	SE		Partly concordant	do	Weathered	F-Q-M wall zone; Q core, discontinuous.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Macon County—Continued</b>						
201	Bryson No. 2 mine.....	DMEA.....	1953-54.....	Cut 200 long, 10-30 deep, shaft 45, drifts 78.	Ruby, cracked, bent.....	Small sheet.....
369	Bryson Branch mine.....	USGS.....	1910, 1943-44.....	Cut 60 long, 15 deep; adit 21.	Brown, cracked, small, concentrated along hanging wall.	Small sheet (1943-44).
179	Bryson prospect.....	USGS.....	Pre-WWII.....	Pit 25.	Light brown, small.....	do.....
200	Carr Bryson prospect.....	USGS.....	Pre-WWII.....	6 shafts, short adit.....	do.....	do.....
216	Terrell Bryson (Neal Bryson, Old Bryson) mine.	USGS, DMEA.....	Pre-1900, 1940, 1942, 1953-62.	Cut 250 long, 30 deep. Shaft 105, drifts and stopes. Old works included adits and shafts, now caved.	Ruby, hard, stained, bent, cracked, ruled.	Moderate sheet, large scrap.
215	Terrell Bryson prospect.....	USGS.....	WWII.....	2 pits, adit 50.....	Green, soft, ruby, small.....	Small sheet.....
257	Buoy mines: No. 1 (Rock Cut).....	USGS.....	1870, 1934, 1942-44, 1953 int to 1962.	3 shafts, stopes, cut 120 long 10-15 deep.	Ruby, ruled, cracked, bent, minor stained.	Large sheet.....
258	No. 2.....	USGS, OF.....	1895, 1922, 1931, 1941, 1943-45.	Cut 200 long, 10-30 deep, 2 shafts, 3 adits, stopes, drifts in area 75 by 500, 160 deep.	Brown to greenish brown, color banding, hard, stained, ruled.	do.....
407	Burch prospect.....	USGS.....	1944.....	Series of 3 pits for 120.....	Light brown, hard, clear, small.....	Small sheet.....
396	Burd prospect.....	USGS.....	Pre-WWII.....	Trench 35 long, 1-6 deep.....	Light brown, ruled, bent, cracked, stained, small.	do.....
329	Burke-John (N. L. Barnard) mine.	USGS, DMEA.....	1905-06, 1952-54.....	Series of shallow pits, shafts, adits for 1,000. Southeast adit 315.	Light brown, ruled, cracked, small, concentrated near core.	Small sheet (1952-54).
298	John Burleson (Old Doc Moore) mine.	USGS.....	1900, 1909, 1944, 1954-55.	Cut 200 long, 10-20 deep; 6 shafts 35-80 deep. Caved adit.	Ruby, bent, ruled, stained.....	Moderate sheet(?) (1954).
297	John Burleson River prospect.	USGS.....	1944.....	2 small prospect pits.....	Ruby, small.....	Small sheet.....
202	Burr Knob Kaolin-mica (Bryson) mine.	USGS.....	Pre-WWII, 1943-44.	2 large cuts 320 long, 55 deep, and 200 long, 40 deep. Several adits and prospect pits.	Light brown, minor stained, small.....	Small sheet (1943-44), scrap, clay.
219	Buttermilk mine.....	Olson (1946, p. 41), USGS.	Pre-WWII.....	Cut 160, 3 adits, 2 shafts.....	Scrap.....	do.....
317	Cabe No. 1 (Amanda Martin) mine.	DMEA.....	WWII, 1951-52.....	Cut 100 long, 60 deep; shaft 20, drift 40.	Ruby, clear, hard, bent, cracked, ruled, clay stained.	Small sheet (1952).
292	Calloway and Monday prospect.	USGS.....	WWII.....	Several pits.....	Ruby, small.....	Small sheet.....
225	Campbell (Bradley-Campbell, Higdon) mine.	USGS.....	1906, WWII, 1951-58.	Large cuts, drift 350, stopes, in area 200 by 900.	Light brown to greenish brown, cracked, tied, ruled, bent, biotite intergrowths.	Moderate sheet, large scrap.
413	Coil Carpenter prospect.....	USGS.....	1943.....	Short adit, caved.....	Green, small.....	do.....
334	Carson Cove mine.....	USGS.....	1944-45.....	2 shafts 34-47 deep, drifts, stopes.	Ruby, tied, bent, small.....	Moderate sheet.....
335	Carson Cove prospect.....	USGS.....	1953(?).....	Cut 75 long, 25 deep.....	Ruby, bent, cracked.....	do.....
338	Chalk Hill mine.....	USGS, DMEA, OF.	1909-14, 1940-44, 1951-61.	Cuts, shafts, adits, drifts, stopes in area 500 by 1,500.	Ruby, biotite intergrowths, moderately ruled, concentrated near core margins.	Large sheet, large scrap.
189	Cloer mine.....	USGS.....	WWII, 1952.....	Cut 8-10 deep, pit, drift.....	Ruby, "A" structure, bent, cracked, stained.	Small sheet.....
204	Cody mine.....	USGS.....	WWII(?).....	Adit, 3 shallow shafts.....	Ruby, hard, clear, small.....	do.....
366	Mathew Cole prospect.....	USGS.....	1944.....	Pit 10 long, 8 deep.....	Pale greenish brown, "A" structure, stained, small, concentrated near core.	do.....
235	Coon Creek mine.....	USGS.....	Pre-WWII.....	Series of pits, cuts, adits for 300 up slope.	Little mica seen.....	do.....
271	Corbin Knob mine.....	USGS.....	1917.....	Pits and cuts for 75.....	Ruby, moderate "A" structure, stained, small.	do.....
394	Corpening prospect.....	USGS.....	WWII.....	Cut 50 long, 20 deep.....	Light green, bent, cracked.....	Small sheet.....
316	Crawford prospect.....	USGS.....	1954.....	Cut 100 long, 5 deep; adit 20.	Ruby, cracked, ruled, small; green, "A" structure.	do.....
318	Crawford Branch prospect.	USGS.....	Pre-WWII.....	Shaft 35, adit, pit.....	Brown to greenish brown, moderately tied, stained, small.	do.....
239	Lee Crawford prospect.....	USGS.....	WWII.....	Adit 46, cut.....	Ruby, small.....	Small sheet.....
348	Lester Crawford prospect.....	USGS.....	Pre-WWII.....	Adit 35.....	Medium brown, clay stained.....	do.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Macon County—Continued

Tabular	7-12 T.	NE	NW		Concordant	Biotite gneiss	Weathered	Pl-P-Q-M-B wall zone; medium grained; P intermediate zone, coarse grained; Q core, discontinuous. Pegmatite faulted.
do	3-T	NE	SE			Mica gneiss		F-Q-M pegmatite.
do	10 T.	NW	SW		Discordant	Mica gneiss	Weathered	F-Q-B-M pegmatite.
Tabular	2-7 T.	NW	Variable		Partly concordant	Biotite gneiss	Weathered (90 ft.)	F-Q-M pegmatite, poorly exposed. Pl-P-Q-M wall zone, medium to coarse grained; accessory garnet, apatite, sulfides; Q core.
	2-6 T.	NE	SE			Mica gneiss	Weathered	P-Q-M pegmatite; Q-M pegmatite, fine grained, occurs locally.
Irregular	>32 T.	NE	NW	NE	Discordant	Hornblende gneiss		Pl-Q-M-B wall zone, medium grained; Pl-B-Q-M outer intermediate zone, medium grained; Q-M intermediate zone, fine grained (burr rock); Q core. Accessory allanite, pyrrhotite, hedenbergite(?), apatite.
Tabular	1-7 T, >300 L, >150 D.	NW	NE	NW	Partly concordant	Biotite gneiss	Weathered	Pl-Q-M wall zone, medium to coarse grained; P intermediate zone, discontinuous; Q core. Accessory garnet, sericite, pyrite.
Lenses	1 T.	NE	NW			do	do	F-Q-M-B pegmatite.
Tabular	6 T.	NE	Vertical		Discordant	Mica gneiss	do	F-Q-M pegmatite, medium grained.
do	15-20 T.	NW	SW		Partly concordant	do	do	Pl-P-Q-M wall zone, accessory garnet; Q core.
Lens	2-15 T.	NW	Vertical		Discordant	Biotite gneiss	do	F-Q-M-B wall zone; Q core. Similar body to south prospected by shaft 18 ft deep.
								F-Q-M pegmatite.
Irregular, branching.	1-60 T.	N	Vertical		Partly concordant	Mica gneiss	Weathered	F-Q-M pegmatite; accessory biotite; Q masses on dump may be from core. Several bodies present in the various workings.
Irregular	1-7 T.	NW	NE		do	Biotite gneiss	do	Kaolinized F-Q-M pegmatite.
Tabular, branching.	6-10 T.	NE	SE	SW	do	Mica gneiss	do	F-Q-M pegmatite.
	1.5 T.	E	Vertical				do	Do.
Tabular	4-15 T.	NW	NE	SE	Discordant	Biotite gneiss	do	Q-F-M border zone, fine grained; M-Q-F wall zone, coarse grained; Pl intermediate zone, coarse grained; Q core. Accessory garnet, biotite. Large cuts oversteepened and sliding.
							do	F-Q-M pegmatite, poorly exposed.
Pinch and swell.	1-4 T.	NW	SW					F-Q-M wall zone, Q core.
do	4-10 T.	NW	SW		Discordant	Biotite gneiss	Weathered	P-Q-B-M pegmatite.
Irregular, tabular, lenses.	1-40 T, 100-1,000 L.	E	S	SW	do	do	do	Pl-Q-M wall zone, fine to coarse grained; P-Q intermediate zone, coarse grained, discontinuous; Q core, discontinuous; 6 or more large bodies mined or prospected.
Tabular	5.5 T.	NE	SE			Mica schist	do	F-Q-M pegmatite.
do	1 T.					do	do	F-Q-M pegmatite, poorly exposed.
do	4-6 T.	NE	SE		Discordant	Mica gneiss		Q-F-M wall zone, medium grained; Q core, discontinuous. Gneiss inclusions parallel tabular quartz masses.
Irregular		NW			do	Biotite gneiss	Weathered	F-Q-M pegmatite, poorly exposed.
Branching, irregular.	2-15 T.	NE	SE		Partly concordant	do	Unweathered	P-Pl-Q-M-B wall zone, medium grained; Q core, discontinuous. Gneiss inclusions common.
						Interlayered biotite and hornblende gneiss.	Weathered	Kaolinized F-Q-M wall zone; Q core, poorly exposed.
Lens	1.5-2.5 T.	NW	SW		Discordant	Mica schist	do	Pl-Q-P-M pegmatite. Sheared.
Tabular	4-10 T.	NE	SE		do	Biotite gneiss		Q-Pl-P-M-B pegmatite; accessory garnet.
do	6 T.	NE	Vertical				Weathered	F-Q-M pegmatite.
do	>5 T.	NE	SE		Discordant	Mica gneiss	do	M-Q border zone, fine grained; F-Q-B-M wall zone, medium to coarse grained; Q core.

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Macon County—Continued</b>						
337	Cunningham mine.....	USGS, OF.....	1880 int to 1944.....	Series of shafts, pits 25-50 deep, 250 along strike. Adit 170, drifts, stopes.	Brown, color bands, "A" structure, ruled, cracked, bent, minor stained.	Moderate sheet (WWII).
221	Dalton East mine.....	DMEA.....	WWII, 1956.....	Trench, 125 long, 18-25 deep; adit 105.	Ruby, small.....	
220	Dalton West mine.....	USGS.....	WWII, 1944.....	4 pits, small cut, 3 adits in area 50 by 100.	Ruby, clear, bent, cracked.....	Small sheet (1944).
255	Herman Dean prospects.....	USGS.....	1930-32, WWII(?).....	Series of pits for 175.	Light brown, ruled, small.	
270	Deerlick Knob (Berry) mine.....	USGS.....	1930-32, WWII(?).....	Series of pits for 75, 2 adits shaft.	Ruby, bent, lanky, minor stained; green, lanky, stained. Biotite intergrowths.	Small sheet (WWII).
217	DeHart prospect.....	USGS.....	1944.....	Shaft 25.	Stained, small.....	
406	Dills mine.....	USGS.....	WWII.....	Pit, incline.....	Dark greenish brown, stained, small.....	
407	Dills prospect.....	USGS.....	WWII.....	Pit 5 deep.....	Scrap.....	
398	Merit Dills prospect.....	USGS.....	1905, 1944.....	Cut, adit.....	Stained.....	
391	Dobson mine.....	USGS, Sterrett (1923, p. 243-44).	Pre-1900, 1950's.....	Many shallow pits and shafts, short adits in line 200.	Brown, stained, bent, ruled.....	
212	Charles Downes prospect.....	USGS.....	Pre-WWII.....	2 series of pits, drifts 150.....	Brown, clear, ruled, small.....	
262	Clyde Downes prospect.....	USGS.....	1943.....	Small caved cut.....		
360	East Camp Branch prospect.....	USGS.....	1944.....	2 shallow pits.....	Light greenish brown, "A" structure, tied, minor stain.	Small scrap.....
267	Elmore mine.....	USGS, DMEA.....	1900, 1944-45, 1954-55.	Cut 125, 5 shafts 35-90, drifts, adits in belt 450 long.	Greenish brown to ruby, ruled, bent, cracked, moderately stained.	Moderate sheet (1944-45), small sheet (1955).
268	Elmore Branch prospect.....	USGS.....	Pre-WWII.....	Adit 75, pit.....		
376	Enloe mine.....	USGS.....	1951.....	Trench 250.....	Ruby "A" structure, cracked, broken, small.	Small scrap.....
283	A. J. Evans (Corundum Hill) mine.....	Sterrett (1923, p. 227), USGS.	Pre-WWII.....	Small cuts and stopes for 150, several adits.	Greenish brown, commonly stained.....	
288	Ferguson mine.....	DMEA.....	WWII(?), 1955-56.	Cut 100 long, 10 deep; shaft 60, drifts 80.	Ruby, biotite intergrowths, bent, ruled, stained, small.	Moderate sheet.....
242	Fox mine.....	USGS.....	Pre-WWII.....	20 shafts and pits 20-25 deep in area 75 by 270.	Light brown, clay stained, small.....	
284	George Frady prospect.....	USGS.....	Pre-WWII.....	Small pit.....	Medium brown, moderately stained.....	
180	Gallager II prospect.....	USGS.....	WWII.....	Cut 20 long, 8 deep.....		
377	Garden Branch mine.....	USGS.....	1952.....	Trench 65 long, 7 deep.....	Ruby, small.....	None.....
260	Gibson mine.....	USGS, OF.....	1943-44.....	Adit, stope; shaft 57, stopes, cuts and pits in area 50 by 220.	Brown to greenish brown; bent, reeved, cracked.	Moderate sheet.....
191	Carroll Gibson mine.....	USGS.....	1941, 1944.....	Cut 16 long, 18 deep; shaft 32.	Light brown, minor "A" structure, soft, biotite intergrowths, bent, moderately cracked, ruled, stained.	
188	Gum Gap mine.....	USGS.....	Pre-WWII.....	3 shafts 22-33 deep pit, drifts, stopes.	Light brown, bent, cracked, stained, mottled.	
188	Gum Gap prospect.....	USGS.....	Pre-WWII.....	Several small pits.....	Light brown, clay stained.....	
185	Gum Knob mine.....	USGS.....	1944.....	2 adits, drifts, shaft 16.	Ruby, bent, clay stained.....	Small sheet.....
324	Gurney mine.....	USGS, Watts (1913, p. 133-35), Ries and others (1922, p. 41-42).	Pre-1900 int to 1942.	2 cuts 100-400 long, 30-40 deep. Small prospect pits, old shafts 100(?) deep.	Light brown, small.....	Clay, scrap.....
209	Hall mine.....	USGS, OME, OF.	1880 int to 1928, 1942-45, 1952-55, 1959.	Cut 350 long, 40 deep; adits, shafts, drifts and stopes 60-100 deep.	Ruby, minor "A" structure, stained, biotite intergrowths, commonly bent, ruled, cracked.	Moderate sheet (WWII).
384	Hall prospect.....	USGS.....	Pre-WWII.....	2 small pits.....	Light brown, clear, small.....	
208	Hall-Burra mine.....	USGS, OF.....	1943-44, 1951-54.....	Cut 100, incline, stope, adit 150, drifts in area 150 by 200.	Olive brown to light brown, "A" structure, bent, cracked, ruled, stained.	Small sheet (WWII).
322	Harris mine.....	USGS, DMEA.....	1919-22, 1944, 1954-58.	Small cuts, shafts 45-245 deep, drifts and stopes, in area 100 by 280.	Ruby, minor stained, bent, ruled.....	Large sheet, scrap 1954-58.
320	Henry prospect.....	USGS.....	1920, 1944.....	Shaft.....	Green.....	Small sheet.....
280	Jacob W. Henry (Jake Henry; Rocky Face) mine.....	Sterrett (1923, p. 226), USGS.	Pre-1910, 1942.....	Cut 25 long, 20 deep.....	Brown, bent, tangle sheet, biotite intergrowths.	
241	John Henry mine.....	USGS.....	1943-44.....	2 shafts, 30 deep, several drifts.	Brown, small.....	Small sheet.....
285	Will Higdon prospect.....	USGS.....	Pre-WWII.....	2 adits.....	Green, ruled, biotite intergrowths.	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				
Tabular	6-10 T	NW	SW		Discordant	Biotite gneiss	Weathered	Pl-Q-M wall zone, medium to coarse grained; P intermediate zone, coarse grained, discontinuous; Q core; accessory biotite, muscovite.
do	6-12 T	NW	SW		do	do	do	F-Q-M wall zone, medium grained; Q core. Pegmatite in shear zone, cut by late faults.
Pinch and swell, branching.	0.5-4 T	NW	SW		Partly concordant.	Mica gneiss	do	M-F-Q wall zone, medium grained; F-Q intermediate zone, medium grained; Q core. Cut by faults.
Tabular	Thin	NW	Vertical		Discordant	do	do	F-Q-M pegmatite.
do	3-5 T	N	W				do	P-Q-M-B wall zone; Q core. Poorly exposed.
do	3 T	NE			Discordant	Mica gneiss		F-Q-M pegmatite; central gneiss septum.
do	2.5 T	NE	SE		Partly concordant.	Biotite gneiss		P-Pl-Q-M pegmatite; accessory biotite, garnet.
							Weathered	F-Q-M pegmatite, poorly exposed.
		NE					do	Do.
		NE	Steep		Partly concordant.	Mica gneiss	do	F-Q-M wall zone; Q core. Poorly exposed.
Irregular	1-5 T	NW	Variable		do	Biotite gneiss	do	F-Q-M pegmatite, fine to medium grained.
Tabular	5 T	NW			Mica gneiss	Mica gneiss	do	F-Q-M pegmatite, poorly exposed.
do	4-9 T	NE	SE		Partly concordant.	do	do	F-Q-M wall zone; Q core. 2 similar bodies 200 ft apart.
							do	M-Q-F border zone, fine grained; Q-Pl-M wall zone, medium grained; Pl-Q-M intermediate zone, fine to coarse grained; P-Q core, coarse grained, accessory garnet, pyrite.
		NW					do	F-Q-M wall zone(?); Q core. Poorly exposed.
Lens	1-6 T, 120 L					Mica gneiss	do	F-Q-M wall zone; Q core.
Tabular	6-12 T	NE	SE		Discordant	do		F-Q-M pegmatite.
do	5-6 T	NE	NW		Partly concordant.	Biotite gneiss	Weathered (40 ft).	F-Q-M wall zone; Q core, accessory biotite, sericite.
do	15 T	NE	SE		do	Mica gneiss	Weathered	F-Q-M wall zone; Q core.
do	1 T	NE	Steep					F-Q-M pegmatite.
do	4-5 T	NE	NW			Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed.
Stringers, pods,	1-4 T				Discordant	Hornblende gneiss.	do	F-Q-M pegmatite.
Irregular, tabular.	4-12 T	NW	Variable		do	Biotite gneiss		P-Pl-Q-M wall zone, medium grained; Pl-P-Q-M intermediate zone, fine grained; accessory biotite, garnet; Q core, discontinuous.
Tabular	2-4 T	NW	Vertical		do	do	Weathered	F-Q-M wall zone; Q core. Gneiss septa cross pegmatite.
Irregular, lens.	11 T	NW	Vertical		do	do	do	F-Q-M wall zone; Q core.
Tabular	3 T	NE	SE				do	F-Q-M pegmatite.
Tabular(?)	2-4 T	Variable	Variable		Discordant	Hornblende gneiss.	do	F-Q-M wall zone; Q core, discontinuous. May be several bodies.
Irregular	200 T	NE			do	Mica gneiss	Weathered (100 ft).	Q-F-M-B wall zone, fine grained; Q core, discontinuous.
Lens	15-50 T	NW	SW	SE	do	Biotite gneiss	Weathered (60 ft).	Pl-Q-M wall zone, coarse grained; Pl-P-Q-M-B intermediate zone, medium grained; Q core. Accessory garnet. Several smaller bodies prospected to north.
Tabular	1-2 T							F-Q-M pegmatite. 2 small bodies, poorly exposed.
Irregular	1-15 T	E	S	SE	Discordant	Biotite gneiss	Weathered (40 ft).	Pl-P-Q-M wall zone, coarse grained; Q core, discontinuous; accessory garnet. Gneiss inclusions common.
Irregular, tabular.	5-20 T	NW	Variable		Partly concordant.	do	Weathered (50 ft).	Pl-P-Q-M wall zone, coarse grained; accessory garnet; Q core; Q-M pegmatite, fine grained (burr rock) locally along walls. Several parallel dikes prospected at surface.
								F-Q-M pegmatite.
Irregular	3-15 T	NE	SE		Partly concordant.	Biotite gneiss		F-Q-M-B wall zone; Q core, discontinuous.
		NE	Steep					F-Q-M pegmatite.
Tabular	5 T	E	Vertical		Discordant	Mica gneiss		F-Q-M wall zone; Q core; accessory biotite.

FRANKLIN-SYLVA DISTRICT—Continued

Macon County—Continued

TABLE 4.—Summary description of mica mines and

Locality No. on pl. 5	Mine or prospect				Description of muscovite	Production
	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Macon County—Continued</b>						
409	Hodgins mine.....	USGS.....	1943-44.....	5 cuts 8-20 deep in line 100...	Light green, "A" structure, tied concentrated along core; brownish green, stained, ruled, cracked, in wall zone.	Small sheet.....
409	Hodgins prospect.....	USGS.....	1944.....	Cut 20 long, 10 deep.....	Small.....	.....
282	Beulon Holland prospect.....	USGS.....	1951.....	Pit 8 deep.....	Hard, clear, small.....	.....
183	Horn-Blaine mine.....	USGS.....	Pre-WWII.....	Cut 40 long, 10-20 deep, several pits.	Ruby, clear.....	.....
190	Howell prospect.....	USGS.....	1953.....	Trench.....	Ruby, "A" structure, bent, cracked, clay stained.	.....
192	A. T. Hurst (H. H. Plemmons?) mine.	USGS.....	1951.....	Cut 30, drift 30.....	Green and ruby, bent, cracked, locky, stained.	Scrap.....
293	Tom Hurst mine.....	USGS.....	1950.....	Trench 40 long, 8 deep.....	Ruby, cracked, stained, ruled.....	.....
327	Iotla-Bowers mine.....	USGS, DMEA, OF.	1868, 1890 int to 1930, 1944-45, 1952-55.	Extensive cuts, adits, winzes, stopes in area 150 by 700. Workings 200 deep.	Ruby, minor bent, ruled, reeved, clay stained.	Large sheet and scrap (1952-55).
249	Iotla-Bradley (Iotla, Iotla Bridge) mine.	Olson (1946, p. 37-38), Broadhurst and Hash (1953, p. 54-55), OF.	1905-15, 1935-47, 1950's.	Cut 900 long, 160 deep.....	Brown, "A" structure, ruled, small. Large books concentrated near core.	Large scrap, large sheet (WWII).
240	Jack Knob (Lower) mine.....	USGS.....	Pre-WWII, 1942.....	Cut 20 long, 10 deep, 2 adits.	Brown, commonly stained, biotite intergrowths.	Small sheet (1942).
240	Jack Knob (Upper) mine.....	USGS.....	Pre-WWII.....	2 adits 15-25 long.....	Brown, biotite intergrowths, stained.....	.....
319	Sol Jacobs mine.....	DMEA.....	1954-55.....	Cut 40, shaft 60, drifts.....	Ruby, biotite intergrowths, ruled, cracked.	Small sheet.....
374	Johnson prospect.....	USGS.....	Pre-WWII.....	3 small pits.....	Light brown, clear, small.....	.....
382	Judson prospect.....	DMEA.....	1951.....	3 trenches (Back filled, 1961).	Ruby, clear, hard, ruled.....	.....
291	Kasson (Holbrook) mine.....	USGS, DMEA, Sterrett (1923, p. 225).	1900-1910, 1938, 1944, 1952-54.	Cut 200 long, 10-30 deep; 7 shafts 25-80 deep, drifts, stopes, adit 65, in area 100 by 600.	Ruby, hard, minor stained, bent, cracked.	Small sheet; large scrap (1952-54).
386	Keener prospect.....	USGS.....	1950(?).....	3 prospect pits.....	Ruby, stained, small.....	.....
395	Kell (George Wilkerson) prospect.	USGS.....	Pre-1952.....	Cut 30 long, 4-9 deep; caved adit (?), prospect pit.	Ruby, hard, stained, bent.....	.....
276	Lassie Kelley (Pine Knob) mine.	USGS, DMEA.....	1900, 1942, 1952.....	Cut 200, shaft 25, drift 90, caved adits and pits.	Ruby, moderately reeved, bent, cracked.	Small sheet (1952).
269	Kinsland prospect.....	USGS.....	1932.....	Cut 60 long, 8 deep.....	Brown, commonly stained.....	.....
380	Kiser mine.....	Olson (1946, p. 38-40), OF.	1942-45.....	Cut 200 long, 35 deep.....	Green, soft, stained, bent, cracked; brown, hard, clear, rare.	Large sheet, scrap.
253	Annie Laurie (Wade Moody) mine.	USGS.....	1925, 1938, 1943-44.	5 adits, 2 shafts 15-65, 6 pits in area 100 by 350.	Light brown to greenish brown, stained, bent, cracked, ruled.	Small sheet.....
214	S. C. Leatherman prospect.	USGS.....	WWII.....	5 shafts, 15-20 deep.....	Light brown, clear, small.....	.....do.....
404	J. H. Ledbetter prospect.....	USGS.....	WWII, 1951.....	3 adits 50-170, shaft 25, cut 25.	Ruby, clear, small.....	.....do.....
289	Ledford Cove mine.....	USGS, OF.....	1885, WWI, 1935, 1943-44.	Cut, several shafts, adits, irregular stope in area 100 by 300.	Brown, hard, stained, mineral inclusions.	Moderate sheet (WWII).
400	D. E. Ledford prospect.....	USGS.....	1945.....	Several small pits.....	Light brown to greenish brown, minor bent, stained.	Small sheet.....
381	Lenoir mine.....	USGS, OF.....	WWII, 1950.....	Cut 125 long.....	Green to greenish brown, bent, cracked, stained, biotite intergrowths.	Scrap.....
263	Leonard prospect.....	USGS.....	.....	Shaft 20.....	Ruby, hard, small.....	.....
389	Lequire mine.....	USGS.....	.....	Shaft 29, drift 22.....	Ruby and green, hard, locky, stained.....	.....
379	Oscar Lewis prospect.....	USGS.....	WWII.....	Shaft 18, drift.....	Light brown, ruled, small.....	.....
353	Lin Cove prospect.....	USGS.....	Pre-WWII.....	Trench 20 long, 10 deep.....	Light brown, small.....	.....
231	Little Rock (Spreadout) mine.	USGS.....	1942-45.....	Cut 50 long 30 deep.....	Brown, bent, ruled, cracked.....	.....
229	Little Springs mine.....	Olson (1946, p. 47), USGS.....	1938, 1942.....	Adit 100, cut 80, 3 short adits.	Light brown, small.....	.....
230	Littlefield (Houston) mine.	USGS, Olson (1946, p. 47).	1942, 1944, 1954.....	Cut 60, 3 short adits, 3 shafts in area 50 by 240.	Ruby, ruled, cracked, bent, mineral inclusions, small.	Small sheet, moderate scrap.
358	Locust Tree prospect.....	USGS, OF.....	1944.....	Cut 20, 3 short drifts, shaft 24.	Ruby, "A" structure, minor stained.....	Small sheet.....
390	Long prospect.....	USGS, OF.....	1944.....	Cut 25.....	Brown, stained, small.....	.....
296	Doc Lucas mine.....	USGS, OF.....	1900, 1943-44.....	Several shafts, adits, stopes, cut in area 50 by 460, 75 deep.	Brown to greenish brown, "A" structure, ruled, bent, mineral intergrowths, concentrated in wall zone, green, "A" structure, bent, soft, concentrated near core.	Moderate sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Shape	Size (feet)	Pegmatite Attitude			Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Macon County—Continued

Wedge	0.5-18 T	NE	Vertical	NE	Discordant	Biotite gneiss	Weathered	Q-M border zone, fine grained; M-Q-F wall zone, coarse grained, F-Q-M intermediate zone, medium grained, contains pods of Q-M pegmatite fine grained, burr rock; Q core.
Tabular		NE	SE		do	do	do	Q-Pl-M pegmatite, cut by veinlets of Pl-M pegmatite, fine grained.
Lens	1 T	NE	Vertical		Concordant	Mica schist		F-Q-M pegmatite.
		NW			Discordant	Interlayered biotite and hornblende gneiss.	Weathered	F-Q-B-M pegmatite, poorly exposed.
Tabular	6 T	E	S				do	F-Q-M wall zone; Q core.
Pinch and swell	6-10 T	NW	SW			Biotite gneiss	Weathered (10 ft.)	F-Q-M pegmatite.
Tabular	1-2 T	NW	NE				Weathered	F-Q-M pegmatite, poorly exposed.
do	4-10 T	NW	SW	SE	Partly concordant	Biotite gneiss	Weathered (60 ft.)	Pl-Q-M wall zone; Q core; accessory sulfides, garnet. Several parallel bodies prospected.
Irregular, crescent	200 T, 1,000 L	NE	Vertical	SW	Discordant	do	Weathered	F-Q-M-B wall zone, medium grained; Q core. Numerous gneiss inclusions.
Tabular	10 T	NW	NE		Partly concordant	do	do	P-Q-M-B wall zone; Q core.
do	20 T	NW	SW		Discordant	do	do	Pl-Q-M wall zone, coarse grained; P-Pl-Q-M-B core.
do	6 T	NE	NW		Partly concordant	Mica schist	do	F-Q-M-B pegmatite; cut by many small faults.
Lenses	1-5 T	NE	SE			Mica gneiss	do	F-Q-M wall zone; Q core.
Tabular, lenses	1-8 T	NE	SE		Discordant	Biotite gneiss	Weathered (100 ft.)	F-Q-M wall zone; Q core. 2 lenses prospected.
	Small						Weathered	P-Pl-Q-M wall zone; accessory biotite, garnet, pyrite; Q core, discontinuous. Several bodies prospected.
							do	F-Q-M pegmatite, poorly exposed.
Pinch and swell	1-4 T	NE	SE		Concordant	Biotite gneiss	do	Do.
Irregular	>3 T	NW	SW		Discordant	Mica gneiss	do	F-Q-M pegmatite, poorly exposed. Several sills prospected in earlier workings.
Irregular, tabular	1-25 T, >255 L	NE	NW		do	Biotite gneiss	do	P-Pl-Q-B-M wall zone; Q core.
Lenses	1-3 T	Variable	Variable			Mica gneiss	do	F-Q-M pegmatite, medium to coarse grained; accessory biotite, garnet.
Tabular	3 T	NW	NE		Concordant	do	do	F-Q-M pegmatite. A few pegmatite lenses have Q core.
Lenses	4-10 T	NE	SE			do	do	F-Q-M-B pegmatite.
Irregular	25 T	NE	Vertical		Discordant	Biotite gneiss	Weathered (50 ft.)	F-Q-M wall zone; Q core. 3 bodies prospected.
Tabular	5 T	NE	SE		Discordant	Biotite gneiss	Weathered	Pl-Q-B-M wall zone, medium grained; Q-P core; accessory apatite, pyrrhotite, hedenbergite(?). Gneiss inclusions common.
Tabular	2-3 T	NW	SW		Concordant	do	do	F-Q-M pegmatite, poorly exposed.
do	6 T	E	S			do	do	F-Q-M wall zone; Q core, discontinuous.
do	2-5 T	NE	SE		Discordant	Interlayered biotite and hornblende gneiss, biotite alteration.	do	F-Q-M pegmatite poorly exposed.
Irregular		NE	SE		do	Mica gneiss	do	F-Q-M pegmatite.
do	5-10 T	NW	SW		do	do	Weathered	F-Q-M pegmatite; accessory biotite, garnet.
do	2-10 T	NW	NE		Partly concordant	do	do	Pl-Q-M wall zone; accessory biotite, sulfides, garnet; Q core, discontinuous.
do	1-6 T	NE	SE		Discordant	do	do	Q-F-M wall zone, medium grained Q core, discontinuous. Muscovite obtained from float 300 ft to the northwest of prospect.
do	6-8 T	NE	NW		Concordant	Biotite gneiss	do	F-Q-M wall zone; Q core; accessory kyanite (along footwall).
Tabular	4-7 T	NW	SW		Discordant	Hornblende gneiss.	Weathered (50 ft.)	Pl-P-Q-M-B wall zone, medium grained; accessory garnet, apatite, tourmaline; Q core, discontinuous.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 5	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Macon County—Continued</b>						
294	Doc Lyle (J. M. Lyle; Bessie Johnson) mine.	USGS.....	1909, 1928, 1943-44, 1956.	5 shafts 30-65 deep in area 40 by 100; drifts, cross-cuts.	Light brown, cracked, ruled, small.....	.....
363	Lyle Cut mine.....	USGS, OF.....	1870, int to 1920, 1941-43.	Tabular open-cut and stope 225 long, 85 deep; shaft 23, drift, adit, pits.	Light brown, "A" structure, bent, ruled, cracked, commonly stained, mineral inclusions.	Moderate sheet (WWII).
224	Lyle Knob mine.....	Olson (1946, p. 40-41), DMEA, OF.	1880, 1899-1901, 1910, WWII, 1951 int to 1961.	Large cuts, adits, drifts, and stopes in area 400 by 900.	Ruby, ruled, moderately bent, cracked, minor stained.	Large sheet (WWII), feldspar, quartz 1959(-61).
182	Mack mines: No. 1 (Reid-Mary).....	USGS, DMEA.....	Pre-WWII, 1951-52.	Cut 120, adit 50.....	Light brown, ruled, bent, clay stained, biotite intergrowths.	Moderate sheet (1951-52).
181	No. 2 (Reid-Mary).....	USGS.....	Pre-WWII, 1950-52.	Cut 60, 3 adits.....	Light brown, bent, ruled.....	Scrap.....
250	Malonee mine.....	USGS.....	Pre-WWII.....	7 shallow shafts.....	Light brown, "A" structure.....	.....
326	Mashburn prospect.....	DMEA.....	1900, 1918, 1953-54.	8 shallow cuts, shaft 80, drifts in area 50 by 130.	Light brown, cracked, bent, stained.....	.....
388	W. W. Mashburn prospect.	USGS.....	1941, 1944.....	2 cuts 12-47 long, 6-12 deep..	Brown, hard, mineral inclusions, reeved, stained.	.....
218	Lee Mason mine.....	USGS.....	Pre-WWII.....	Shaft 40, drifts, stope, 3 adits in area 50 by 120.	Brown, minor "A" structure, moderately bent.	.....
177	May mines: No. 1 or North.....	USGS, DMEA, OF.	WWI, 1944, 1952-53.	Cut 100 long, 30 deep, 2 adits, prospect pit in area 100 by 200.	Brown, hard, bent, ruled, concentrated in wall zone; greenish brown, cracked, stained, concentrated near core.	Moderate sheet.....
178	No. 2 or South.....	USGS, DMEA, OF.	WWI, 1952-53.....	Adit 70, stopes, caved. 3 cuts 100 long, 10-20 deep.	Brown, soft, bent, ruled, cracked.....	Large scrap.....
331	McGuire feldspar mine.....	USGS.....	Pre-WWII.....	Cut 100 long, 30 deep.....	Brown, stained, small.....	Feldspar.....
403	Will McGuire prospect.....	USGS.....	1939.....	Shaft 12, drifts 20, adit 40.....	Light brown.....	.....
251	H. C. Meadows mine.....	DMEA.....	WWII(?), 1952-53.	Adit 120, small pits, shaft 38.	Ruby, "A" structure, cracked, bent, ruled.	Small sheet, moderate scrap.
194	Mica City Creek prospect.	USGS.....	1951.....	Several shallow pits.....	Ruby.....	.....
259	Mill Knob mine.....	USGS, OF.....	1880, int to 1958.....	Cut 350 long, 60 deep; shafts, drifts, stopes. Adit 210.	Ruby, bent, tied, stained, cracked.....	Large sheet, scrap.....
245	Miller (Sanders) mine.....	USGS.....	Pre-WWII, 1944, 1952.	Series pits, shafts, adits for 450.	Brown, minor stained.....	Small sheet (WWII).
355	Poll Miller (Burning-town) mine.	Olson (1946, p. 42-46), DMEA, OF.	1900-1920, 1943-45, 1953-59.	Cut, adits, shafts, open stope, 100 long, 150 deep, smaller stopes, in area 100 by 300.	Light brown, hard, reeved, stained, moderately bent, ruled.	Moderate sheet (WWII).
325	Moody mine.....	Olson (1946, p. 42-43), DMEA, OF.	1900, 1914-22, 1942-44, 1958.	8 adits 50-240, stopes, cuts, shafts, inclines in area 200 by 400.	Ruby, bent, stained.....	Large sheet.....
277	A. J. Moore mine.....	USGS.....	1900.....	Cut 25 long, 15 deep, caved adit.	Light brown, stained.....	.....
300	Jim Moore mines: No. 1.....	USGS, OF.....	1909, 1916, WWII.	Cut 140 long, 20 deep; 3 shafts, 40-55 deep, drifts.	Ruby, hard.....	Moderate sheet (WWII).
	No. 2.....	USGS, OF.....	1900, 1942.....	4 shafts, 10-27 deep, drifts.....	Ruby, bent, cracked, clay stained.....	Small sheet.....
	No. 3.....	USGS, OF.....	1942-44.....	Cut 100, shaft 40.....	Ruby, small.....	Moderate scrap.....
274	Moss Knob mine.....	USGS.....	1942.....	Cut 30, stope 12 at end of cut.	Grayish brown, moderately stained.....	.....
383	Mount Hope Church prospect.	USGS.....	1930.....	4 shafts 18-30 deep, pit.....	Light brown, tied, stained.....	Small sheet.....
304	Mud Cut (Mudhole) mine.	Olson (1946, p. 20-21), DMEA.	1930, 1942, 1952, 1954-55.	Cut 70 long, 30 deep; 10 shafts 15-65 deep, drifts in area 100 by 200.	Ruby, hard; green, stained.....	Moderate sheet, scrap (1954-55).
344	Mudhole (Angel-Wildes) mine.	USGS.....	1941-43, 1952.....	8 shafts 20-45 deep, adit 100, several pits for 550.	Light brown, hard, biotite intergrowths, ruled, bent, small.	.....
205	O'Neil prospect.....	USGS.....	1941.....	Cut 22 long, 6 deep; shaft 27, drift 6.	Light brown, stained, small.....	.....
207	Carl Parrish prospect.....	USGS.....	Pre-WWII.....	Series shallow pits for 100.....	Light brown, bent, small.....	.....
211	Dwight Parrish prospect.	USGS.....	1944-45.....	Shaft 61, drift 12.....	Light brown, small.....	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Macon County—Continued

Lenses(?)	10 T	NE	NW		Discordant	Biotite gneiss	Weathered	Pl-Q-M-B wall zone, medium grained; P core(?). Poorly exposed.
Tabular	1-9 T, avg 5 T	NE	SE		do	do		Pl-Q-M wall zone, medium to coarse grained; accessory biotite, tourmaline; Q core. Pegmatite may continue 600 ft northeast to Turkey Nest mine.
Elongate lens	15-40 T	Variable	N	W	do	Mica gneiss	Weathered (40 ft)	Pl-Q-M border zone, fine grained; Pl-Q-P-M wall zone, medium to coarse grained; P-Pl intermediate zone, coarse grained; Q core, accessory biotite, garnet, pyrite.
Pinch and swell	2-12 T	NE	NW	SW	do	do	Weathered (20 ft)	P-Pl-Q-B-M wall zone; Q core.
Irregular	40 T	NW	NE		do	do	Weathered	P-Pl-Q-M-B wall zone; Q core.
		NW	Steep		do	Interlayered biotite and hornblende gneiss.	do	F-Q-M-B pegmatite, medium grained.
Irregular	1-7 T	NW	SW		Partly concordant.	Biotite schist	Weathered (80 ft)	F-Q-B-M pegmatite.
Tabular	5 T	NE	SE		Discordant	Biotite gneiss	Weathered	M border zone, fine grained; Q-M-F wall zone, fine grained; F-Q-M core, fine to medium grained.
do	4-6 T	NE	NW	N	do	Mica gneiss	do	F-Q-M wall zone; Q core.
Irregular	10-30 T	E	S	SW	do	do	Weathered (10 ft)	Pl-Q-M-B wall zone; accessory garnet, apatite; Q core.
Tabular	1-15 T	NW	SW		do	Biotite gneiss	Weathered	Pl-P-Q-M-B wall zone, medium grained; Q core.
Irregular	10-30 T	NE			do	do		P-Q-B-M pegmatite, medium to coarse grained. Biotite and quartz fill fractures in pegmatite. Q masses, discontinuous, may be core.
Tabular(?)		NE	Steep					F-Q-M pegmatite.
Tabular	3-7 T	NW	SW		Partly concordant.	Biotite gneiss	Weathered (30 ft)	P-Q-M wall zone, medium to coarse grained; Q core; accessory biotite, garnet.
Tabular(?)	6 T	NE	SE			Mica gneiss	Weathered	F-Q-M pegmatite, poorly exposed.
Irregular	1-25 T	NE	Variable	SE	Discordant	Biotite gneiss	do	Q-Pl-M wall zone, medium grained Q-P-Pl-B core, medium to coarse grained. Several irregular bodies mined and prospected.
Tabular	3-5 T	NE	SE		Concordant	Mica gneiss	do	F-Q-M wall zone; Q core. Landslide stopped recent work.
do	8 T	NE	SE	NE	Discordant	Biotite gneiss	Unweathered	Q-F border zone, fine grained; Pl-Q-M-B wall zone; accessory pyrrhotite; M-Pl-Q outer intermediate zone, coarse grained, discontinuous; P inner intermediate zone, coarse grained, discontinuous; Q core; accessory biotite.
Irregular	2-10 T	E	S	SW	do	Mica gneiss	Weathered (100 ft)	Pl-Q-M border zone, fine grained; P-Q-M-B wall zone, coarse grained; accessory garnet; Q core; accessory biotite.
do	2-15 T	NW	SW		do	Biotite gneiss	Unweathered	Pl-P-Q-M-B wall zone, coarse grained; Q core.
Tabular	15 T	N	Vertical		do	Interlayered biotite and hornblende gneiss.	Weathered	F-Q-M wall zone; Q core.
do	1 T	N	Vertical		do	do	do	Pl-Q-M pegmatite, medium grained, sheared. 500 ft southeast of No. 1 mine.
Tabular	6-12 T	NW	NE		Discordant	Interlayered biotite and hornblende gneiss.	do	Pl-Q-M-B wall zone, medium grained; Q core. 450 ft southwest of No. 1 mine.
Irregular	12-14 T	NW	NE		Partly concordant.	Biotite gneiss	Unweathered	F-Q-M-B pegmatite, medium grained.
Tabular	8 T	NE	SE			Mica gneiss	Weathered	F-Q-M pegmatite, fine to medium grained, poorly exposed.
do	5-12 T	E	S		Partly concordant.	Hornblende gneiss.	Weathered (60 ft)	Pl-Q-M wall zone, medium to coarse grained; P-M-Pl intermediate zone, coarse grained; Q core. Second pegmatite prospected to southeast.
do	3-12 T	NE	SE		Discordant	Mica gneiss	Weathered	F-Q-M-B wall zone; Q core. Several bodies poorly exposed.
do	12 T	NE	SE				do	F-Q-M wall zone; Q core.
do	5 T	NW	SW		Discordant	Mica gneiss	do	F-Q-M wall zone; Q core, poorly exposed.
do	4 T	NE	NW					F-Q-M pegmatite.

TABLE 4.—Summary description of mica mines and

Local- ity No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of informa- tion	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVIA DISTRICT—Continued</b>						
<b>Macon County—Continued</b>						
401	Passmore mine.....	USGS.....	1885 int to 1944.....	Cut, 2 adits, drift.....	Light brown, bent, cracked, small.....	Small sheet, (WWII).
252	Patton prospect.....	USGS.....	1944.....	Pit 15 deep.....	Greenish brown to brown, bent, ruled, cracked, stained.	Scrap.....
385	Thad Patton mine.....	USGS.....	1943-44.....	6 shafts 20-35 deep, incline, drifts in area 40 by 70.	Light brown.....	Small sheet.....
323	Pendergrass prospect.....	USGS.....	Pre-WWII.....	Trench, caved adit.....	Heavily stained, bent.....	.....
411	Penland mine.....	USGS.....	1955.....	Cut 20 long, 10 deep.....	Green, tied, stained.....	Small sheet, moderate scrap.
412	Penland prospect.....	USGS.....	1951.....	2 cuts 30 long, 6 deep; pit.....	Small.....	.....
186	Pine Mountain (Pine Ridge; Hall, Cow Ridge) Mine.	USGS.....	1912, 1944.....	3 cuts, 20 deep; adit 149, shaft 53.	Light brown, bent, cracked, biotite intergrowths.	Small sheet (1944).
192	H. H. Plemmons mine (possibly the A. T. Hurst mine?).	USGS.....	1944.....	Cut 45 long, 30 deep.....	Brown, hard, minor stained, small; green, tied, bent, stained, concen- trated in intermediate zone.	Small sheet.....
397	Poplar Cove prospect.....	USGS.....	Pre-WWII.....	5 small pits.....	Light brown, biotite intergrowths, bent, ruled, small.	.....
303	Prison Camp prospect.....	USGS.....	1943.....	Cut.....	Light greenish brown, "A" structure, bent, ruled, cracked, clay stained.	Small sheet.....
290	Quizzenberry mine.....	USGS, DMEA.....	Pre-WWII 1953.....	Shaft 60, drift 75; old pits; shaft and stope 30 deep, caved.	Light brown, ruled, stained, small.....	.....
354	Raby (Grady Duvall) mine.	USGS, OF.....	1941-45.....	Cut 190 long, 40 deep; 2 adits 75 each.	Ruby, hard, mineral inclusions, locky, cracked, "A" structure.	Small sheet.....
330	Raby-Sweet (Upper Raby) mine.	Sterrett (1922, p. 237), USGS.	1880's, 1956.....	Series of pits, shafts, trenches for 400, adit reported 400 to intersect 2 shafts 75.	Ruby, cracked, clay stained.....	Moderate sheet, large scrap.
408	Randall prospect.....	USGS.....	Pre-1950.....	Cut 35, pits, shaft 30(?).....	Ruby, hard, stained.....	.....
340	Ray prospect.....	USGS.....	1943.....	Small pit.....	.....	.....
333	Ray Cove prospect.....	USGS.....	Pre-WWII.....	Series of shallow pits and shafts, 2 adits.	Ruby, ruled, biotite intergrowths, quartz, inclusions.	.....
341	Lissie Ray prospect.....	USGS.....	Pre-WWII.....	Series of pits for 250.....	Ruby, cracked, bent, clay stained.....	.....
351	Tom Ray prospect.....	USGS.....	Pre-WWII.....	2 caved adits, shallow cut.....	Ruby, cracked, bent, small.....	Scrap.....
328	Ray-Liner mine.....	DMEA.....	1928, 1930's, 1958.....	Cut 150 long, 20 deep, 4 shafts 40-60, 5 adits in area 120-200.	Light brown, moderately bent, ruled, clay stained.	Small sheet (1958).
256	Emma Reid mine.....	USGS.....	1953-54.....	Shaft 70, drift 64.....	Ruby, tied, stained.....	Small sheet.....
184	Reid-Hooker mine.....	USGS.....	WWII(?), 1952-53.....	Cuts 60-75 long, 10-25 deep, pits, adits in area 60 by 100.	Ruby, bent, ruled, cracked.....	Scrap.....
307	Rickman mine.....	USGS.....	Pre-WWII, 1944.....	Series shafts and pits for 300. Crosscut 130.	Brown.....	Small sheet (1944), clay.
365	Roaring Fork (Norman Mashburn; Smith) mine.	USGS.....	1900, 1918, 1943- 45, 1952.	2 cuts 100, shaft 35.....	Light brown to pale green, soft, "A" structure, bent, ruled, tied.	Small sheet (1952).
234	Rocky Face mine.....	Olson (1946, p. 46-47), O.F.	1870 int to 1944, 1955.	2 cuts, large stope 160.....	Light brown, moderate green mottling, minor stained, commonly bent.	Large sheet, scrap.
339	C. A. Rogers mine.....	USGS.....	Pre-1950.....	Adit 40, drift 15, pits.....	Ruby, "A" structure, stained, cracked.....	.....
311	Roper prospect.....	USGS.....	Pre-1955.....	Cut 60, 2 adits 85 and 90.....	Ruby, hard, moderately ruled, cracked, concentrated in wall zone; green, "A" structure, concentrated near core.	.....
347	Bud Roper prospect.....	USGS.....	Pre-WWII.....	Series of caved adits and stopes.	Ruby, ruled, bent.....	.....
345	C. R. Roper mine.....	USGS.....	1915, 1944.....	Cut 40 long, 20 deep; drift 50, incline, caved.	Ruby, small.....	Small sheet (1944).
350	Ortha Roper prospect.....	USGS.....	1948, 1952.....	Cut 55 long, 6-15 deep.....	Ruby, "A" structure, bent, small.....	Small sheet.....
346	Raleigh Roper mine.....	USGS.....	1944.....	2 trenches 21-28 long; drift 11.	Light brown, "A" structure (along foot- wall).	.....do.....
332	Roper-Ray mine.....	DMEA.....	1952.....	Cut 80, shaft 24.....	Ruby, hard, minor stained.....	.....do.....
370	Rough Fork mine.....	USGS.....	1940, 1943.....	Cut, several caved shafts, incline.	Ruby.....	.....do.....
352	Rowland prospect.....	USGS.....	Pre-1950, 1952.....	5 pits for 50.....	Green and ruby, "A" structure, bent, cracked.	.....
399	Russell mine.....	USGS, OF.....	1900, 1944.....	Cut 100 long, 20 deep; shaft 30; adit 90; drift 36; small stope.	Green, stained, cracked.....	Small sheet.....
247	Doc Sanders mine.....	USGS, Sterrett (1922, p. 229).	1900, 1942, 1945.....	Cut 65 long, 50 deep, adit 150, shafts.	Green, bent, clay stained; brown, stain- ed, small.	Scrap, feldspar, clay.
236	B. H. Scott mine.....	USGS.....	1943-45.....	Adit 80, shaft 38, drift 18.....	Light brown, cracked, bent, small.....	Small sheet.....

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite		Attitude			Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Macon County—Continued

Tabular	6 T	NE	NW				Weathered	F-Q-M wall zone; Q core, discontinuous.
do	2 T	NE	SE				do	F-Q-B-M pegmatite, medium grained.
Irregular	2-6 T	NE	SE		Concordant	Biotite gneiss	do	F-Q-M pegmatite. Mostly mined out.
Pinch and swell	2-3 T	NE	NW		Discordant	Mica gneiss	do	F-Q-M pegmatite, poorly exposed.
Lens	2 T, 30 L	NE	Vertical	NE	do	do	do	Q-P-Pl-M pegmatite; cut by small faults.
Lens	2 T, 30 L	NE	SE		do	Biotite gneiss	do	F-Q-M pegmatite.
Tabular	4-8 T	NE	NW		do	do	Weathered (30 ft).	Pl-Q-M-B wall zone, medium to coarse grained; accessory pyrite, sericite, garnet; Q core.
Lens	1-13 T	NW	Vertical		Concordant	do	Weathered	F-Q-M wall zone, medium grained; Q-M-F intermediate zone, coarse grained; Q core.
Tabular	15-20 T	NE	SE		do	do	do	Q-F-M pegmatite, fine to medium grained, poorly exposed.
do	40 T	NE	SE		Concordant	Mica gneiss	do	F-Q-M pegmatite. Local masses of quartz-muscovite pegmatite near footwall. Gneiss inclusions.
Lens	1-3 T	NW	Vertical		Discordant	Biotite gneiss	do	P-Q-B-M wall zone; Q core.
Irregular lens	1-11 T	NE	SE	S	do	do	do	Pl-Q-M-B wall zone, medium grained; Q core.
Lenses(?)	>5 T(?)	Variable	Variable		Discordant(?)	Biotite schist	do	F-Q-M wall zone; Q core. Poorly exposed. Recent prospecting suggests pegmatite is discontinuous.
		NE				Mica schist	do	F-Q-M pegmatite, poorly exposed.
		NE				Hornblende gneiss	Weathered	Do.
Tabular	>10 T	NE	SE		Concordant	Biotite gneiss	do	F-Q-M-B wall zone; Q core(?), discontinuous. Poorly exposed.
Irregular	>4 T	NE	NW		Partly concordant	do	do	Pl-Q-B-M wall zone; Q-P core.
Lenses	3-10 T	NW	SW		Discordant	Mica gneiss	Weathered (80 ft).	Pl-Q-M wall zone; Q core; accessory biotite.
Tabular	6-10 T	NE	SE					Pl-Q-M wall zone; Q core, discontinuous.
do	5 T, >60 L	NW	SW		Concordant	Biotite gneiss	Weathered (60 ft).	Pl-Q-B-M pegmatite, may be extension of Buoy No. 1 pegmatite.
do	5-20 T, >300 L	E	Vertical		Discordant	Mica gneiss	Weathered	F-Q-M wall zone, medium grained-Q core. Cut by faults.
do	9-10 T	NE	SE		do	do	do	F-Q-M-B wall zone; Q core.
								Q-M border zone, fine grained; Q-F wall zone, fine grained; F-M intermediate zone, coarse grained, discontinuous; Q core. 2 bodies prospected.
Pinch and swell	20 T	NW	NE	SE	Partly concordant	do	do	Pl-Q-M wall zone; accessory garnet, pyrrhotite; Q core. 2 pegmatites present, western one richer.
Tabular	5 T	NW						F-Q-M wall zone, medium to fine grained; Q core. Other prospects nearby.
do	10-15 T	E	S		Discordant	Mica gneiss	Weathered (40 ft).	M-Q-Pl border zone, fine grained; Pl-Q-M wall zone, fine to medium grained; P-Q-M intermediate zone; Q core.
Tabular(?)	3 T	NE	NW		do	do	Weathered	F-Q-B-M wall zone; Q core, discontinuous. Poorly exposed.
Pinch and swell	2-3 T	NW	NE			Biotite gneiss		F-Q-M wall zone; Q core.
Tabular	>10 T	NE	SE			Mica gneiss	Weathered	F-Q-M wall zone; Q core. Poorly exposed.
Tabular(?)	11 T	NE	SE			do	do	F-Q-M wall zone; Q core.
Lens	1-7 T, 17 D	NE	Vertical		Concordant	Interlayered biotite and hornblende gneiss.	Weathered (30 ft).	Do.
Tabular	6 T	NE	Vertical			Mica gneiss		F-Q-M pegmatite.
		NE					Weathered	F-Q-M pegmatite, poorly exposed.
Tabular	1-2 T, 150 L	NE	SE		Discordant	Biotite gneiss	do	Pl-Q-M pegmatite, medium grained
Tabular(?)	50 T	NW	SW			Mica gneiss	Weathered (60 ft).	Pl-P-Q-M wall zone, medium to coarse grained; Q core, discontinuous. Faulted.
Tabular	3-8 T	NE	Vertical	NE	Discordant	Biotite gneiss		Pl-Q border zone, fine grained; Pl-B-Q wall zone; accessory garnet; Pl-Q outer intermediate zone, medium grained; M inner intermediate zone, coarse grained; Q-P core, coarse grained, sheared.

TABLE 4.—Summary description of mica mines and

Local-ity No. on pl. 5 or 6	Mine or prospect				Description of muscovite	Production
	Name	Source of informa-tion	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Macon County—Continued</b>						
227	Tom Scott-Ridge prospect.	Olson (1946, p. 47), USGS.	Pre-WWII	5 shallow cuts for 125	No book mica exposed	
393	Setser prospect	USGS	1956-57	Trench 100 long, 12 deep, pit 13.	Ruby, minor stained	Small sheet
237	Sheep Cliff mines:	USGS	1943-44	Cut 60 long, 12 deep; adit 20.	Light brown	do
238	East(?)	USGS	1900(?)	Series of bench cuts 30 long, 20 feet deep.	Ruby, hard, bent, cracked, stained, small, concentrated near hanging wall.	
198	Sheep Knob mine	USGS, OF	1900, 1956	3 cuts, shaft 20, adit 100, stope 15 in area 120 by 240.	Light brown, bent, cracked, clay stained, small.	Small sheet (1956).
199	Sheep Knob prospect	USGS	1956	2 shafts 37-60, 2 pits 15 deep.	Ruby, ruled, mineral inclusions	Small sheet
266	Shepherd mine	USGS	1910, 1958	Shaft 60(?), adit 110, drift 30, stopes(?)	Green, bent, locky, ruled	Small sheet (1958).
197	Shepherd Knob mine	USGS (Olson, 1946, p. 48, 50-51), OF.	1875, int to 1950's.	Large cut 350 long, 75 deep, numerous adits, stopes in area 500 by 1,000.	Ruby, stained, ruled	Large sheet, scrap.
248	Shields Farm prospect	USGS	WWII	2 shallow pits	Green, small, scrap	Scrap
213	Shoemaker mine	USGS	Pre-1950	5 pits, 3 inclined shafts	Ruby, small, scrap	
187	Shotgun mine	USGS	Pre-1940	5 shallow cuts for 100	Light brown, cracked, small	Scrap
223	Siphon Cut mine	USGS (Olson, 1946, p. 41).	1938	Cut 150 long, 5-15 deep; stope 30.	Small	
402	Slagle mine	USGS	Pre-WWII	Cut 30 long, 18 deep; adit	Greenish brown, soft, bent, cracked, clay stained, small.	Scrap
371	Annie Slagle mine	USGS	Pre-WWII	2 adits, shaft 12, pit	Light brown, small	
378	Burt Slagle prospect	USGS	1941-44	2 adits 30-100, crosscuts, winze, drifts	Brown, mineral inclusions, ruled, cracked, stained.	
392	Slagle-Drake (Slagle) mine.	USGS, OF	1939, 1943-44	2 cuts, 5 shafts 30-40, drifts in area 150 by 250.	Green, tied, stained, cracked, bent, concentrated near quartz core; brown, hard, cracked, stained, concentrated in wall zone.	Small sheet
372	Slagle Scrap mine	USGS	Pre-WWII	Cut 100 long, 20 deep	Small, scrap	Scrap
206	Smith prospect	USGS	1938	Cut 33 long, 14 deep	Light brown, tied, small	
356	Ruth Stalcup mine	USGS		2 small cuts, adit	Brown	
410	Stamey mine	USGS, OF	1905, 1931, 1943-45.	3 cuts, 3 adits, stope in area 100 by 250.	Greenish brown, stained, ruled, cracked	Moderate sheet
387	Swanson mine	USGS	1941, 1944	Cut 50 long, 12 deep, adit 65.	Greenish brown, cracked, bent, stained	Small sheet
312	Talent mine	DMEA	Pre-WWII, 1955, 1960.	Cut 170 long, 40 deep; 5 shafts 25-75, drifts in area 100 by 200.	Ruby, bent, cracked, stained, concentrated in wall zone; green, concentrated near core.	Moderate scrap, small sheet.
336	Tallent prospect	USGS	WWII, 1952	Pit 10 deep, adit 15	Ruby, stained, cracked	Small sheet
375	Harry Talley prospect	USGS	1951	2 trenches 100-150 long	Ruby, clear, bent, ruled	
273	Fred Taylor prospect	USGS	1940	Cut 25 long, 9 deep	Dark brown, stained	
261	Thompson prospect	USGS	1952	3 pits 10-18 deep	Ruby, bent, cracked, ruled, small concentration near core.	
368	Thorne Mountain mines: NE	USGS	Pre-WWII	2 cuts 50-70 long, 30 deep	Light brown	
367	SW	USGS	Pre-WWII, 1942, 1944.	2 cuts 25-65 long, 10-30 deep, short adit; stope.	Light brown, tied, biotite intergrowths, minor stained.	Small sheet
359	Trimont Ridge prospect	USGS, OF	1944	Series of small pits 300	Light brown, "A" structure, small	do
272	Turkey Knob (Passamore) mine.	USGS, DMEA	1937, 1953-54	Cut 70 long, 10-30 deep, adit 130, drift, stope, winze 55.	Ruby, minor biotite intergrowths, stained.	Small sheet (1953)
362	Turkey Nest mine	Olson (1946, p. 54-55), OF.	1900, 1943-45, 1952-53.	Cut 80 long, 30 deep, 3 adits, drifts, stopes.	Greenish brown, bent, ruled, cracked, stained.	Moderate sheet (WWII).
415	Verdell mine	USGS	1939	3 cuts 20-30, 2 shafts, adit in area 50 by 100.	Green to greenish brown, "A" structure, stained, biotite intergrowths.	
407	Waldrop prospect	USGS	Pre-WWII	Shaft 25	Ruby	
228	Watauga mine	USGS	1943	Cut 20 long, 15 deep	Ruby, ruled, clay stained	
364	Wayah Bald mine	USGS	1919-20	Cut 50, adit 50, short stopes	Light brown	

prospects in the Blue Ridge of North Carolina—Continued

Pegmatite					Relation to wall-rock structure	Wallrock	Extent of weathering	Remarks (Internal structure, texture, and mineralogy of pegmatite)
Shape	Size (feet)	Attitude						
		Strike	Dip	Plunge				

FRANKLIN-SYLVA DISTRICT—Continued

Macon County—Continued

Tabular	5-6 T	NW	Vertical		Discordant	Biotite gneiss		Pl-Q-M-B wall zone; Q core.
Lens	2-3 T, 50 L, 20 D.	NW	NE			Mica gneiss	Weathered	Pl-Q-M pegmatite, fine to medium grained.
Tabular	7 T	NE	SE		Partly concordant.	Biotite gneiss		Pl-P-Q-M pegmatite. F-Q-M wall zone, fine to medium grained; Q core. This may be the mine called Sheep Cliff East.
do	4-5 T	NW	NE					
Lenses	1-3 T	NE	NW	SW	Discordant	Hornblende gneiss	Weathered	Q-F-M pegmatite, medium grained. Several zones of small lenses and stringers. Prospect northwest of mine.
Lenses(?)	1 T	NW				Interlayered biotite and hornblende gneiss.	do	F-Q-M pegmatite, fine grained, poorly exposed.
Irregular	8 T	E	N	E	Discordant	Mica schist	do	F-Q-M wall zone, medium grained; Q core. Poorly exposed.
do	150 T	NW	NE	NE	do	Mica gneiss	Weathered (100 ft.)	Pl-Q-M-P-B wall zone, fine to coarse grained; Q-P1-M-P-B intermediate zone, coarse grained; Q core; zones discontinuous.
Tabular	2 T						Weathered	M border zone, fine grained; foot-wall zone; Q core.
do	9 T	NE	NW		Discordant	Biotite gneiss	do	F-Q-M wall zone; Q core.
Irregular	1-8(?) T	NW	SW		do	Mica gneiss	do	F-Q-M wall zone, medium grained; Q core, discontinuous.
Tabular	3-6 T	NW	NE		do	do	do	F-Q-M pegmatite.
		NE	Steep				Weathered	F-Q-M pegmatite; accessory garnet, tourmaline. Poorly exposed.
	12 T	NE	NW		Discordant	Interlayered biotite and hornblende gneiss.	do	F-Q-M-B pegmatite.
Lenses	0.1-4 T	Variable	Variable		Partly concordant.	Mica gneiss	do	F-Q-M pegmatite. Small discontinuous bodies.
Tabular	2-3 T	NE	Variable		Concordant	Biotite gneiss	do	F-Q-M wall zone; accessory biotite; Q core, discontinuous; accessory garnet.
do	15-20 T	NE	NW		Partly concordant.	Mica gneiss	do	F-Q-M wall zone, fine grained; accessory biotite near footwall; Q core, discontinuous.
Tabular	Several feet T, 6 T	NE	Vertical			Mica gneiss		F-Q-M wall zone; Q core.
do	2 to 6 T	NE	Variable	NE	Discordant	Biotite gneiss	Weathered	F-Q-M pegmatite. Contains platy masses of quartz parallel to walls.
do	2-5 T	NW	SW		do	do	do	F-Q-M-B pegmatite, medium to coarse grained. Several similar bodies; cut by faults.
Irregular	7-20 T	NW	Variable		Discordant	Mica gneiss	Weathered (75 ft.)	Q-F-B-M wall zone, medium grained; Q core, discontinuous. Pegmatite intruded in fault zone.
Tabular	1-3 T	NW	Vertical			do		Pl-Q-M wall zone, coarse grained; P-Q-M intermediate zone, coarse grained; Q core.
Pinch and swell	1-2.5 T, 100 L.	E	S			do	Weathered	Pl-Q-M-B wall zone, medium grained; Q core, discontinuous.
Tabular	1.5 T	NW	NE		Discordant	Biotite gneiss	Weathered (5 ft.)	F-Q-M pegmatite; accessory biotite. Western trench exposed only small pods.
do	2-4 T	NW	SW			Mica gneiss	Weathered	Q-F border zone, fine grained; P-P1-Q-M wall zone; Q core, discontinuous.
Irregular	15-20 T	NE	NW		Discordant	Biotite gneiss		F-Q-M wall zone; Q core.
Tabular	5-12 T	NE	SE		do	do		F-Q-B wall zone; Pl-P-Q-M intermediate zone; coarse grained; Q core; accessory garnet, pyrrhotite, apatite.
do	8 T	NE						Pl-P-Q-M wall zone; accessory biotite, garnet, apatite, pyrite, chalcopyrite; Q core.
Tabular, pinch and swell	0.1-5 T	NW	Variable	SE	Discordant	Biotite gneiss	Weathered (80 ft.)	F-Q-M wall zone, medium grained; Q core.
Tabular	7.5 T (avg)	NE	SE		do	do		Q-F-B-M wall zone; accessory allanite; Q core, discontinuous. Only thin stringers of pegmatite in winze.
Irregular, branching	7-10 T	NE	NW	NE	Partly concordant.	Mica gneiss		Pl-Q-M wall zone, medium to coarse grained; Q core.
Lens	4-8 T	N	E		Concordant	Mica gneiss	Weathered	F-Q-M pegmatite, fine to medium grained. Small quartz lenses may be discontinuous core.
Pinch and swell	2-4 T	NW	SW		Discordant	Biotite gneiss	do	F-Q-M pegmatite, poorly exposed.
								F-Q-M wall zone; Q core. Do.

TABLE 4.—Summary description of mica mines and

Mine or prospect					Description of muscovite	Production
Local-ity No. on pl. 5 or 6	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
<b>FRANKLIN-SYLVA DISTRICT—Continued</b>						
<b>Macon County—Continued</b>						
210	Welch mine.....	USGS, OME.....	1880, int to 1930, 1942-44, 1952-57.	Cuts, small pits, 5 shafts, 4 adits, stopes, drifts in area 300 by 500, 115 deep.	Light brown to greenish brown, "A" structure, bent, moderately stained, cracked.	Moderate sheet (WWII).
361	West Camp Branch prospect.	USGS, OF.....	1944.....	Adit 10, cut.....	Light brown to greenish brown, "A" structure, concentrated in wall zone.	Small sheet.....
315	C. C. West mine.....	USGS.....	1941-42.....	Pit 20, 2 shafts 20-30, small prospect pits.	Brown, ruled, clay stained.....	
203	C. N. West mine.....	USGS.....	Pre-WWI, 1942-43.	Series of small cuts and pits for 300.	Light brown, small.....	Moderate sheet, clay.
343	Wild Cove mine.....	DMEA.....	1956.....	Cut 100 long, 10-25 deep, adit 55.	Greenish brown, "A" structure, bent.....	
349	Jud Wildes prospect.....	USGS.....	1942.....	5 shafts in line 125.....	Light brown, ruled.....	
275	Williams prospect.....	USGS.....	1952.....	4 shallow pits and small cut for 100.	Ruby, hard, locky, stained, small.....	
305	Willis mine.....	USGS.....	1926, 1943.....	9 shafts 10-45 deep, adit 150.	Ruby, ruled, cracked, bent, clay stained.....	
195	Cecil Wilson prospect.....	USGS.....	1944.....	Prospect pit.....	Small.....	
418	Winding Stair mine.....	USGS.....	Pre-WWI.....	3 adits, incline.....	Light brown, small; green, stained, ruled, cracked.	
309	Windy Gap mine.....	USGS.....	1942.....	3 shafts 25, crosseut 60.....	Light brown, "A" structure, small.....	
321	Winecoff mine.....	USGS (Sterrett, 1922, p. 236).	Pre-1907.....	Series of shafts 35-65, adit, pits, drifts in area 800 long.	Ruby, biotite intergrowths, small.....	
302	Hal Zachary mine.....	USGS, DMEA.....	1910-12, 1941-43, 1951.	Series of pits and shafts 30-117 deep, cut 50, in area 300 long.	Ruby, small.....	Small sheet (1941-43).
226	Zoom mine.....	USGS.....	Pre-WWII, WWII.	Pits, short inclines for 200...	Brown, cracked, small.....	Small sheet (WWII), scrap.
<b>Clay County</b>						
Mine or prospect					Description of muscovite	Production
Local-ity No. on pl. 5	Name	Source of information	Principal periods worked	Workings (measurements, in feet)		
416	Big Four (Rough Cove) prospect.	USGS.....	1915, 1944.....	Cut 32 long, 10 deep; 5 pits..	Ruby.....	Small sheet.....
417	Bud Kitchen prospect.....	USGS.....	1910.....	Cut 40 long, 10 deep; adit 30.		



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