METALLIC MINERAL DEPOSITS OF THE CAROLINA SLATE BELT, NORTH CAROLINA

by
P. Albert Carpenter, III

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ABSTRACT

Deposits of metallic minerals, including chromite, copper, gold, iron, lead, zinc, silver, molybdenum and tungsten, occur within the slate belt in North Carolina. Although none of the deposits are presently mined, many were once commercially worked. This report is a compilation of information on 195 inactive mines and prospects in the slate belt.

Each mine description includes the location, history, the condition of the workings at the time of the field investigation and a brief description of the geology. Information from out-of-print publications is included to make the descriptions complete.

Based upon field work conducted periodically from March, 1966, until January, 1971, the mines and prospects can be grouped into three parallel, northeast-trending belts or zones. One belt follows the Gold Hill-Silver Hill fault zone from southern Union County to Guilford County, a second belt begins in central Stanly County and extends northeastward into Virginia at the Person-Granville County line, and a third belt begins in eastern Montgomery County and extends northeastward into Orange County.

The gold, copper, lead and zinc deposits, generally in volcanic rocks ranging in composition from rholitic to andesitic, are usually associated with faulted rocks. Certain metallic minerals are related to particular geographic areas. These observations support current theories suggesting a possible volcanogenic origin for the deposits or a relationship to an island arc system.

INTRODUCTION

Although North Carolina has never been a large producer of metallic minerals, the State does not have a long history of sporadic production. America's first gold rush was in North Carolina, near the western border of what is known as the Carolina slate belt. This discovery, in 1799, led to the discovery of other gold deposits and soon gold mines had sprung up in several other counties. By the mid 1850's copper, lead, zinc and silver were being produced. Tungsten and iron have also been produced in the slate belt and chromium and molybdenum have been of interest.

The slate belt has long been a source of interest to geologists because of its geologic complexity and its yield of metallic minerals. Many geologists believe that the slate belt still has potential as a source of metallic minerals and that with the use of modern exploration techniques important new deposits may still be found.

Purpose and Scope

This report is a compilation of information on the metal mines of the slate belt in North Carolina. Many reports have been written describing the gold mines of the State but in none of these reports are the mines located in detail. No comprehensive report has been written since the 1948 work by Pardee and Park, and all of the older publications are out-of-print. It is one of the purposes of this report to give precise locations of as many mines as could be located and to include information from the older reports so that the information will again be available. Each mine description includes a detailed location of the deposit, a review of the history of the deposit, the condition of the deposit at the time of the field investigation and a brief description of the geology of the deposit.

Fieldwork for the project was begun by W. Richard Hahman in March, 1966, and he carried out the field investigations until September, 1969. During that time, Hahman located and described 119 mines and prospects. His fieldwork covered the counties of Alamance, Chatham, Davidson, Franklin, Granville, Guilford, Halifax, Harnett, Johnston, Lee, Moore, Nash, Orange, Person, Randolph, Vance, and Wake. Most of the written descriptions of the deposits in those counties were taken directly from Hahman's notes. The present author completed the investigations from June, 1970 until January, 1971, during which time 76 mines and prospects were located and described. All of the mines and prospects were plotted on N. C. State Highway Commission county road maps at a scale of 1/2 inch = 1 mile.

Where topographic map coverage was available, the deposits were also plotted on topographic maps. The topographic maps are on open file in the Geological Survey Section and are available for study by those who require more precise map locations than those given in this report. Where sufficient mine dump material was available for study, samples were taken, and these samples are on file in the sample storage laboratory of the Geological Survey Section. The descriptive geology of each deposit in this report is based upon binocular microscope and field observation, and no petrographic analysis was used for the rock and mineral identifications.

No attempt was made in this report to study in detail the mineralogy of the deposits. It is hoped that the information contained will be an aid to more detailed study of the metallic mineral deposits in the slate belt and will provide a permanent record of the mine locations.

Access

The detailed mine and prospect locations in this report are given so that the locations will be permanently recorded and the mines can be located for purposes of exploration, scientific study or to determine their affects upon highway or building construction. This report is not intended for use as a mineral collecting guide. Most of the mines and prospects are on privately owned land, and the deep open pits and shafts render them dangerous to trespassers or anyone not using extreme caution. When it is desirable to visit a deposit, one should always obtain permission from the landowner.

Acknowledgments

This project was carried out under the supervision of Stephen G. Conrad, State Geologist. His comments and suggestions were helpful in the completion of the project. Appreciation is expressed to William F. Wilson for his help and interest in the project and to other members of the staff of the Mineral Resources Section for their assistance. Appreciation is also expressed to William H. Spence of North Carolina State University for his review of the manuscript and to Edward R. Burt for editing the manuscript.

The project was initiated by W. R. Hahman who carried out the field investigations from March, 1966 until September, 1969. The author expresses his appreciation to Hahman for his suggestions and for sharing the ideas he formulated during his work in the slate belt.

Locating the mines was greatly facilitated by the help of many individuals. The author would particularly like to acknowledge the help of Henry S. Brown of Raleigh and A. P. Craddock of Charlotte in locating the mines of Union County, Claude Hicks of Candor in locating the mines of southeastern Montgomery County and Glen Isenhour of Gold Hill in locating the mines of the Gold Hill district. Appreciation is expressed to the residents of the counties in the slate belt for giving directions on how to get many of the mines and for permitting access to their property. Almost without exception, the landowners were most cooperative and made the fieldwork more pleasant and much less difficult.

The author also wishes to acknowledge the work of previous authors whose work served as a foundation for this project. Information from these earlier publications was used freely in this report. The geologic maps of Orange and Moore counties; the Albemarle, Gold Hill and Denton quadrangles; and the Cid, Gold Hill and Virgilina districts were helpful in locating the mines of those areas. The information contained in those reports was invaluable in making the descriptions of the mines complete.

General Geology

The slate belt in North Carolina consists of a northeast-trending belt of eugeosynclinal rocks crossing the central part of the State. The belt varies in width from 25 to 70 miles and is bounded to the west by igneous and medium- to high-rank metamorphic rocks of the Charlotte belt and is bounded to the east by Triassic sediments located in a half-graben.

A second belt of metavolcanic rocks lies east of the Raleigh area and is overlain by Coastal Plain sediments along its eastern edge. Rocks in the slate belt consist of rhyolitic to basaltic volcanic flows and tuffs interbedded with sediments. The rocks in the belt have been metamorphosed to the greenschist facies and have been intruded by igneous rocks ranging in composition from granite to gabbro.

The volcanic rocks generally have well developed cleavage that strikes to the northeast and dips to the northwest or southeast. Units throughout the belt have been folded into a series of anticlines and synclines. Mapping in the Albemarle, Denton, Gold Hill and Mount Pleasant quadrangles has delineated a northeast-trending anticlinorium, the Troy anticlinorium, with anticlines and synclines on both the west and east limbs. Minor faulting is common throughout the slate belt, and these faults are commonly associated with the gold occurrences. Zones of major faulting are also present, such as the Gold Hill-Silver Hill fault zone which in many places forms the contact between the slate belt and the Charlotte belt. Within this zone the rocks have been sheared to phyllite (phyllonite) and schist. The gold and copper deposits of the Cid and Gold Hill districts and those of eastern Cabarrus and Mecklenburg counties and western Union County lie within or near this fault zone. The age of the slate belt rocks is uncertain but may range from Precambrian to Ordovician.

Figure 1. **Location of the Slate Belt in North Carolina**

FELSIC VOLCANIC ROCKS

The felsic volcanic rocks consist of flows and tuffs ranging in composition from rhyolite to dacite. The flows are dense, aphanitic , dark gray to black and many are porphyritic. Flow banding and spherulitic structure are in many cases distinguishable.

The pyroclastic rock consist of coarse and fine tuff including lithic tuff, crystal tuff, lithic-crystal tuff, breccia, welded tuff and devitrified vitric tuff. These rocks range in color from bluish gray to greenish gray. Most of the fragments in these rocks are felsic volcanic rocks that range in size from less than 2.5 cm to 50 cm.

MAFIC VOLCANIC ROCKS

The mafic volcanic rocks include tuffs and flows that range in composition from andesite to basalt. These rocks occur interbedded with the felsic volcanic rocks. The flows are light green to dark green in color and many are porphyritic or amygdaloidal. Pillow structures have been recognized in basalt flows in Orange County (Allen and Wilson, 1968).

Most of the mafic pyroclastic rocks are green and include lithic tuff, crystal tuff, lithic-crystal tuff and tuff breccia. They contain fragments of mafic volcanic rocks ranging in size from 2 mm to 50 cm.

INTRUSIVE ROCKS

Intrusive rocks in the slate belt range in composition from granitic to ultramafic and in size from dikes and sills to large plutons. In some areas igneous complexes consisting of rocks of one or more stages of intrusion and of varying composition are present. Some of the intrusives have been affected by metamorphism, but others are apparently unaltered. In most cases these intrusive rocks crosscut the volcanic rocks and are considered to be younger.

The Charlotte belt intrusive rocks along the western margin of the slate belt form an igneous complex com-

posed of gabbro, diorite, granodiorite, granite and quartz monzonite.

Metallic Minerals

CHROMIUM

Deposits of chromite, the only ore mineral of chromium, have been known since about 1870 to occur in North Carolina. Most of the deposits are in the western part of the State, associated with peridotites and other altered ultramafic rocks. These western deposits were actively prospected and mined from about 1880 until 1900. The deposits were mined in 1918, and some prospecting was again carried out in the early 1940's.

Small amounts of chromite are known to occur in ultramafic rocks of the slate belt; however, only two deposits have been prospected. These deposits are the Adam Mountain area in Wake County and the Perry deposit near Wilton in Granville County. The deposits are located in altered ultramafic bodies that are part of a series of bodies forming a belt approximately 3 miles wide and 15 miles long. The belt extends from near Adam Mountain to a few miles northeast of Wilton. These two deposits were drilled around 1950 but were of too low grade to be used economically.

COPPER

Copper was first produced in North Carolina in the early 1850's at the Fentress mine in Guilford County. Although the State has never been a large producer, in many cases there was some copper production associated with the gold mining activity, and several mines were known primarily as copper producers. The major period of production was from 1850 to 1930.

In the slate belt, there are five main districts where copper has been of importance. These areas are the Virgilina district, the Gold Hill district, the Cid district, the southwest corner of Chatham County, and the Guilford County area. In addition, various other mines outside these districts have produced copper.

The copper mineralization, which is primarily chalcopyrite, bornite, chalcocite and malachite occurs as veins along shear zones and fractures in predominantly felsic volcanic rocks. These mineralized veins average 3 to 5 feet in width, generally strike to the northeast and have steep dips. An exception is the Guilford County area where the veins are less steeply dipping.

GOLD

It is not definitely known when gold was first discovered in North Carolina, but there are reports of mining by the Indians before the first white settlers arrived. The first authenticated discovery of gold was in 1799 on the farm of John Reed in Cabarrus County. There are numerous accounts of how Reed finally came to know of the importance of his son's discovery of a yellow metal in Meadow Creek, but when the nugget, weighing 17 pounds, was finally identified as gold, it initiated the beginning of America's first gold rush.

As word of the gold discovery spread, many small placer operations opened in nearby counties. It was not until about 1824 that the first lode deposit was worked, on the Tobias Barringer property in Stanly County. Within a few years, gold mining had spread to the western part of the State. Gold soon became such an important resource that in 1831 Christopher Bechtler, from near Rutherfordton, began coining gold and in 1835 the United States Mint opened a branch in Charlotte.

From 1803 through 1828, North Carolina recorded the only production of gold in the United States, approximately $110,000 worth. Total production from 1799 through 1962 has been estimated at 1,173,481 fine ounces valued at $24,638,108. During the period 1829-1855, 33 percent of this total, or 393,119 fine ounces, was produced. Other important periods of production were 1882-1891, 1902-1906 and 1912-1915. In 1933, interest in gold was renewed when the price was raised from $20.67 to $35.00 per ounce. From 1935 through 1944, 14,774 fine ounces of gold valued at $517,119 were produced. During this period, many of the long abandoned mines were reactivated and many new prospects and mines were opened. Since 1944, gold production has been very sporadic. In December, 1971, the federal government devalued the dollar, raising the official gold price by 8.57% to $38.00 per troy ounce. At the same time the government ceased buying gold. In 1972 the free market gold prices began to climb and in February, 1973, the official U. S. price of gold was raised to $42.22 per ounce. In early 1974 the free market gold prices climbed to over $180.00 per troy ounce, and there was speculation that the price would reach as high as $200.00 per ounce.

As gold prices continued to climb, there was renewed interest in North Carolina's gold resources. In Stanly County numerous long abandoned mines were explored and from other counties there were reports of individuals purchasing abandoned mines.

Gold deposits occur as either of two main types, placers or lodes. In many instances, mining of a deposit originally began by working the alluvial material. Many lodes were discovered when the alluvial gold was mined out, and the miners looked to the nearby hillsides to find the lode from which the placer gold came.

Lodes generally occur as either veins or mineralized zones. Veins generally are tabular in shape and have distinct boundaries; whereas mineralized zones are irregular in shape and have indefinite limits. Both types of lodes carry gold along with pyrite and sulphides of copper, lead and zinc. The veins range in size from stringers to bodies up to 20 feet wide and 2,000 feet long. They

generally occur in sheared zones in the country rock and in many cases contain inclusions of phyllite or schist. The mineralized zones, composed of quartz, sericite and chlorite, occur along sheared zones in the country rock. These mineralized zones may be up to 100 feet in width; but often only a portion of that width was economical to mine.

Mineralization in the gold deposits normally consists of quartz, sericite, calcite and chlorite. The primary ore minerals include gold, chalcopyrite, galena and sphalerite. Other minerals commonly found include pyrite, pyrrhotite, bornite, chalcocite, siderite, malachite, azurite, hematite and limonite. The gold occurs as free gold and is also commonly held in the sulphides.

IRON

Iron ore was first discovered in North Carolina about 1585, but it was not until about 1728 that the first production was recorded. Iron was produced in several counties during the Revolutionary War, and by 1810 there were 18 bloomeries in operation in the Piedmont section of the State. Some production was also beginning to come from the western part of the State. Production increased until 1830 but then declined for a number of years.

During the Civil War, iron ore from North Carolina was used for ordinance. Ore from the Buckhorn mine in Harnett County was shipped to the Endor furnace at Egypt, N. C. and a furnace was operated at Ore Hill, Chatham County, by the Sapona Iron Company.

Modern blast furnaces came into existence about 1870, and the Buckhorn furnace, erected in Harnett County in 1873, was the first in the State. The furnace was in operation for only three months when the ore was depleted. In 1892, a blast furnace was opened in Greensboro, but the furnace was never operated successfully. The furnace closed down permanently in 1903, closing down several mines, including Ore Hill, Chatham County, and Wilson Mills, Johnston County. The major period of production was from 1900-1930 when 1,529,973 tons were produced. The largest production was reported for the year 1918 when 108,332 tons were produced. Most of North Carolina's production has come from the western part of the State. In 1972 the Cranberry mine in Avery County was the only active producer.

Iron deposits in the slate belt consist primarily of limonite with lesser amounts of hematite, magnetite and goethite. Most of the production came from Chatham County; however, mines in Johnston, Harnett and Orange counties were also producers.

LEAD, ZINC AND SILVER

Lead, zinc and silver are associated with many of the gold and copper mines, and all the production of these minerals has come as a by-product of gold and copper production. The first production of lead and zinc was apparently from the Silver Hill mine around 1840. Production continued intermittently at this mine until about 1882 and again from 1898 until 1900. From 1954 until 1957, lead and zinc were produced at the H and H (House) mine in Halifax County. More recently, lead and minor zinc production has come from the Tungsten Queen (Hamme Tungsten) mine in Vance County.

Generally the lead and zinc occur as galena and sphalerite, and the silver in many cases is closely associate as argentiferous galena. These minerals are usually associated with pyrite and chalcopyrite as well as other minerals normally found in the gold and copper deposits of the slate belt. Exact figures on the amount of lead and zinc produced are not available; however, silver production through 1953 for the State has been estimated at 357,223 fine ounces. From 1954 through 1963, total production for the State was 602,497 fine ounces valued at $533,243.

MOLYBDENUM

Although molybdenite is known to occur at numerous locations in North Carolina, commercial quantities have yet to be found. For years, minor amounts of molybdenite had been known to occur associated with the gold and copper deposits of the slate belt, and in 1935 molybdenite was discovered in Halifax County on the Boy Scout-Jones and Moss-Richardson properties. These properties were prospected from 1939 until 1946, but no production was realized from the deposits.

The molybdenite in Halifax County occurs in quartz beins along the contact between a granite body and mica schist. Pyrite, chalcopyrite and sericite are associated with the molybdenite. Molybdenite also occurs in a small granite quarry northeast of Wilton in Granville County. In the late 1950's, Bear Creek Mining Company conducted a geochemical survey in the area but found no economic concentrations of molybdenum.

Molybdenum has also been prospected at the Neverson Quarry in Wilson County and in Halifax County on the Ellis property northwest of the Boy Scout-Jones prospect.

TUNGSTEN

Tungsten occurs at several localities in North Carolina. It has been found in minor amounts associated with gold mines in Cabarrus County and as large deposits of tungsten in the northwest corner of Vance County. Tungsten was noted in the Cabarrus County mines as early as 1875. Hidden (1890) was the first to report tungsten in Vance County. Tungsten associated with the gold mines never proved to be of commercial value, and

the tungsten deposits in Vance County were of little interest until 1942 when the Hamme brothers rediscovered the deposits. The Vance County deposits (the Hamme or Tungsten Queen mine) were prospected and developed after 1942 and were important producers of tungsten in the United States from 1951 until 1958. Operation of the mine since that time has been sporadic, primarily due to fluctuating market conditions.

The tungsten associated with the gold mines occurs primarily as scheelite and minor wolframite and is in quartz veins associated with pyrite, chalcopyrite, barite, siderite, calcite and gold. At the Tungsten Queen mine, huebnerite and scheelite are the primary ore minerals and are in quartz veins associated with sphalerite, chalcopyrite, pyrite, galena and minor gold and silver.

Table 1: Production of Tungsten in North Carolina, 1943-1974

Year	Tungsten	
	Short Tons WO_3 Concentrate	Units (20 lbs. of WO_3)
1943	47	2,798
1944	187	11,198
1945	139	8,314
1946	298	17,908
1947	578	34,656
1948	942	56,522
1949	942	56,484
1950	1,088	65,271
1951	1,035	62,078
1952	1,248	74,904
1953	2,525	128,645
1954	3,028	151,166
1955	3,054	158,304
1956	2,858	171,451
1957	2,287	132,215
1958	a	a
1959	a	a
1960	a	a
1961	a	a
1962	a	a
1963	a	a
1964	—	—
1965	—	—
1966	—	—
1967	—	—
1968	—	—
1969	—	—
1970	a	a
1971	a	a
1972	—	—
1973	—	—
1974	—	—
TOTAL	20,256	1,136,914

a - Some production but no figures available.

Production

Production figures for copper, gold, lead, silver and zinc in North Carolina are incomplete. No records were kept during the early years, and the first published sources of information were reports of the Director of the Mint. The mint records included only gold sent to the mint and did not include gold used for ornamental and jewelry purposes and gold sent abroad. In 1880 statistical reports known as Mineral Resources of the United States began reporting figures of mineral production. These reports were printed until 1932, at which time the Minerals Yearbook of the U. S. Bureau of Mines began reporting production figures.

Although total production figures for gold as listed in Table 1 are 722, 309 fine ounces valued at $15,310,954; it is estimated that from 1799 through 1962 a total of 1,173,481 fine ounces valued at $24,638,108 was produced in North Carolina (Stuckey, 1965, p. 299). This total includes estimates of the amounts used in the arts and shipped abroad during the early days of mining.

Yearly production figures were withheld when one mine accounted for all the production of a particular metal; therefore, the production totals for copper, lead, zinc, silver and tungsten represent only a portion of the actual total produced. Most of the silver production came from processing copper and copper-lead-zinc ores. After 1927, most of the production came as a by-product of copper mining at the Fontana mine in western North Carolina. All of the tungsten production has been from the Tungsten Queen (Hamme) min; therefore, production figures for tungsten since 1957 are not available.

Table 2: Production of Gold, Silver, Copper, Lead and Zinc in North Carolina, 1804-1974

Year	Gold		Silver		Copper		Lead		Zinc	
	fine oz.	value ($)	fine oz.	value ($)	lbs.	value ($)	tons	value ($)	lbs.	value ($)
1804–										
1823	2,274	47,000								
1824	242	5,000								
1825	822	17,000								
1826	968	20,000								
1827	1,016	21,000								
1828	2,225	46,000								
1829	6,483	134,000								
1830	9,869	204,000								
1831	14,224	294,000								
1832	22,158	458,000								
1833	22,980	475,000								
1834	18,384	380,000								
1835	12,724	263,000								
1836	7,165	148,100								
1837	5,656	116,900								
1838										
1839										
1840										
1841										
1842	140,232	2,898,505								
1843										
1844			c	c						
1845										
1846										
1847										
1848	22,910	473,543								
1849	23,502	485,793								
1850	17,200	355,523								
1851	15,814	326,883			c	c				
1852	19,512	403,295			c	c				
1853	13,334	275,622								
1854	10,018	207,073								
1855	10,954	226,416								
1856	8,276	171,070								
1857	4,058	83,870								
1858	9,325	192,742								
1859	10,381	214,574								
1860	7,556	156,182								
1861	536	11,088								
1862	112	2,313					c	c		
1863	63	1,309					c	c		
1864	295	6,094								
1865	614	12,693								
1866	6,818	140,937								
1867	3,208	66,306								
1868	4,350	89,906								
1869	5,645	116,672								
1870	4,892	101,111								
1871	4,633	95,766								
1872	5,557	114,863								
1873	5,822	120,332			c	c				
1874	5,180	107,070			c	c				
1875	5,255	108,628			c	c				
1876	4,411	91,181			c	c				

Table 2: (Cont'd)

Year	Gold		Silver		Copper		Lead		Zinc	
	fine oz.	value ($)	fine oz.	value ($)	lbs.	value ($)	tons	value ($)	lbs.	value ($)
1877	3,872	80,026			c	c				
1878	3,634	75,123			c	c				
1879	3,971	82,076			c	c				
1880	4,596	95,000	108	140	c	c				
1881	5,564	115,000			c	c				
1882	9,192	190,000	?	25,000	a	a				
1883	8,079	167,000	?	3,000						
1884	7,596	157,000	?	3,500						
1885	7,354	152,000	?	3,000						
1886	8,466	175,000	?	3,000						
1887	10,885	225,000	?	5,000						
1888	6,580	136,000	?	3,500						
1889	7,102	146,795	3,000	3,879						
1890	5,733	118,500	6,000	7,757						
1891	4,596	95,000	5,000	6,465						
1892	3,801	78,560	9,000	11,636						
1893	2,593	53,600	13,400	17,325						
1894	2,330	48,167	3,682	4,760						
1895	2,622	54,200	400	520						
1896	2,143	44,300	500	646						
1897	1,674	34,600	300	388						
1898	4,064	84,000	700	905						
1899	1,669	34,500	300	388						
1900	1,379	28,500	11,200	14,481						
1901	2,685	55,500	20,300	26,246	512,666	76,900	c	c	c	c
1902	4,388	90,700	20,900	27,022	1,417,020	212,553				
1903	3,411	70,500	11,000	14,222	458,133	67,037				
1904	5,994	123,900	14,800	19,133	305,000	36,600				
1905	6,081	125,685	20,364	20,216	488,888	88,000				
1906	3,973	82,131	30,769	30,944	703,775	135,829				
1907	3,976	82,193	25,200	16,600	597,878	116,416				
1908	4,716	97,480	1,260	668	19,393	2,560				
1909	1,946	40,230	499	324	224,512	29,186				
1910	3,292	68,045	9,053	4,888	140,514	17,845		(incl.		(incl.
1911	3,400	70,282	943	500				zinc)		lead)
1912	8,032	166,014	4,854	2,985	63,766	10,521	46	25,694	283,320	25,694
1913	6,117	126,448	1,777	1,095					20,400	1,142
1914	6,344	131,141	1,524	843	20,434	2,718				
1915	8,321	172,001	1,465	743	17,170	3,005				
1916	1,269	26,237	663	436	9,800	2,411				
1917	589.55	12,187	1,110	915	124,991	34,123	1¼	222		
1918	78.90	1,631	17	17						
1919	5	20	19	21	3,334					
1920	72	1,147	11	10						
1921	153.78	3,179	18	18						
1922	93.80	1,939	9	9						
1923	68	1,102	79	65	62,000					
1924	219.63	4,540	31	21						
1925	896.87	18,540	108	75						
1926	78.90	1,631	21	13						
1927	49.10	1,015	5	3						
1928	114.46	2,366	19,051b	11,345b	a	a				
1929	244.48	5,054	21,106b	11,249b	a	a				
1930	705.40	14,582	30,054b	11,571b	a	a				
1931	367.55	7,598	20,333b	5,897b	a	a				

Table 2: (Cont'd)

Year	Gold		Silver		Copper		Lead		Zinc	
	fine oz.	value ($)	fine oz.	value ($)	lbs.	value ($)	tons	value ($)	lbs.	value ($)
1932	367	7,591	10,045b	2,913b	a	a				
1933	725b	18,520b	11,492b	4,022b	a	a				
1934	509b	17,779b	9,710b	6,312b	a	a				
1935	2,176	76,145	7,584b	5,460b	a	a				
1936	2,037	71,301	5,575b	4,318b	a	a	c	c		
1937	949	33,203	5,538b	4,283b	a	a				
1938	1,878	65,730	5,500b	3,556b	a	a	4	368		
1939	495	17,325	3,961b	2,689b	a	a				
1940	1,943	68,005	6,480b	4,608b	a	a				
1941	3,244	113,540	7,438b	5,290b	a	a				
1942	4,077	142,695	8,259b	5,873b	a	a				
1943	131b	4,585b	7,169b	5,098b	a	a				
1944	21b	735b	1,461b	1,039b	a	a				
1945										
1946										
1947										
1948										
1949	13	455								
1950										
1951										
1952										
1953										
1954	214	7,500	438	396	360	106	4	1,049		
1955	190	6,650	181	164	300	112	2	596		
1956	882	30,870	753	682	c	c	10	3,140		
1957	1,373	48,000	12,347b	11,000b	a	a	9	3,000		
1958	876	31,000	15,157b	14,000b	a	a				
1959	965	34,000	16,319b	15,000b	a	a				
1960	1,826	64,000	212,368b	192,000b	a	a	424	99,000		
1961	2,094	73,000	169,742b	157,000b	a	a	318	66,000		
1962	460	16,000	100,439b	109,000b	c	c	219	40,000		
1963	33	1,000	26,754	34,000	c	c	62	13,000		
1964										
1965										
1966										
1967										
1968										
1969										
1970										
1971	c	c	c	c	c	c	c	c		
1972										
1973										
1974										
TOTALS	722,309	15,310,954	955,643	911,887	5,169,934	835,922	1,099	252,069	303,720	36,836

a - Some production (chiefly from western North Carolina) but no figures available.
b - Primarily by-product of copper mining in western North Carolina.
c - Some production but no figures available.

M Table 2

METALLIC MINERAL DEPOSITS OF THE SLATE BELT

Distribution of Mines and Prospects

There are approximately 340 inactive metal mines and prospects in the North Carolina slate belt. Most of these deposits were worked for gold, and many have been referred to as mines even though there was no actual production. The deposits appear to be concentrated into three major northeast-trending zones or belts within the slate belt (Plate 1). The belt containing the most dense concentration of mines, and also the largest producers, follows the Gold Hill —Silver Hill fault zone. Within this belt are included such mines as the Howie, the Reed and the mines of the Gold Hill and Cid districts. In North Carolina, the belt begins in southwestern Union County, extends northeastward along the western edge of Union County, into eastern Cabarrus County, into southeastern Rowan County, across southeastern Davidson County, western Randolph and finally ends in southwestern Guilford County.

A second belt lies to the east of the Gold Hill —Silver Hill belt and begins in central Stanly County. The belt extends northeastward into northwestern Montgomery County, across central Randolph County, southern Alamance, central Orange and into northeastern Person and northwestern Granville counties. The Virgilina district forms the northeastern end of the zone and extends into Virginia. The third zone is less well defined than the previous two. It begins in southeastern Montgomery County, continues into northwestern Moore County, into southwestern Chatham County and finally into southeastern Orange County.

The distribution of mines within each zone is not continuous and in places there are gaps where no deposits exist. In some instances these gaps represent an area where volcanic rocks have been intruded by an igneous body, but in other cases the gaps are apparently not related to intrusives. There are also many deposits between the zones, and when all of the known deposits in the slate belt are plotted, the zones become somewhat broader; however, the concentration of deposits within each zone becomes more dense.

Previous Investigations

Since the mid 1850's many reports have been written describing the mines in the slate belt. One of the first reports was the "Geologic Report of the Midland Counties of North Carolina" by Emmons in 1856. From 1875 until 1897 investigations were carried out by Nitze, Kerr, Hanna, Wilkens and Becker. These older reports contain much valuable information concerning the early workings and history of the mines. The 1910 reports of Laney and Pogue on the Gold Hill and Cid districts, respectively, remain the most comprehensive reports on those districts, as is Laney's 1917 work on the Virgilina district. The 1936 report by Bryson summarized much of the material from the early publications and Bryson's work served as a major source of information until recently, when it became out-of-print. Perhaps the most comprehensive study of gold mines in the southern Piedmont is U. S. Geological Survey Professional Paper 213 by Pardee and Park. This 1948 publication, also out-of-print, contains detailed information on the geology, mineralogy and production of many of the mines in North Carolina.

In recent geologic reports by Conley (1962 a,b) in the Albemarle Quadrangle and in Moore County, and by Allen and Wilson (1968) in Orange County, the mines in those areas have been located and described. In addition to the reports mentioned, many other reports have been written dealing with specific areas within the slate belt. These reports are too numerous to mention but are included in the list of references.

Mine Descriptions

ALAMANCE COUNTY

Slate belt rocks, predominantly felsic tuffs and felsic crystal tuffs, underlie most of southeastern Alamance County (figure 1). Interbedded with the felsic tuffs are small rhyolite flow, andesitic flow and andesitic tuff units. In eastern and central Alamance County, several extensive areas are underlain by mafic to intermediate volcanic rocks.

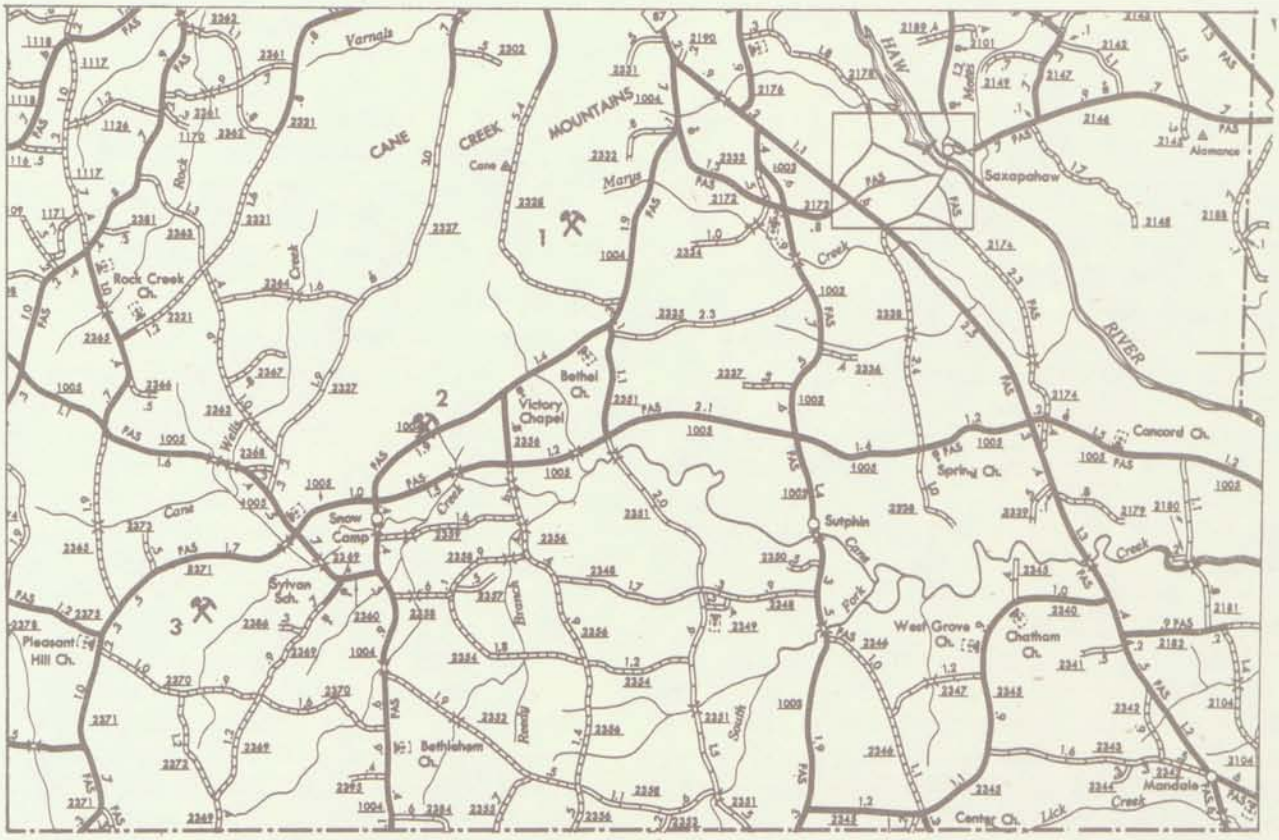
Intrusive rocks, ranging in composition from granitic to ultramafic, underlie most of western and northern Alamance County. The most common rock types are coarse-grained biotite-quartz diorite and granodiorite within which are smaller, irregular-shaped bodies of diorite, gabbro and ultramafic rocks. Portions of the quartz diorite and granodiorite have been intruded by numerous mafic dikes which are so abundant in some areas that they become the predominant rock type.

The interest in metals in Alamance County has been restricted to gold and copper prospecting in the southern portion of the county. The deposits were small and there was no production.

Copper Prospect (CuP)*

Location: A copper prospect is located in southwestern Alamance County, 15.1 miles south of Burlington and 2.0 miles southwest of Snow Camp. To reach the prospect travel 0.46 mile northeast on SR 2371 from the intersection of SR 2371 and SR 2375. Turn onto a farm road trending S. 75° E. and continue 0.8 mile. Then turn left onto another road and go 0.2 mile to the mine.

Workings: The prospect consists of two shafts and a trench. One shaft is filled with trash to within 10 feet of



1 Foust
2 Robeson
3 Copper prospect

⚒ mine
X prospect

Figure 2. **Alamance County Deposits**

the surface and the other is caved to within 5 feet of the surface. The trench is 36 feet long, 10 feet wide, 5 feet deep and strikes N. 70° W. The shafts form a line trending N. 45° W. Very little dump material remained in 1966.

Geology: Prospecting was carried out on a quartz vein striking N. 45° E. and dipping vertically. The country rock seems to be andesitic tuff. No metallization was observed in the quartz, but the shafts were apparently sunk in gossan. The country rock carries minor sulphides.

Foust Copper Mine (CuP)

Location: Located in southern Alamance County, the Foust Copper mine is 11.1 miles south-southeast of Burlington and 4 miles west-southwest of Saxapahaw. The mine is reached by travelling 1.3 miles south on SR 1004 from the intersection of SR 1004 with SR 2332. Turn west (right) onto a farm road and go 0.65 mile to a field. From the gate at the field go 900 feet N. 18 W. around the northeast side of the field. Then continue for 450 feet on a logging road to the mine.

Workings: The Foust mine was worked around 1893 with a 78-foot deep shaft being opened. In 1966 the shaft had been filled with dump material to within 5 feet of the surface. The shaft collar was 10 feet square.

Geology: Rock types found in the dump include rhyolite porphyry, basalt and rhylotic welded tuff in contact with diorite. Near the vein, the country rock has been chloritized, but seems to be rhyolite or rhyolite porphyry. The ore is in massive to sheared vein quartz containing chlorite, calcite, limonite, sericite and feldspar as gangue minerals. Ore minerals of native silver, sphalerite,

*The symbols represent the principal minerals extracted from the deposit: Ag-silver, Au-gold, Cr-chromium, Cu-copper, Fe-iron, Mo-molybdenum, Pb-lead, W-tungsten, and Zn-zinc. An "M" following the symbol indicates that the deposit was a mine. A "P" following the symbol indicates that the deposit was a prospect.

chalcopyrite, galena, aurichalcite and malachite occur in cavities and fractures in the quartz. Minor pyrrhotite and bornite are also present.

Robeson Gold Prospect (AuP)

Location: The Robeson prospect is in southwestern Alamance County, 13.2 miles south of Burlington and 6.3 miles southwest of Saxapahaw. The mine can be reached by travelling 1.0 mile northeast on SR 1004 from the intersection of SR 1004 with SR 1005. The mine is 30 feet north of the road.

Workings: There is no record of production at this prospect. In 1966 a pit 10 feet by 12 feet by 4 feet was filled to the surface with soil and vegetation.

Geology: The prospect was opened in a quartz vein in sericitized felsic lithic tuff. A quartz vein cropping out in a road cut and trending toward the prospect pit strikes N. 70 W. and dips vertically (?). Some relic sulphides are in the tuff, but this was the only indication of metallization.

CABARRUS COUNTY

Approximately the eastern one-fourth of Cabarrus County is underlain by slate belt rocks (figure 1). Both felsic and mafic volcanic rocks and volcanic-sedimentary rocks are present. The northeast-trending Gold Hill and Silver Hill faults extend through this section of the county and it is within this fault zone that most of the gold mines in the county occur.

The western three-fourths of the county is underlain by Charlotte belt rocks, primarily a complex sequence of igneous rocks including hornblende gabbro, granite, diorite and granodiorite. Near the center of the county two bodies of syenite form a discontinuous ring around dark gabbro. Charlotte belt rocks are commonly fractured and sheared and have been intruded by diabase, granite and lamprophyre dikes.

Most of the metal mining in Cabarrus County was for gold; however, there has been some production of copper and silver. Tungsten has been investigated at several mines but there has been no production. The Gold Hill district, extending into the northeast corner of the county from Rowan County, was the most productive, but the most famous mine is the Reed mine in the southeast portion of the county.

Allman Prospect (AuP)

Location: The Allman prospect is in eastern Cabarrus County, 2.8 miles south-southwest of Mt. Pleasant and 7.2 miles southeast of Concord. The prospect can be reached by travelling 0.8 mile southeast on SR 2626 from the intersection of SR 2626 with SR 2627. At the power lines, walk northeast to the open field, then walk west to the edge of the open field. The prospect is in the woods on the south side of a small creek.

Workings: The workings include two pits or shallow shafts approximately 10 feet in diameter and filled with trash to within 3 feet of the surface. A small amount of dump remains. There is no record of production at this prospect.

Geology: Prospecting was undertaken in milky vein quartz containing limonite. The workings are near the contact between rocks of the slate belt and granodiorite (?). Inclusions of a fine-grained, dark volcanic rock are in the igneous rock.

Buffalo Mine (AuM)

Location: The Buffalo mine is 0.4 mile northwest of Georgeville and 5.8 miles southwest of Mt. Pleasant. The Cabarrus mine lies 0.5 mile northeast of the Buffalo and the Rocky River mine is 0.9 mile to the southwest. The mine can be reached by travelling 0.5 mile east on N.C. Highway 200 from SR 1006. Turn north (left) and walk up a path to the left of a deserted barn. The mine is 200 feet north of N.C. Highway 200 and 100 feet west of the path.

Workings: Three shafts are along the crest of the ridge. The largest shaft is 17 feet in diameter and 50 feet deep and a smaller shaft, which is southwest of the largest, is 8 feet in diameter and choked to within 6 feet of the surface. Another small shaft, 6 feet in diameter and 4 feet deep, is 20 feet northeast of the largest shaft. There is very little dump material present. Farther northeast of the shafts, three trenches 6 feet wide, 2 feet deep and 25 feet long were cut perpendicular to the strike of the ridge exposing small quartz stringers.

Geology: Gold was mined from a quartz vein and also from a mineralized zone in the phyllite. The country rock is chlorite-sericite phyllite striking N. 40° E. and dipping 80° SE. In places, the phyllite is brecciated.

Cabarrus? (Ellsworth & Crosby?) Mine (AuP)

Location: A mine, referred to as the Cabarrus or Ellsworth and Crosby mine, is located 8.8 miles southeast of Concord and 4.8 miles south of Mount Pleasant. The mine can be reached by travelling 0.75 mile south on SR 1006 from its intersection with SR 1132. Turn east (left) onto a dirt road which is located at the south side of a field. Travel 0.35 mile to the crest of a ridge. The workings are north of the road.

Workings: No description of this mine could be found in the available literature. Numerous small pits and approximately 6 shafts are concentrated along the crest of a narrow, northeast-trending ridge. Most of the shafts are caved and filled with either water or trash. At the highest point on the ridge is a series of closely spaced pits connected by trenches which expose a three foot wide quartz vein. The deepest shaft is also at this point and is 12 feet by 12 feet at the collar and approximately 75 feet deep.

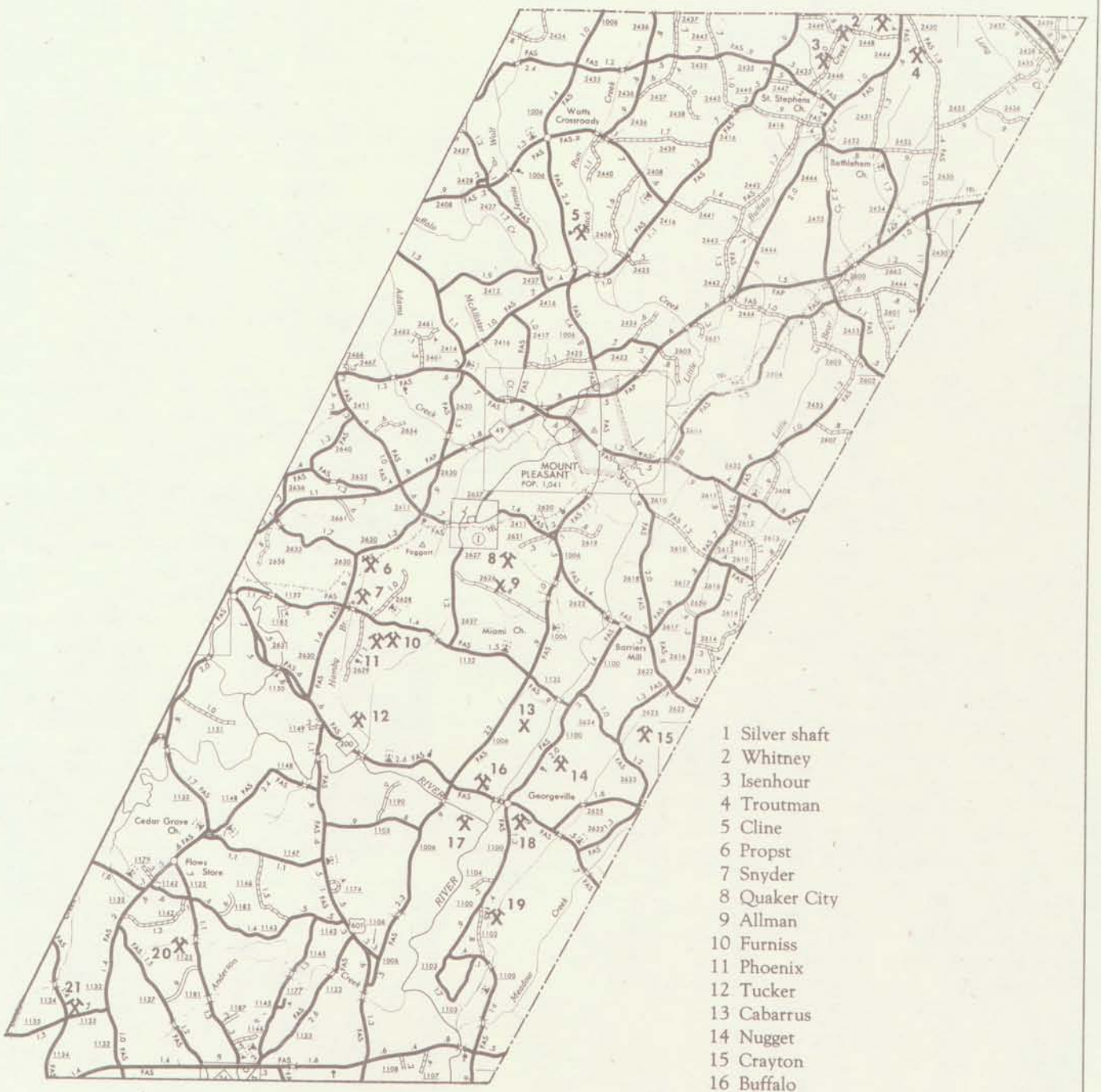


Figure 3. **Cabarrus County Deposits**

Geology: Mining was carried out in northeast-trending quartz veins enclosed by chlorite-sericite phyllite. One quartz vein is 3 feet wide, strikes N. 55° E. and dips 65° NW. A considerable amount of quartz float is scattered over the ridge, and much of the quartz contains vugs lined with quartz crystals. The quartz contains limonite, chalcopyrite and malachite. The chlorite-sericite phyllite country rock contains small amounts of calcite.

Cline (Cruse) Mine (CuM)

Location: The Cline copper and tungsten mine is in northeastern Cabarrus County, 8.2 miles northeast of Concord and 3.4 miles north of Mt. Pleasant. The mine is reached by travelling approximately 1.3 miles south on SR 1006 from the intersection of SR 1006 with SR 2408. Turn east (left) onto a dirt road and continue for 0.5 mile to a house. The shafts are along the slope near the southwest side of a pond located south of the house.

Workings: This mine was originally worked for gold in 1895 and was last operated in 1902. Three shafts were opened on the property, the deepest shaft having been developed to 200 feet. The mine was unwatered around 1933, but the work was soon discontinued. In 1946 the U. S. Bureau of Mines drilled four diamond-drill holes on the property. The drilling showed the vein to pinch at depth and revealed no mineralization of economic importance.

Geology: The shafts were opened on a 1 to 3 foot wide quartz vein striking N. 35° W. and dipping 75° NE. The andesitic or dacitic tuff adjacent to the vein has been brecciated and contains some metallization. Siderite is common in the quartz, and calcite coats the surfaces of some samples. Pyrite occurs primarily as euhedral crystals disseminated through the quartz and the country rock. Portions of the tuff are rich in chlorite. Earlier reports indicate the presence of scheelite and chalcopyrite.

Crayton Mine (AuM)

Location: The Crayton mine, near the Cabarrus — Stanly County line, is 5.1 miles southeast of Mt. Pleasant and 2.7 miles northeast of Georgeville. The mine is reached by travelling northwest on SR 2623 from the intersection of SR 2623 and SR 2625. Turn north onto the road to Smith Lake. At the lake, walk east up the creek 100 yards to the mine.

Workings: This mine was first worked in 1923 and three shafts were developed to a maximum depth of 88 feet. One shaft was sunk on the property in 1933, but work was soon discontinued. In 1969 one shaft was located. The shaft was filled with water and a large amount of dump material was near the shaft.

Geology: Mining was carried out on a 2 to 6 foot wide lode enclosed by bluish-gray slate and argillite. Shear planes cut through the slate, and at depth the lode is reported to be cut by numerous low-angle faults. Calcite forms tiny veinlets and also occurs as masses in the country rock. In places, the argillite and slate are brecciated and calcite has filled the voids. Pyrite occurs as concentrations along and parallel to bedding planes and also forms cubes in gray masses of calcite. In places, tiny veinlets of white calcite cut through the gray calcite. Other minerals noted include minor bornite and chalcopyrite disseminated through the quartz. Some joint surfaces are coated with calcite and manganese. According to Pardee and Park (1948, p. 66), the lode strikes from N. 10° - 35° E. and dips about 50° NW.

Furniss Mine (WP, AuM)

Location: The Furniss mine is in eastern Cabarrus County, 6.3 miles southeast of Concord and 4.6 miles southwest of Mt. Pleasant. The mine can be located by travelling 0.35 mile south on SR 2629 from the intersection of SR 2629 and SR 1132. Turn east (left) onto a paved road north of the Green Oak Golf Course and follow the road for 0.55 mile. Turn left and go behind a house to a dirt road and follow the dirt road for 0.2 mile to the mine.

Workings: The original work at the Furniss mine was prior to 1860, and the mine was last worked between 1900 and 1906. Some prospecting was carried out in the early 1930's. The vein was worked from a 176 foot shaft with several drifts. An additional shaft, the Furr shaft, was opened southwest of the Furniss shaft and was sunk to a depth of 60 feet.

In 1948, the U. S. Bureau of Mines drilled eight holes and examined the underground workings of the mine. Four additional holes were drilled in 1949 and numerous trenches were dug. The work by the Bureau was carried out after scheelite was discovered on the mine dumps. The Bureau's investigation did not indicate a workable deposit of scheelite and no scheelite occurred at depth. In 1970, the main shaft was filled with water, and the numerous trenches and pits were overgrown with vegetation. The Furr shaft was 25 feet in diameter and was choked to within 20 feet of the surface.

Geology: Mining was carried out in quartz veins enclosed by iron-stained andesitic tuff. Numerous epidote stringers crosscut the andesite. Calcite, siderite, chalcopyrite and pyrite are in both the country rock and the milky quartz. Malachite covers weathered surfaces of rocks and occasionally encloses chalcocite(?). Magnetite occurs with pyrite in the andesite. Small crystals of galena are in calcite, and scheelite is disseminated through the quartz as small grains and also occurs in concentrations. The quartz vein strikes N. 60° E. and dips 80° NW., and the ore is said to have occurred in lenses, pockets and veinlets in the quartz. Gold occurred as free gold and in pyrite.

Eva Furr Mine (AuM)

Location: The Eva Furr mine is less than one mile southeast of Georgeville and approximately 6 miles northeast of Midland. Travel 0.7 mile south on SR 1100 from Georgeville and turn east (left) onto a dirt road beside a large pine tree. Travel 0.35 mile (past an open field, turn left beyond the wooded area) and the shaft is on the left side of the dirt road in a wooded area in an open field. The shaft is 50 yards from the dirt road.

Workings: The main shaft is 5 feet by 5 feet and filled

with water. A smaller caved shaft or pit is 50 feet south of the larger one and the two form a line trending N. 10° W. A small amount of dump remains. Most of the mining was done prior to 1896. Development work was carried out at the mine in 1934 and 1935. In 1954, a drill hole was put down on the property by the U. S. Bureau of Mines as a part of the strategic minerals survey. The survey showed the quartz vein to contain sulfides between 166 feet and 174 feet. Analyses ran 0.03 percent copper and 0.01 percent zinc.

Geology: Mining was in a quartz vein enclosed by sheared felsic tuff. The quartz contains pyrite, siderite, calcite and galena with small amounts of chalcopyrite and sphalerite. Portions of the quartz vein contain large concentrations of pyrite. Small cubes of pyrite are disseminated through the tuff.

Isenhour Mine (AuM)

Location: The Isenhour mine is 7.4 miles northeast of Mt. Pleasant and 2.6 miles southwest of Gold Hill. The mine is one-half mile southwest of the Whitney mine and is 50 feet west of SR 2448, behind an old house. The old house is located 0.3 mile south of the intersection of SR 2448 and SR 2449.

Workings: The Isenhour mine was worked as a part of the Whitney group of mines. The shaft is approximately 20 feet in diameter at the surface and is filled with dirt. No dump material remains.

Geology: No samples were taken at this mine; however, the geology is very similar to that at the Whitney mine.

Newell (Dixie Queen) Mine (CuM)

Location: The Newell mine is in southeastern Cabarrus County, 4.6 miles northwest of Midland and 1.4 miles south of Flows Store. The Pioneer Mills mine is 2 miles southwest of the Newell. The mine is reached by travelling south on SR 1125, 0.9 mile from the intersection of SR 1125 and SR 1143. After crossing the creek, turn right (west) onto the first dirt road south of the creek. Follow the dirt road, taking the right fork, for 0.35 mile. The mine is near the creek and on the south side of the dirt road.

Workings: The mine was opened between 1895 and 1900 and was primarily a copper mine. The property was again worked in 1923 and in recent years some prospecting has been done. Two shafts are on the property but are now filled with water. Some relatively fresh dump material from the recent prospecting is available.

Geology: The shafts were opened on a 2 foot wide quartz vein containing pyrite, chalcopyrite, bornite, chalcocite, malachite, and euhedral grains of magnetite. Malachite is altering from chalcocite, and much of the chalcopyrite is coated with manganese oxide. Gossan has developed in contact with the quartz and usually is near pyrite and sericite concentrations. The country rock is felsic volcanic rock enclosed by diorite and granite; however, gabbro and granodiorite were found on the dumps. In places, the country rock is sheared and bleached.

Nugget (Biggers) Mine (AuM)

Location: The Nugget mine, in eastern Cabarrus County, is 1.3 miles northeast of Georgeville and 5.2 miles south of Mt. Pleasant. The mine is reached by travelling 0.8 mile north from Georgeville on SR 1100. Turn east (right) onto a dirt road and continue past St. Stephens Church to the house of Mr. Simonis, the owner of the property on which the mine is located. Continue for approximately 0.25 mile northeast of the house, through the woods, across a small creek and past a pond to the mine workings. The workings are in the valley draining from the crest of a northeasterly trending ridge.

Workings: This property was worked intermittently from 1885 to 1935. Most of the work was aimed at the recovery of placer gold from a small stream draining from the crest of the ridge. Numerous pits are along the west slope of the ridge; however, little work was done on the quartz veins.

Geology: The Simonis property is underlain by blue-gray slate and felsic crystal tuff striking N. 30° E. and dipping 75° NW. The quartz veins are iron stained and cellular and contain pyrite and minor galena. Portions of the country rock are sheared. Earlier reports describe the lower slope of the ridge as being underlain by a schist derived from siliceous tuff. The crest of the ridge is underlain by greenstone.

Phoenix Mine (CuM)

Location: The Phoenix mine is in eastern Cabarrus County, 6 miles southeast of Concord and 4.9 miles southwest of Mt. Pleasant. The mine is reached by travelling 0.35 mile south on SR 2629 from SR 1132 and turning east (left) onto a paved road north of Green Oaks Golf Course. Follow this road 0.55 mile and turn southwest (right) onto a dirt road and go 0.1 mile to the mine.

Workings: The Phoenix mine was first worked prior to 1856 and was developed to a depth of 140 feet. Operations ceased in 1889, but the mine was active again from 1900 to 1906. The deepest shafts were 600 feet deep and numerous levels were driven from these shafts. In 1969 the shafts were filled with trash and some of the workings had been destroyed by the construction of a golf course. A considerable amount of dump remains but contains mostly country rock. Much of the dump has been used to surface roads.

Geology: Mining was carried out in a vein ranging from a few inches wide to 4 feet wide, striking N. 57° W. and dipping 80° NW. The vein is located in a shear

zone enclosed by dark greenish-gray andesitic tuff. Much of the vein quartz is bleached and contains vugs lined with tiny quartz crystals. Iron stains many fractures in the quartz. The primary mineralization includes bornite, pyrite, chalcopyrite and cross-cutting veinlets of siderite. Chalcopyrite is in some places intergrown with pyrite and a few masses of calcite are present. Earlier reports indicate the presence of galena and barite as well as scheelite.

Pioneer Mills Mine (AuM)

Location: The Pioneer Mills mine is in southeastern Cabarrus County, 3 miles southwest of Flows Store and 3.1 miles northeast of Cabarrus. The mine is in an open field 50 yards northwest of the intersection of SR 1134 and SR 1135. Three tenths mile farther east on SR 1135 is another shaft 100 feet north of the road.

Workings: The mine was opened about 1844 but very little work has been done since the late 1850's. Some sampling was carried out in 1934. Very little dump material remains at the mine. Along the small creek 100 yards north of the mine, numerous prospect pits and trenches have been dug.

Geology: The mine was opened in a quartz vein enclosed by hornblende-quartz diorite (or granodiorite) containing much magnetite. Some mafic volcanic material is found just east of the dumps; so the mine is apparently near the slate belt contact. The country rock is in some places sheared. The only dump material present was scattered through the field, and it was primarily iron-stained, vuggy, cellular quartz containing siderite, chalcopyrite, calcite and minor amounts of chrysocolla and malachite. Calcite generally occurs as fracture fillings in the quartz, and manganese oxide coats much of the quartz.

Propst (Nash, Heglar) Mine (AuM?)

Location: The Propst mine is 4.2 miles southwest of Mt. Pleasant and 5 miles southeast of Concord in eastern Cabarrus County. The Snyder mine is less than 1 mile south of the Propst and the Phoenix and Furniss mines are 1.5 miles southeast. The Propst mine is located by travelling 0.35 mile south on SR 2630 from the intersection of SR 2630 and SR 2633. Turn east (left) onto a dirt road leading to a farm house. Follow the dirt road behind the house and through the gate to the pasture. Continue almost parallel to SR 2630 to the north edge of the pasture and into the woods. The mine is in the valley trending east-west into Hamby Branch.

Workings: A 5 foot by 5 foot shaft filled with water is in the small valley and numerous trenches are on the slopes of the valley. Very little dump material remains.

Geology: The shaft was opened in a silicified zone of granite or quartz monzonite. Metallization is in a fine-grained, dark-gray to brown siliceous zone in a pink granite. Minerals present include pyrite, molybdenite, barite, chalcopyrite and magnetite. Molybdenite is disseminated in bleached or altered portions of the siliceous material as fine flakes. Some molybdenite is in bleached portions of granite. Magnetite occurs primarily in the granite. Sundelius and Bell (1964, p. 207) mention the presence of rare earth elements in an andradite-opal-chalcedony-quartz gangue. The deposit is radioactive, and residual weathering products of allanite are suggested as the possible source of the radioactivity.

Quaker City Mine (AuM)

Location: The Quaker City mine, located in eastern Cabarrus County, is 2.5 miles southwest of Mount Pleasant and 7.0 miles southeast of Concord. The mine is 0.4 mile north of the Allman prospect and can be reached by travelling 0.8 mile southeast on SR 2626 from the intersection of SR 2626 and SR 2627. Stop at the power lines and walk north one-half mile to the mine.

Workings: Very little information is available concerning the Quaker City mine, but it has apparently been inactive since about 1886. Three shafts, the deepest of which was 80 feet, were opened on the property. In 1969 the remains of the workings consisted of numerous pits and shafts trending N. 25° W. paralleling the crest of a low ridge. The largest opening was 30 feet in diameter at the surface and was choked to within 30 feet of the surface.

Geology: Mining was carried out in a vein 2 to 5 feet wide enclosed by diorite. The dump material consists primarily of milky, iron-stained quartz containing limonite. Numerous cavities have been left in the quartz due to weathering of the pyrite. Masses of calcite are associated with the quartz, and a small amount of gold was observed in several small vugs. A small amount of copper is reported to be in the deposit.

Reed Mine (AuM)

Location: The Reed mine, in southeastern Cabarrus County, is 2 miles south of Georgeville and 2.8 miles northwest of Locust. The mine is reached by following SR 1102 south for 0.25 mile from the intersection of SR 1102 and SR 1100. Turn east (left) onto a dirt road and follow the road for approximately 0.5 mile to the mine. The mine is north of the dirt road at the top of a hill east of Little Meadow Creek.

Workings: The Reed mine is considered to be the site of the first authenticated discovery of gold in North Carolina (1799) and was one of the richest placer deposits in the State. The lodes were first worked in 1831 and were worked until 1835. Following a period of inactivity, the mine was operated in 1854, from 1881 to 1887 and from 1894 to 1899. Some placer work was still being carried out in 1935. In 1971 the Reed property

Plate 2A. Reed Mine

was acquired by the State of North Carolina, and plans were initiated to develop the mine into a State Historic Site.

The remaining workings consist of a series of deep vertical shafts along the crest of a long ridge. These shafts are open and fences have been placed around the openings (Plate 2, A). Numerous pits have been dug in the slopes north and west of the shafts and also along the creek west of the ridge. In 1971 four of the shafts were accessable to depths of about 60 feet, and a level was open in two of the shafts. All the workings were overgrown with vegetation and little dump material remained. The shafts probably do not extend deeper than 120 feet (Pardee and Park, 1948).

Geology: Lode mining at the Reed mine was aimed at the recovery of gold from quartz veins and stringers along the crest of the ridge. The country rock is dacitic tuff and rhyolitic tuff. Earlier reports indicate that a sill of greenstone forms the crest of the ridge (Pardee and Park, 1948, p. 70). The quartz veins normally trend northeast at approximately 45° and dip to the southeast at approximately 50°. The country rock strikes N. 25° E. and dips 75° NW. The attitude of the smaller quartz stringers varies.

The Reed property is well known for its large gold nuggets. During the period from 1803 to 1835, 14 nuggets were found having a total weight of 115 pounds. The size of the nuggets ranged from 1 to 24 pounds. Later, a 25 pound nugget was found.

Rocky River Mine (AuM)

Location: The Rocky River mine is 0.9 mile southwest of Georgeville and 9.2 miles southeast of Concord. The mine can be reached by travelling 0.45 mile south on SR 1006 from N. C. Highway 200 and turning east (left) onto a dirt road. Follow the dirt road along the north side of an open field, then turn south behind the field and then turn back east into the woods. The road forks and the left fork leads to the main shafts and the right fork leads to a smaller shaft and several mill wheels. The workings are approximately 0.5 mile east of SR 1006. The Eva Furr mine is 1 mile to the east and the Buffalo mine is less than 1 mile north.

Workings: The primary explorations at this mine were in 1895 and no work has been done since that time. A total of five shafts were opened along the crest of the ridge and a sixth shaft is down slope to the east. There are numerous trenches approximately 1 foot deep, 3 feet wide and 30 feet long. The two southernmost shafts are choked and one has been used as a trash dump. Dump material from the mine is not abundant.

Geology: The mine was opened in a series of quartz veins enclosed by chlorite-sericite phyllite which strikes N. 20° E. and dips 70° NW. Most of the milky quartz contains numerous vugs filled with limonite and hematite. Narrow quartz veinlets cut parallel to the phyllite and contain calcite, galena and possibly sphalerite. Pyrite was noted in the quartz and phyllite. Chalcopyrite is reported to be present. Approximately 50 percent of the gold was free milling; however, much of the gold was carried by galena and pyrite (Nitze and Hanna, 1896).

Silver Shaft (Ag-AuM)

Location: The Silver shaft is in northeastern Cabarrus County, approximately 1.7 miles southwest of Gold Hill and 8.3 miles northeast of Mt. Pleasant. The mine lies midway between the Union Copper mine to the northeast and the Whitney mine less than 1 mile to the southwest. The mine is located by travelling 0.3 mile west on SR 2448 from the intersection of SR 2448 with SR 2444. At this point, walk north along the west side of an open field to the shaft, which is in the woods at the northwest corner of the field.

Workings: The Silver shaft was apparently operated during the time of the greatest activity in the Gold Hill district; however, little is recorded concerning production at the mine. The shaft is now 40 feet in diameter at the top and is filled with water to within 40 feet of the surface. Numerous small dumps remain and are overgrown with vegetation.

Geology: The shaft seems to have been opened into a quartz vein enclosed by a mineralized zone. The country rock is chlorite-sericite phyllite containing pyrite, chalcopyrite and malachite near the vein. Portions of the phyllite have been folded. Calcite veins up to 4 inches wide are common, particularly along the contact between a quartz vein and sericite phyllite. Portions of the calcite are folded and contain pyrite. The country rock strikes N. 40° E. and dips 65° NW. A small amount of felsic

crystal tuff is mixed with the phyllite on the dumps. The primary metallization at the Silver shaft consists of mixtures of galena and sphalerite with sericite and minor chalcopyrite. Sphalerite predominates and is pale yellow.

Snyder Mine (AuM)

Location: The Snyder mine is in eastern Cabarrus County 4.6 miles southwest of Mt. Pleasant and 5.3 miles southeast of Concord. The Propst mine is less than 1 mile north of the Snyder and the Phoenix and Furniss mines are 1 mile southeast. The mine is reached by travelling 0.18 mile north on SR 2630 from SR 1132. Turn east (right) onto a dirt road leading across a small creek to a barn. Continue past the barn for approximately 150 yards, and the mine is to the left, 50 feet north of a small branch flowing into Hamby Branch.

Workings: Two shafts are on the property. The largest shaft is 5 feet by 10 feet and filled with water and a choked shaft is 20 feet west of the first. A small amount of dump material remains. The deepest shaft was sunk in 1935 to a depth of 137 feet. At depth the vein began to pinch and gold values decreased (Bryson, 1936, p. 86).

Geology: Chalcopyrite, bornite, calcite, rhodochrosite, magnetite, malachite, siderite, epidote and pyrite are found in the milky vein quartz. The country rock is diorite and seems to have been sheared to a biotite-chlorite schist. The schist contains minor amounts of pyrite, chalcopyrite, epidote, magnetite and rhodochrosite. Rhodochrosite forms large masses but is barren of metallic minerals. Veinlets of calcite generally cut the rhodochrosite, and bornite and chalcopyrite are in the calcite.

Troutman (Trautman) Mine (AuM)

Location: The Troutman mine, in northeast Cabarrus County, is 8.3 miles northeast of Mt. Pleasant and 1.9 miles south of Gold Hill. The mine is reached by travelling 0.65 mile south on SR 2450 from the intersection of SR 2450 and SR 2444. Turn west onto a dirt road and continue 0.1 mile to the mine.

Workings: The Troutman mine is the site of the first discovery of gold in the Gold Hill district, in 1842. Little remains of the old workings. The main shaft is filled with trash, and numerous prospect trenches and pits are along the crest of a low ridge. The shaft is 25 feet in diameter, and the largest trench is 15 feet wide, 3 feet deep and 200 feet long, trending N. 30° W.

Geology: The country rock is sericite phyllite and chlorite-sericite phyllite with minor greenstone. Much milky vein quartz with limonite and iron-stained fractures is scattered about. No metallization is recognizable from the dumps except for a few tiny pyrite cubes in the phyllite. The country rock strikes N. 10°E. and dips 75° NW. Some portions of the phylite are bleached.

Tucker (California) Mine (AuM)

Location: The Tucker mine is located in eastern Cabarrus County, 6.8 miles southeast of Concord and 6.0 miles southwest of Mt. Pleasant. The mine can be reached by following SR 2629 south from SR 1132 until it becomes an unimproved road. Follow the road south into the woods for approximately 0.5 mile to a series of shafts east of the road. Continue 0.25 mile farther south to additional shafts west of the road. An old mill site is at the end of the road in the floodplain of Hamby Branch.

Workings: The Tucker property was worked prior to 1884, and a 175 foot deep shaft was opened. Levels totaled 117 feet in length. A second vein on the property was worked by a line of pits and shafts 500 feet long. In 1970 the workings were overgrown with vegetation and little dump material remained. Parts of a Chilean mill and some machinery were present.

Geology: The mine was opened in a quartz vein striking N. 80° E. and enclosed by andesitic tuff striking N. 45° E. The country rock dips almost vertically or slightly northwest. Pyrite and minor chalcopyrite occur in the milky vein quartz along with specular hematite. Some felsic crystal tuff, in places sheared and containing calcite, and meta-andesitic flow (?) were also found on the dumps. The gold was reported to assay $15 per ton.

Whitney (McMakin) Mine (AuM)

Location: The Whitney mine, in northeastern Cabarrus County, is 7.8 miles northeast of Mt. Pleasant and 2.1 miles southwest of Gold Hill. One shaft is 100 feet east of the point where SR 2449 intersects with SR 2448. The other shaft is 100 yards north of the intersection. The property is owned by Mr. Hammill.

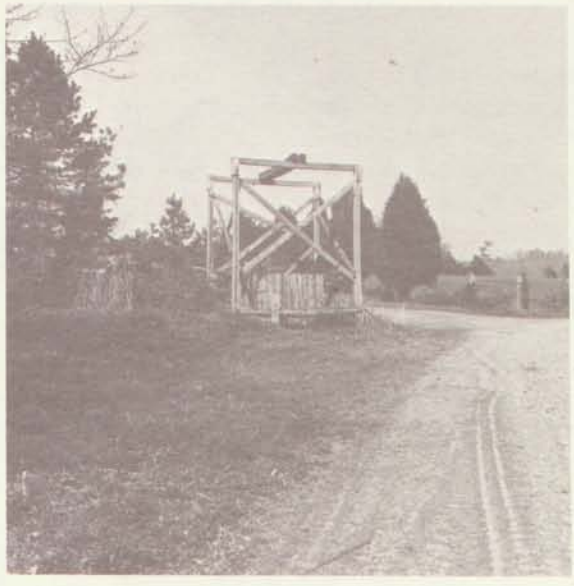


Plate 2B. Shaft at the Whitney Mine

Workings: The mine, originally known as the McMakin, was first operated around 1842 and was active until 1861. Three shafts were opened to a maximum depth of 180 feet. The Whitney Company reopened the McMakin and the Isenhour mines in 1906, and the two shafts were developed to a maximum depth of 800 feet. In 1935, several of the old shafts were cleaned out and partially dewatered; however, the work was soon discontinued.

Geology: The shafts were opened into a 4 to 25 foot wide silicified shear zone trending N. 30° - 35° E. and dipping 75° - 85° NW. Within the shear zone, numerous quartz layers alternate with silicified country rock. The dump material shows metallization in quartz veins and pyrite stringers in chlorite-sericite phyllite. Malachite, sphalerite, galena, and small amounts of enargite (?) or chalcocite (?) were disseminated through milky vein quartz. A small amount of greenstone was also scattered about the dumps. Earlier reports mention the presence of psilomelane, pyrolusite, pyromorphite, cerussite, chalcopyrite and argentiferous tetrahedrite.

CHATHAM COUNTY

Chatham County is in the east-central portion of the slate belt (figure 1). Western and central Chatham County are underlain by a complex sequence of felsic to mafic flows and tuffs interbedded with sedimentary rocks including argillite, graywacke and conglomerate. The Farrington igneous complex, in the northeastern part of the county, consists primarily of granodiorite, diorite and quartz monzonite. The eastern and southeastern portions of the county are underlain by sedimentary rocks of the Triassic basin.

Most of the interest in metallic minerals of Chatham County has been focused on copper deposits in the southwest corner of the county. These deposits have realized little production, but have aroused interest because of the large number of small copper "shows." Iron was once mined from the Ore Hill deposit southwest of Mt. Vernon Springs.

Bear Creek Copper Mine (CuP)

Location: The Bear Creek mine, in southwestern Chatham County, is 4.1 miles southeast of Bennett and 8.2 miles southwest of Bear Creek. The mine is located by going 0.15 mile north on SR 2318 from the intersection of SR 2318 and N. C. Highway 42. Turn east (right) and go 100 feet S. 65° E. to the workings.

Workings: The mine was first worked in 1942 and 1943 by the Bear Creek Copper Mine Company, of Wilmington, N. C. In 1944, seven tons of ore were shipped to the U. S. Metals Refining Company at Carteret, New Jersey. When Willard Berry visited the property in 1943, a shaft had been put down 23 feet and plans were to cross-cut and drift about 100 yards on strike and then raise to the surface. These plans were apparently not carried out. Nixon (1954, p. 29) visited the deposit in 1954, and the shaft at that time was 5 feet square and 32 feet deep.

Geology: The shaft was apparently opened in a mineralized zone in felsic lithic tuff. The mineralized zone is probably not more than 10 feet wide. The lithic tuff is sheared in places and is in contact with andesite, and in places malachite is slickensided. Potential ore minerals present include chalcopyrite, bornite, chalcocite, malachite and azurite. Gangue minerals include quartz, chlorite, limonite and pyrite. Polished sections by Nixon (1954, p. 31) showed bornite and chalcocite as the predominant minerals with chalcocite in some specimens completely surrounding bornite.

Plate 3A. Bear Creek Copper Mine

Cassana Kidd Prospect (CuP)

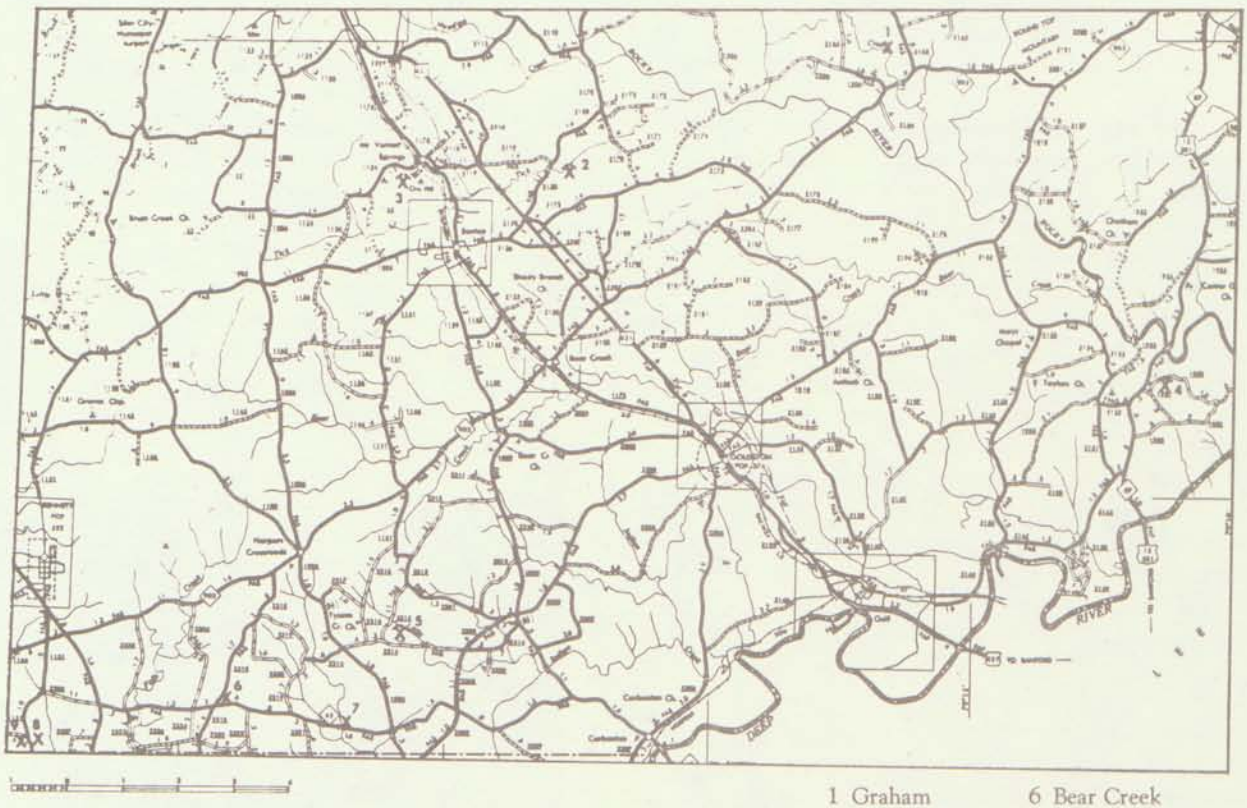
Location: The Cassana Kidd prospect is in the extreme southwest corner of Chatham County, 3.2 miles south of Bennett and 11.5 miles southwest of Bear Creek. The prospect can be reached by travelling 0.09 mile south on SR 1151 from the intersection of SR 1151 and SR 2328. Turn west (right) towards an old abandoned house and go 0.15 mile to the house. The prospect is 1000 feet N. 70° W. from the back of the house.

Workings: A single prospect pit, 4.5 feet long, 3 feet wide and 2 feet deep, is at the location.

Geology: The pit was apparently opened in iron-stained quartz bordered by felsic crystal tuff. No metallization was observed.

Gilmore-Hart Mine (CuM)

Location: The Gilmore-Hart mine is in western Chatham County 6.2 miles southeast of Siler City and 5.7 miles northwest of Goldston. To reach the mine go 0.35 mile south on SR 2170 from the intersection of SR



1 Graham
2 Gilmore-Hart
3 Ore Hill
4 Sloan
5 Phillips
6 Bear Creek
7 Barringer Phillips
8 W. H. Purvis
9 Cassana Kid

Figure 4. **Chatham County Deposits**

2170 with SR 2172. Turn west (right) onto a farm road just south of Tick Creek and follow the road back through the pastures along Tick Creek for approximately 1 mile. The mine is on the north side of the road.

Workings: Berry (1943, p. 2) described two holes on the property. The first hole was reported to have been worked for copper in 1860's(?). The second hole was 6 to 12 feet deep and 10 feet square and caved and overgrown in 1943. In 1966, the mine property was owned by the Hamilton Lumber Company. One small trench and two small pits remained on the property.

Geology: The pits were opened in a one-half to one foot wide quartz vein striking N. 40° E. and dipping 80° SE. The vein contains specularite and malachite along edges and malachite along fractures. Numerous quartz stringers containing chlorite occur in the rhyolitic or andesitic tuff country rock.

Graham Copper Prospect (CuP)

Location: The Graham prospect is in central Chatham County, 6.0 miles southwest of Pittsboro and 10.6 miles east-southeast of Siler City. To reach the mine, travel 0.25 mile southeast on SR 2163 from the intersection of SR 2163 and SR 2159. Turn west (right) onto a farm road for approximately 0.4 mile to the mine.

Workings: The prospect consists of a 20 foot square pit that is 10 feet deep.

Geology: The prospect was opened in milky vein quartz containing chlorite. No metallization was observed on the dump. Berry (1943, p. 7) described the country rock as a fine-grained volcanic tuff with narrow quartz stringers. He stated that the vein quartz contained stringers of calcite and also contained pyrite and minor chalcopyrite. The tuff contained specks of chalcocite.

Ore Hill Iron Mine (FeM)

Location: The Ore Hill iron mine is in western Chatham County, 4.5 miles southeast of Siler City and 4.2 miles northwest of Bear Creek. Travel 0.04 mile south on SR 1135 from the intersection of SR 1135 and SR 1134. Turn east (left) and go 0.4 mile northeast on the Long Meadow Dairy farm road. The mine is on the north side of the farm road.

Workings: This mine was worked primarily during the Revolutionary and Civil Wars. The Sapona Iron Company operated a small charcoal furnace here during

the Civil War and the North Carolina Steel and Iron Company took out 700 tons during prospecting, apparently around 1890. There was some production in 1903. Numerous openings were made on the property. Opening No. 1 was 40 feet deep with drifts in several directions; opening No. 2 was 80 feet deep with one short drift; the whim shaft was 90 feet deep, and four other openings were 85, 10, 4 and 12 feet in depth.

Geology: The ore is primarily limonite occuring in veins ranging up to 20 feet in thickness. The strike of the veins is variable ranging from slightly northwest to slightly northeast. The country rock is sheared and bleached rhylotic tuff striking N. 45° E. and dipping 70° NW. The iron ore appears to be a pseudogossan composed of transported limonite with geothite and hematite. Tension fractures along both sides of the shear zone have been filled with iron ore and some smaller fractures have been filled with quartz. Limonite was also deposited in the veins. Earlier reports described the ore as being spongy, porous, scoriaceous, botryoidal, mamillary, stalactitic and tabular. There were reportedly large cavities in portions of the veins.

Phillips (Millright) Mine (CuM)

Location: The Phillips copper mine is in southwestern Chatham County, 6.6 miles southwest of Goldston and 6.5 miles east-southeast of Bennett. The mine is on the property of Mr. Guy Phillips east of the intersection of SR 2312 and SR 2314. Follow an old logging road trending N. 48° E. for 330 feet from the south end of the chicken barn east of the Phillips' house.

Plate 3B. Phillips (Millright) Mine

Workings: The date of the first work at this mine is not known, but the property was worked on a small scale in 1942 and 1943 by the Chatham Milling Company. Two hundred and sixty tons of ore were shipped to C. C. Daughtery's Mill at Troy and later two core holes were put down 200 to 250 feet. The cores showed less than 3 percent copper. In 1943, 33 tons of ore were shipped to the U. S. Metals Refining Company. In 1944 eleven core holes totaling 1,695 feet were drilled. The ores did not show appreciable quantities of ore. In 1966 a pit filled with water was all that remained of the workings.

Geology: The country rock is greenish-gray tuff breccia that is sheared in places. Much iron-stained milk quartz containing chlorite is present. Malachite, limonite after pyrite and hematite are in the quartz. Chalcocite is disseminated through the breccia.

Barringer Phillips Prospect (CuP)

Location: The Barringer Phillips prospect is in southwestern Chatham County, 6.2 miles southeast of Bennett and 8.1 miles southwest of Goldston. The prospect can be reached by going 0.75 mile west on N. C. Highway 42 from the intersection of N. C. Highway 42 and SR 1006. From this point, the prospect is 450 feet N. 15° W. from a house on the north side of the road.

Workings: Originally, there were two pits, 12 feet and 13 feet deep, on the property. The pits have now been filled in.

Geology: Prospecting was carried out in quartz stringers in a mafic tuff (?). Malachite, chalcocite and bornite are disseminatd through the tuff.

W. H. Purvis Prospect (CuP)

Location: The W. H. Purvis prospect is in the extreme southwest corner of Chatham County approximately 0.4 mile east of the Cassana Kidd prospect. To reach the prospect go 0.27 mile south on SR 1151 from the intersection of SR 1151 and SR 2328. Turn east (left) into a driveway and go 0.08 mile. Then go 800 feet N. 20° E. to the pit.

Workings: The workings consist of one small pit.

Geology: The pit was opened in an iron-stained quartz vein enclosed by a felsic to intermediate crystal tuff. No metallization was observed.

Sloan Copper Mine (CuM)

Location: The Sloan copper mine is in south-central Chatham County, 8.0 miles east of Goldston and 7.4 miles south of Pittsboro. The mine can be reached by travelling 0.45 mile east on SR 1958 from the intersection of SR 1958 and SR 1957. Turn south (right) onto a logging road along the east side of a field. Continue along the logging road for 450 feet to the workings, on the west side of the road.

Workings: A shaft was sunk to a depth of at least 40 feet prior to 1888. In 1966 the shaft was 12 feet square and filled with water to within 5 feet of the ground surface.

Geology: The shaft was opened in a fractured, milky

quartz vein in sheared chloritized and bleached felsic lithic tuff. The quartz contains pyrite, bornite, chalcopyrite (?) and chalcocite as primary minerals. Secondary minerals include chalcocite and malachite. The gangue consists of calcite, specularite, chlorite, pyrite and limonite. In places, chalcocite has replaced bornite and pyrite.

DAVIDSON COUNTY

Davidson County is on the border between Charlotte belt and slate belt rocks (figure 1). The northeastern half of the county is underlain by Charlotte belt rocks that are predominantly granitic, in many cases porphyritic, but also include lesser amounts of gabbro and diorite. Slate belt rocks cropping out in the southeastern half of the county, consist primarily of fine-grained epiclastic rocks and rhyolitic to basaltic tuffs and flows.

The metal mines are restricted to slate belt rocks. This mining area, known as the Cid district, was an important source of gold and copper as well as silver, lead and zinc.

The Cid Mining District

The Cid district occupies an area about 13 miles long and 9 miles wide in southern Davidson County. Gold was first worked in this district prior to 1824, but it was not until about 1838 that active mining was carried out. From 1838 to 1862 and from 1875 to 1885, mining was at its peak. Total production figures for the Cid district are not known but would probably total several million dollars. Most of the production came from the Silver Hill mine.

A number of mines, the Sechrist, Silver Hill, Cross, Ida and Hunt mines, are within the Gold Hill-Silver Hill fault zone in sericite phyllite and schist, sheared equivalents of the Cid formation (Stromquist, and others, 1971). East of the fault zone, the Silver Valley, Emmons, Ward, Laughlin, Jones-Keystone, Cid and Hepler mines are in members of the Cid Formation that are locally sheared. Units in which the mines are found include rhyolite and rhyolitic tuff, argillite or mudstone, andesitic tuff and chlorite-sericite phyllite.

The primary "ore" minerals include gold, galena, sphalerite and chalcopyrite, along with minor amounts of silver, chalcocite and malachite. The gold occurs as free gold, auriferous pyrite and in oxidized zones in the deposits (Pogue, 1910, p. 119). The ore minerals are normally associated with the gangue minerals quartz, siderite, calcite, limonite, chlorite and sericite.

Cid Mine (Cu, AuM)

Location: The Cid mine is 11.8 miles southeast of Lexington and 5.5 miles north of Denton in southeastern Davidson County. To reach the mine, travel 0.22 mile east on SR 2318 from the intersection of SR 2318 and N. C. Highway 109 (the Town of Cid). At the Cliff Harrison residence (north side of SR 2318), go 480 feet N. 5° E. to the mine.

Workings: The Cid mine was discovered about 1882 and was worked periodically for a few years. The original work was for the recovery of gold, but later mining was aimed primarily at the recovery of copper. The deepest shaft was developed to a depth of 100 feet. A small production was reported from the mine in 1903. In 1969 three small shafts about 6 feet by 6 feet and filled with trash were on the property. Little dump material was left.

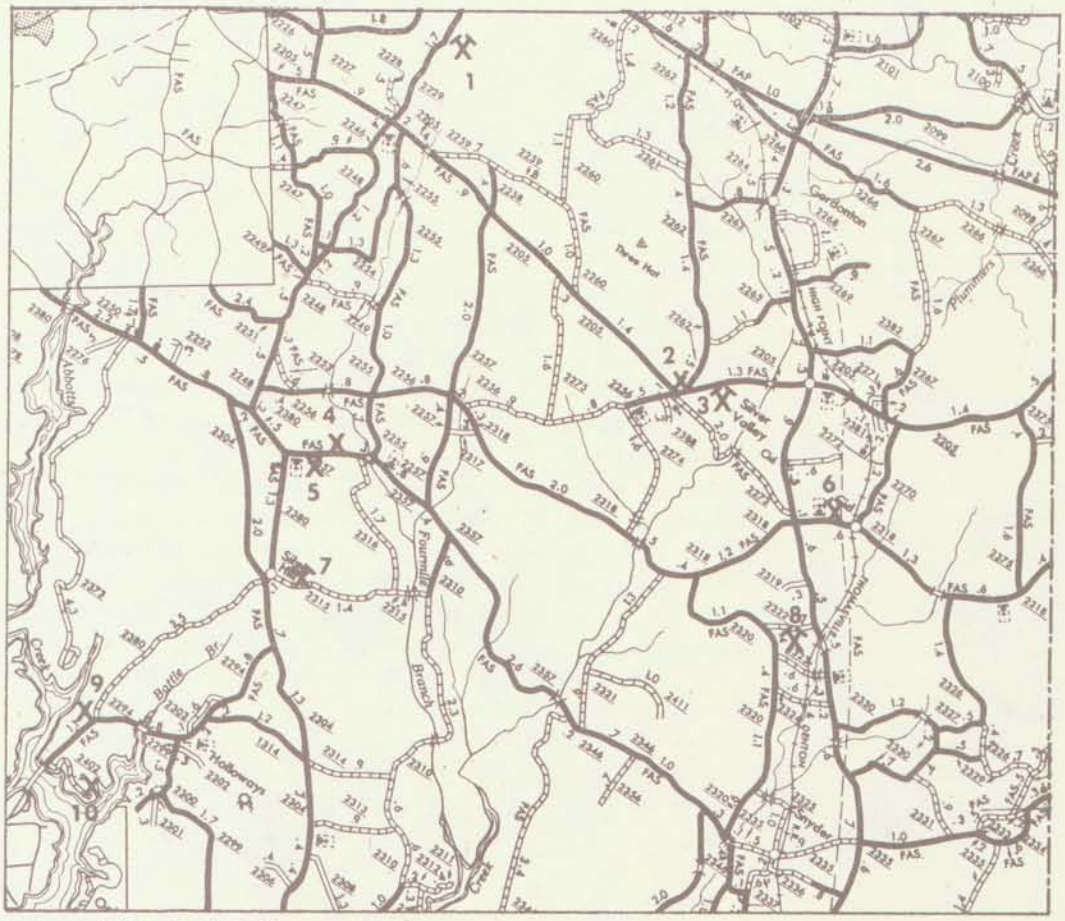
Geology: The country rock consists of porphyritic andesitic tuff (?) and argillite. The andesite contains calcite that has apparently replaced feldspar, and the ferromagnesian minerals have been chloritized. The bedded argillite shows cleavage at 45° from the bedding. Minor pyrite, limonite and quartz are along fractures and some pyrite occurs parallel to bedding planes. Phyllite is also present and shows iron and manganese stains and slickensides.

A two-inch wide quartz-chlorite vein containing pyrite is in a bleached zone of the andesite. The vein is highly fractured with chlorite concentrated primarily along the margins of the vein. Vugs lined with tiny quartz crystals are in the vein. Malachite occurs disseminated through the andesite and also occurs as acicular prismatic forms within vugs. The possibility of the andesite being a flow is suggested by what appear to be vesicles containing quartz crystals. Pogue (1910) reported that the ore was chalcopyrite with pyrite, carrying some silver and a little gold.

Conrad Hill - Dodge Hill Mines (Cu, AuM)

Location: The Conrad Hill - Dodge Hill property is 5.7 miles east-southeast of Lexington and is 8.5 miles southwest of Thomasville in east-central Davidson County. The mine can be reached by travelling 0.55 mile south on SR 2229 from the intersection of SR 2229 and SR 2226. Turn southeast (left) onto a dirt road and go 0.2 mile S. 60° E. and then N. 60° E. to the mine. The Dodge Hill workings are 200 yards N. 45° E. of the Conrad Hill workings.

Workings: The Conrad Hill mine was discovered in 1831 and from that time until 1835 approximately $32,000 of gold was produced. The mine was apparently operated until about 1853 when the mine was idled due to litigation. In 1880 the mine was reopened and in the following two years approximately $125,000 was spent on equipment. In 1882 the mine was the leading producer in the State. The mine was extended to the north to include the Dodge Hill mine but was closed in 1884. In 1907 the mine was dewatered and a small amount of ore produced. A carload of rich slag was reported to have been shipped in 1912, and in 1936, the mine was again dewatered. Total production from the mine has been estimated at $170,000, but some have estimated it



1 Conrad Hill - Dodge Hill
2 Hepler & Claude Hepler
3 Silver Valley
4 Sechrist
5 Ida
6 Cid
7 Silver Hill
8 Emmons
9 Hunt
10 Cross

Figure 5. **Davidson County Deposits**

to be as high as $300,000.

Four main shafts were sunk at the Conrad Hill property with drifts driven from each shaft. Apparently, the deepest shaft reached a depth of 400 feet. In 1969, there were eight shafts or open stopes at the Conrad Hill property. Some of the shafts were up to 50 feet deep and drifts could be seen at several levels. Numerous small pits and trenches were also present.

At the Dodge Hill workings, 4 shafts were open up to 50 feet in depth. Numerous pits were present and together with the shafts they form a line trending N. 10° - 20° W.

Geology: Mining was carried out in quartz veins enclosed by sericite phyllite. Several sets of veins were worked on the property with the main vein striking N. 20° E. and dipping 50° NW. The vein ranges up to 6 feet in thickness and is associated with considerable selvage or mylonite on the footwall. Portions of the veins are brecciated and contain chlorite and siderite in stringers. Chalcopyrite, brochantite, siderite and malachite are in the quartz.

Mining was originally aimed at the recovery of gold, but as the mine was deepened, copper became the primary ore. The U. S. Bureau of Mines mapped and sampled the deposit (Ballard and Clayton, 1948), but their work failed to reveal appreciable copper values or evidence of additional ore deposits.

Cross Mine (AuP)

Location: The Cross mine, located in southern David-

son County, is 10.5 miles south of Lexington and 7.8 miles northwest of Denton. The mine can be reached by travelling 0.55 mile east on SR 2402 from the intersection of SR 2402 and SR 2294. The mine is 50 feet S. 50° E. from SR 2402.

Workings: The mine was discovered just prior to 1860 and was prospected from 1860 to 1865. During this time, a shaft was sunk to a depth of 50 feet. In 1904, the shaft was deepened to 75 feet and some exploration was carried out. In 1969, the workings consisted of two caved shafts and a small trench cut perpendicular to the strike of the country rock. Little dump material remained.

Geology: The work was carried out in sheared, phyllitized crystal tuff and bedded argillite striking N. 20°E. and dipping 80° SE. Minor chalcopyrite and pyrite were in the crystal tuff. Little vein quartz was present. Pogue (1910, p. 8) stated that the oxidized ores contained free-milling gold to a depth of about 70 feet. The quartz vein was reported to be 6 to 18 inches wide.

Emmons Mine (AuM)

Location: The Emmons mine is in southeastern Davidson County, 12.4 miles southeast of Lexington and 4.2 miles north of Denton. The mine can be reached by travelling 0.17 mile west on SR 2322 from N. C. Highway 109. Turn south onto an old farm road and go 200 feet to the end of the road. From the end of the road go 450 feet due south to the mine.

Workings: This mine, formerly known as the Davidson mine, was first worked prior to 1861. It was inactive during the Civil War but was reopened shortly after and worked for a few years. The mine was operated in 1885 and 1886 and some development work was carried out from 1902 until 1904. The last recorded productions were in 1906 and 1907. Total production is estimated at $108,500.

Two main shafts were opened on the property, one shaft opened to a depth of 575 feet and a second shaft opened to 475 feet. A third shaft was opened to a depth of 170 feet. Levels were driven from each shaft to work the ore. In 1969 little was left of the workings except the remains of a few old buildings and a caved shaft.

Geology: The mine was opened in a stringer lode enclosed by andesitic tuff and argillite, both of which are sheared in places. Some quartz monzonite is also found in the dump material. Veinlets of quartz are enclosed by silicified chlorite and contain minor chalcopyrite, pyrite and limonite blebs. A mixture of chlorite, sericite and quartz contains pyrite with some chalcopyrite. Malachite stains some fractures. One sample of the material was brecciated, and slickensides in the rock were coated with iron-stained sericite and kaolin. The chlorite selvage is slickensided and contains pyrite, pyrrhotite and chalcopyrite in fractures. Malachite is on the slickensides, and all of the sulphides are altering to limonite.

One ore body was described in earlier reports as being 2 to 3 feet wide, 50 feet long and 400 feet deep and composed chiefly of chalcopyrite with minor pyrite, galena and sphalerite. Smelter returns of a representative carload of concentrate ran 7.7 percent copper, 1.27 ounces of silver and 0.1 ounce of gold per ton.

Hepler and Claude Hepler Mine (AuP)

Location: The Hepler and Claude Hepler mine (prospect), in eastern Davidson County, is 9.7 miles southeast of Lexington and 6.9 miles north of Denton. The Silver Valley mine is 0.5 mile to the southeast. To reach the Hepler and Claude Hepler mine, travel 300 feet N. 40° E. on SR 2262 from the intersection of SR 2262 and 2205. Turn west (left) and go 420 feet N. 70° W. to the mine.

Workings: There is no record of production at this prospect. The workings consisted of a series of 3 to 5 foot deep trenches near a dry stream bed. Old placer workings are also in the stream. The workings extend for about 100 yards in a N. 5° W. direction.

Geology: The prospecting was apparently carried out in placer material and in vein quartz enclosed by rhyolite.

Hunt Mine (AuP)

Location: The Hunt mine is in southern Davidson County, 9.8 miles south of Lexington and 8.1 miles northwest of Denton. To reach the mine, travel 0.1 mile northeast on SR 2380 from the intersection of SR 2380 and SR 2294. From this point, go 270 feet N. 70° W. to the mine.

Workings: This deposit was apparently only a prospect, and no information concerning the deposit is available in the literature. A few small prospect pits and a small amount of dump was all that remained in 1969.

Geology: Prospecting was carried out in quartz veins enclosed by iron-stained phyllite and mylonite. The vein quartz is sheared and brecciated and contains badly weathered siderite. Many limonite-filled vugs occur in the quartz and phyllite. Many of the vugs are the result of the weathering of pyrite. A quartz-siderite-hematite gossan is also found around the workings.

Ida Mine (AuP)

Location: The Ida mine, in southeast-central Davidson County, is 7.9 miles southeast of Lexington and 7.7 miles northwest of Denton. The Silver Hill mine is 1.2 miles south of the Ida Mine. The mine is reached by travelling 0.17 mile east on SR 2857 from the intersection of SR 2857 and SR 2380. At this point, go 575 feet S. 20° W. to the mine.

Workings: The first recorded work at the Ida mine was in 1878 when a shaft was sunk and a 60 foot cross-

cut was driven. There is no record of production since that time. In 1969 one shaft, reported to be 80 feet deep, was caved and filled with trash.

Geology: The shaft was opened in altered, sheared phyllite composed of chlorite, sericite, quartz and minor limonite. The vein quartz is massive with iron-stained and limonite-filled vugs. The country rock trends N. 20° E. and dips 65° NW.

Sechrist Mine (AuP)

Location: The Sechrist mine, located only 0.4 mile northeast of the Ida Mine, is 7.8 miles southeast of Lexington and 7.8 miles northwest of Denton. To reach the mine, travel 0.65 mile east on SR 2857 from the intersection of SR 2857 and SR 2380. The mine is 20 feet north of SR 2857.

Workings: A shaft was opened on this property prior to 1910 but was abandoned when little ore was encountered. In 1969 the shaft had been filled in, and a few pits and a trench were all that remained.

Geology: The shaft was sunk on a quartz vein enclosed by silicified argillite or phyllite striking N. 30° E. and dipping vertically. The quartz vein and veinlets contain disseminated pyrite and arsenopyrite. A yellowish-tan oxidation mineral is present and may be partially ferrimolybdite. Pyrite and arsenopyrite are also concentrated along shears in the silicified country rock. Mineralization is similar to the Jones-Keystone mines in Randolph County. Pogue (1910, p. 108) stated that the shaft was sunk on a quartz vein carrying pyrite and lead.

Silver Hill Mine (Pb, Ag, AuM)

Location: The Silver Hill mine is in south-central Davidson County, 8.9 miles south-southeast of Lexington and 7.0 miles northwest of Denton. The mine can be reached by travelling east on SR 2315 for 0.3 mile from the intersection of SR 2315 and SR 2380 (the town of Silver Hill). Turn north (left) onto the mine road and continue for 0.1 mile to the mine.

Workings: In 1969 the workings consisted of two shafts, the largest being 12 feet by 10 feet and inclined N. 50° W. at about 45°. The second shaft is vertical and was timbered over when visited in 1969. The shaft was filled with water to within 50 feet of the surface. Numerous old buildings remained on the property (Plate 4).

The mine was originally worked in 1838 as King's mine and was later known as the Washington Silver mine. The deposit was actively mined from 1840 to 1855, and during the Civil War, lead from the mine was used to make bullets. The mine was worked until 1882, but since that time has only been worked intermittently.

At first, the ore consisted primarily of lead carbonate and disseminated native silver which were easily processed. But at depth the sulphides galena, pyrite and chalcopyrite were encountered, rendering the ore difficult to treat. A long period of experimentation aimed at separating the metals followed. Despite the difficulty in separating the metals, the mine was worked for many years. Total production of silver, lead and zinc is estimated at one million dollars or more.

During the early work, mining was carried out from a shaft 650 feet deep. The shaft was deepened to 750 feet during the period from 1898 to 1900. An inclined shaft followed the east vein for about 725 feet, and a vertical shaft connected with the inclined shaft at 160 feet. A third shaft connected with the inclined shaft at the 250 foot level. The two veins were worked by a series of cross-cuts from these shafts.

Geology: The country rock is a rhyolitic tuff that is sheared to a gray to buff, iron-stained, quartz-sericite phyllite. Fractures in the rock are filled with quartz veinlets containing galena, pyrite and sphalerite. A chloritized, sericitized crystal tuff containing disseminated pyrite is also in the dump material. Also present is a greenish-gray saccharoidal quartz and feldspar rock with sparse finely disseminated pyrite, malachite and hemimorphite.

Selvage is composed of iron-stained sericite, quartz and pyrite. Minor veinlets of quartz containing pyrite occur in the selvage. The gangue is composed of milk quartz, chlorite, chalcopyrite, pyrite and sphalerite. Most of the pyrite and chalcopyrite appears concentrated in the chlorite; while the sphalerite is concentrated in fractures in the quartz. Some of the chlorite contains concentrations of pyrite cubes and calcite. In places calcite, tremolite and actinolite form a distinct rock type containing pyrite, chalcopyrite, galena, sphalerite and quartz stringers.

The ore is primarily galena and yellow sphalerite together in a fine-grained mixture. Clear quartz and calcite are mixed with the ore. Hemimorphite coats some sphalerite, particularly the more weathered samples. Some of the milky quartz and calcite contains chalcocite. Narrow stringers of light-green dolomite occur in some of the rock and commonly contain pyrite and arsenopyrite. Brochantite, chrysocolla and goethite are found in some quartz stringers. Covellite in a few specimens covers surfaces of the chalcopyrite. Earlier reports indicate the presence of pyromorphite, cerussite and calamine.

Silver Valley Mine (Au, Ag, Pb, ZnM)

Location: The Silver Valley mine, located in southeastern Davidson County, is 10.2 miles southeast of Lexington and 6.7 miles north of Denton. The mine can be reached by travelling 0.55 mile east on SR 2205 from SR 2262. Turn south (right) and go 1600 feet south-southwest along a logging road to the mine.

Workings: The mine, originally known as the Spring Valley mine, was discovered in 1880. It was worked periodically for a number of years but was finally closed

Plate 4. Mill at Silver Hill Mine

in 1893. In 1896 some testing was done in the placer deposits along a small creek on the property. Prospecting was also carried out in a quartz vein on the west side of the creek. Two shafts were opened to a depth of 210 feet and the other opened to a depth of 80 feet. Levels were run from each shaft. In 1969 workings were visible in the stream and on the hill. Only one shaft was open, the others having been filled in.

Geology: The mine was opened in quartz veins enclosed by a rhyolitic crystal tuff. The vein consists of milky quartz with veinlets or stringers of galena with minor sphalerite and pyrite. In places, the quartz is brecciated, mylonitized and healed with metallic minerals, sericite and silica. Malachite, chalcocite, chalcopyrite and calcite are also present in the quartz.

The dumps consist primarily of a fine-grained felsic tuff composed of quartz and sericite with abundant disseminated pyrite and sphalerite with minor chalcopyrite and covellite, novaculite (?) containing sphalerite, galena and pyrite, with covellite and covellite coatings, and altered andesitic greenstone composed of chlorite, muscovite and quartz. Some of the novaculite has been bleached white and is sheared and fractured. The mine was never a large producer, primarily due to the difficulty in separating ores.

FRANKLIN COUNTY

Slate belt rocks, primarily chlorite and sericite phyllites, argillites and felsic tuffs, are exposed in Franklin County along the southeastern and northeastern Franklin-Nash County line (figure 1). Most of the county is underlain by granitic rocks, ranging in composition from biotite granite to biotite-quartz monzonite. These granitic rocks are the northern extension of the "Rolesville granite" pluton (Stuckey, 1965, p. 115) and are bordered to the west and north by biotite and hornblende gneisses and schists.

Gold prospecting was carried out along much of the eastern edge of Franklin County, but the only extensively developed mine was the Portis mine.

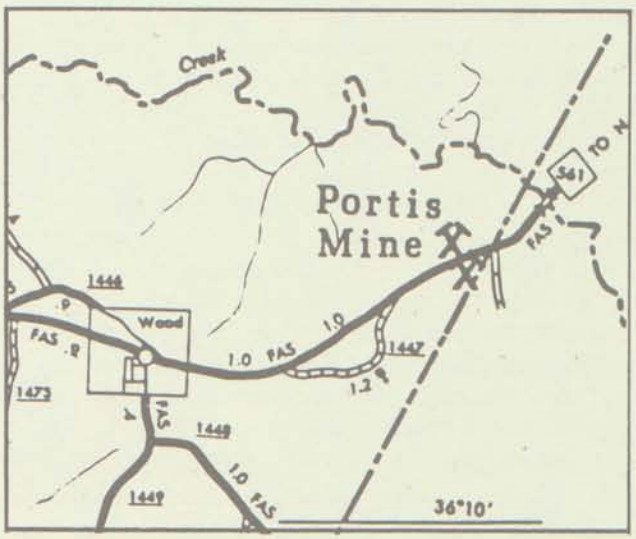


Figure 6. **Portis Mine, Franklin County**

Portis Mine (AuM)

Location: The Portis mine, in northeastern Franklin County, is 2.4 miles northeast of Wood and 0.4 mile due west of the Franklin-Nash County line. From the Franklin County line, travel 0.3 mile south on N. C. Highway 561 and then turn right onto a dirt road. Follow the dirt road for 0.17 mile to the workings. There are also some workings southeast of N. C. Highway 561.

Workings: Gold was first discovered at the Portis mine around 1835, and the mine became the most productive gold mine in the eastern gold belt. There were three main periods of activity. The first period was between 1835 and the Civil War, the second period was in the 1880's, and the third was in the 1930's when the Norlina Mining Company developed the property. Total production has been estimated at between several hundred thousand to more than 9 million dollars. Most of the production came from the hydraulicking of 15 to 30 feet of surface material. In the spring of 1935, the

Norlina Mining Company began development work at the mine and erected a mill, but little production was reported.

In 1966, there were two shafts filled with dirt to within 20-25 feet of the surface. An old dry pond and cut and spoil banks also remained. Southeast of the highway, much of the area appears to have been hydraulicked, and the foundation of a building remains.

Geology: The country rock at the mine is deeply weathered schist into which two sheets or sills of diorite or granodiorite have been intruded. The sills dip to the west at about 25 degrees. The sills and their dike-like off shoots are extremely weathered to a soft, light-gray clay-like mass of granular quartz and kaolin. The saprolite and the weathered sills are crosscut by gold-bearing quartz veinlets. Weathering and erosion of this zone concentrated the gold in the surface layer and in valleys which were sluiced and hydraulicked.

GRANVILLE COUNTY

Most of Granville County is within the slate belt (figure 1). The slate belt rocks consist predominantly of interbedded pyroclastic and epiclastic types. In places these rocks have been metamorphosed to phyllites and schists. Near the center of the county is a series of intrusive igneous rocks consisting primarily of hornblende gabbro, diorite, gabbro-diorite, tonalite, adamellite and granodiorite (Hadley, 1973). Triassic sediments crop out in the southern part of the county. Muscovite and biotite gneisses and schists and hornblende gneiss occupy the extreme southeast corner.

Most of the metal mining in this county has been associated with copper occurrences in rocks of the Virgilina district, which extends through the northwest portion of the county. Chromite has been prospected in ultramafic bodies in the southeast portion of the county.

The Virgilina District

The Virgilina district occupies an area about 22 miles long and 18 miles wide in northwest Granville and northeast Person counties (figure 7). The district extends 50 miles into Virginia. Copper was first discovered in the district about 1852 on the land of William Gillis, later to become the Gillis copper mine. This was one of the first copper deposits to be worked in the United States. There has been little activity in the district since about 1918.

The copper deposits occur in an area mapped by Laney (1917) as Virgilina greenstone or altered andesitic tuffs and flows. The "ore" minerals, chalcopyrite, bornite, chalcocite, cuprite, malachite, azurite, silver and gold, are in quartz veins enclosed by country rock that has been sheared to schist or phyllite. Gangue minerals commonly associated with the veins include limonite, pyrite, chlorite, sericite, epidote, calcite and specular hematite.

Most of the veins trend from N. 30° E. to N. 10° W. and in most cases follow the schistosity of the country rock. The veins are steeply dipping and usually pinch and swell along strike. Most veins average about 3 feet in width but may be as wide as 10 feet.

Blue Wing Mine (CuM)

Location: The Blue Wing mine, in northwestern Granville County, is 1.3 miles south of the town of Virgilina and 6.7 miles northwest of Oak Hill. From the intersection of SR 1332 and SR 1331, go 0.75 mile west-northwest on SR 1332 to the Blue Wing Baptist Church. From the east entrance of the church parking lot, an abandoned dirt road bears right (northeast) away from the parking lot, 50 feet north of SR 1332. Follow the dirt road N. 25° - 30° E. for 1720 feet to the mine.

Workings: The mine was discovered in the early 1890's and was prospected sporadically from 1895 until 1909. The most important work was carried out in the latter part of 1909 with about 3,000 tons of 2 to 3 percent copper ore shipped. During this period, the shaft reached a depth of 360 feet and 400 feet of new drifts were driven giving a total of 1700 feet of drifting. Three prospect shafts were also opened.

In 1942, the U. S. Bureau of Mines conducted exploration on the property by cutting 368 feet of trenching, drilling 637 feet of core and carrying out a resistivity survey. The drilling did not intersect the main vein and the resistivity profiles indicated that the foot wall of the vein was free of quartz veins for about 1.50 miles.

The visit to the property in 1966 found three or four shafts in a line trending N. 12° E. The southernmost shaft, the main haulage shaft, was choked shut about 12 feet below the surface. The dump comprises 0.5 to 1 acre west of the shafts.

Geology: The Blue Wing mine was opened in a quartz vein enclosed by chlorite-quartz-mica schist which seems to have been formed from a rhyolitic or andesitic flow or tuff. The schist strikes N. 30° E. and dips 60° - 70° southeast. The vein consists of milk quartz that was brecciated and healed. Quartz, calcite and chlorite stringers cross-cut the country rock.

The ore consists of bornite and chalcocite with minor amounts of malachite and cuprite. The gangue is primarily quartz, calcite, feldspar, chlorite and sericite with limonite after pyrite. Near the west side of the dump is a pile of massive sulfide ore that has been oxidized. This material is composed of quartz disseminated through massive pyrite and pyrrhotite with possibly some chalcopyrite. (This material is dissimilar to the other dump

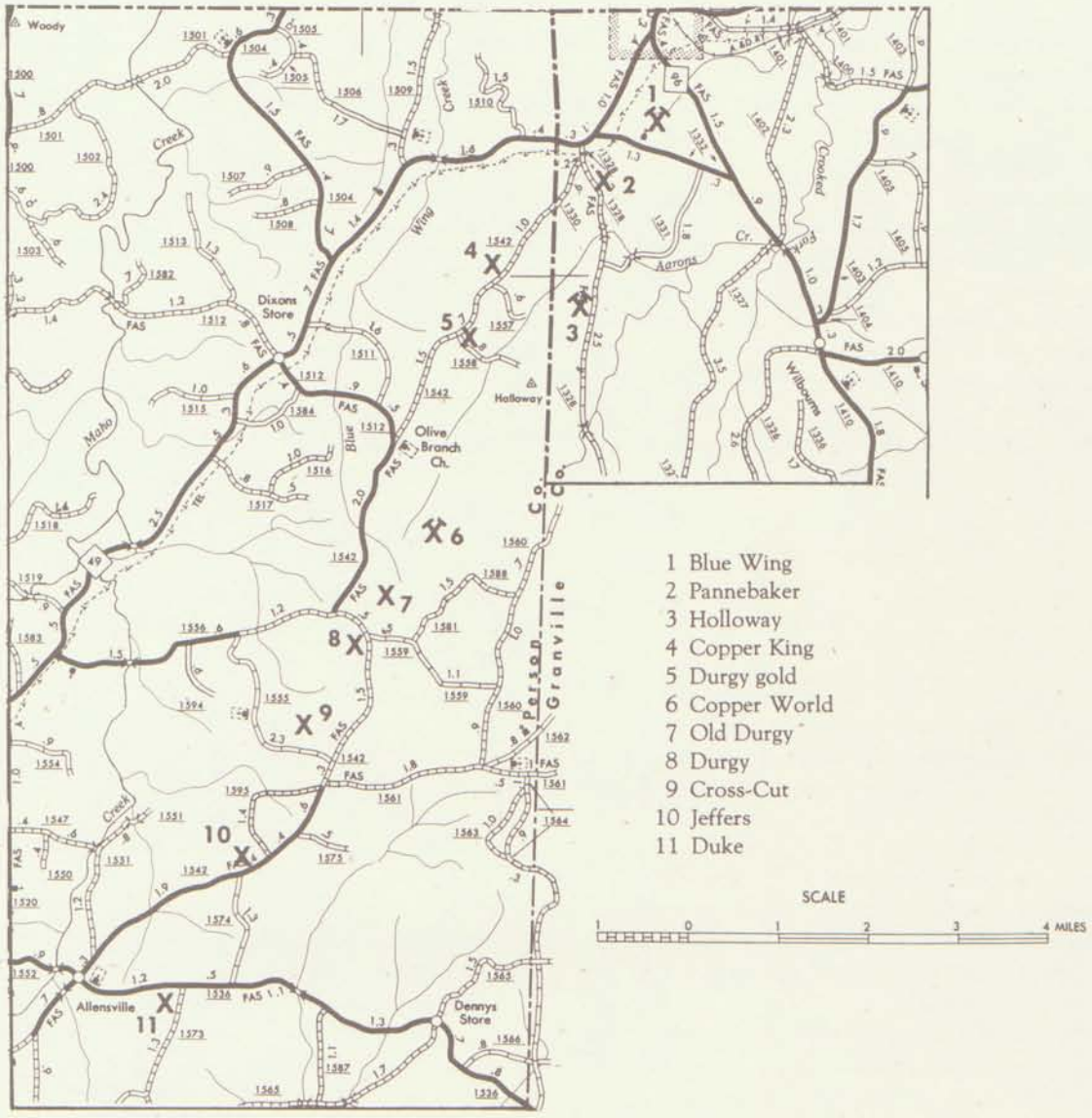


Figure 7. **Virgilina District, Person and Granville Counties**

material and may not be from this mine.)

Laney (1917, p. 108) listed the ore minerals in order of abundance as bornite, chalcocite, malachite, azurite and argentite (?). As in other mines in the district, the ore minerals are intimately intergrown with the gangue. The ore was described as occuring in shoots that have a pitch of about 65° in a vein that varies in thickness from 2 to 6 feet.

Chromite Prospect (CrP)

Location: A chromite prospect is in southeast Granville County on the property of Mr. Leonard Perry, 1.5 miles northeast of Wilton and 5.2 miles north-northwest of Pokomoke. To reach the prospect go south on SR 1623 for 0.1 mile from the intersection of SR 1623 and SR 1630. Turn left (south) and follow a dirt road trending south through the woods and into an open field. The prospect is in a patch of trees in the field.

Workings: The prospect consists of a pit approximately 25 feet long and 6 feet deep. The property was leased by W. H. Daniel of Rocky Mount, and in 1952 a magnetic survey was conducted by H. W. Straley, Jr. The Southeastern Drilling Company of Asheville drilled a 265 foot deep hole inclined at 50° N. 75° W. It is reported that little chromite was encountered in the core. Broadhurst (1955, p. 13) reported that an evalua-

tion of chromite from the Perry property and from an area in northern Wake County averaged less than 30 percent Cr_2O_3.

Geology: The chromite occurs in a small ultramafic body approximately 0.4 mile long and 0.1 mile wide. The exact relationship of chromite to the ultramafic body, whether occurring as dissemnination or stringers, could not be determined from surface information. Several other ultramafic bodies in the area contain chromite, but there is no record of prospecting in those bodies.

Holloway Mine (CuM)

Location: The Holloway mine is in northwestern Granville County, 3.5 miles south-southwest of the town of Virgilina and 5.5 miles northwest of Oak Hill. To reach the mine, travel 0.5 mile south on SR 1328 from the intersection of SR 1328 and SR 1331. Then go 400 feet N. 80° W. to the mine, behind the home of James Murray.

Workings: Copper was first discovered on the Holloway property in 1880 and a prospect pit was opened to expose the vein. A small amount of development was done in 1884 and from that time until 1897 no important development was carried out. Following that period, the most important work was undertaken at the mine. By 1901, mining had reached a depth of 440 feet. These operations ceased in 1903, and little work of importance has been done since that time. Much of the dump material was shipped to the Eustis smelter in Norfolk, Virginia, as early as 1899, and later, in 1909 and 1910, the remainder of the dump was used for macadam and railroad ballast.

Five shafts were sunk on the property, but only one shaft was developed to any extent. This inclined shaft, the No. 1, was 450 feet deep with 1,800 feet of drifting. In 1966, four shafts were located. The southern shafts were choked shut to within 10 to 15 feet of the surface, and the northern shafts were open. A large amount of dump was present. There appears to have been no activity in recent years.

Geology: The country rock is an altered volcanic rock, probably a rhyolite or andesite, that has been sheared, chloritized, sericitized and epidotized. Quartz, calcite, epidote and orthoclase feldspar stringers have been shot through this rock which may have at one time been selvage along a pre-existing fault.

There is quartz monzonite on the dump. The quartz monzonite, seemingly unaltered, contains minor amounts of chalcocite (?) and possible bornite (?) and could be the source of the copper metallization at the Holloway mine. Massively epidotized granite-quartz monzonite dikes (?) with bornite (?) and malachite are present. The bornite appears disseminated but may be confined to healed fractures.

Silicified mylonite (?) with epidote, quartz, malachite and malachite-azurite stained quartz, also with some sericite, is on the dumps. Quartz vein ore appears to be mostly chalcocite with covellite intermixed and coating chalcocite. The secondary ore minerals are malachite and azurite. The metallization seems to be hydrothermal in origin.

Laney (1917) stated that the country rock represents the tuffaceous and porphyritic phases of the Virgilina greenstone. The rock trends N. 20° - 35° E. and dips 70° - 80° southeast. Two veins were described on the property one striking N. 15° W. and the other striking N. 5° E. Most of the work was carried out in the first vein. Ore minerals described by Laney included chalcocite, bornite, malachite, azurite, argentite (?), cuprite, native copper and native silver, and all were described as being complexly intergrown. Chalcocite was the most abundant ore mineral.

Pannebaker Prospect (CuP)

Location: The Pannebaker prospect is in northwestern Granville County, 2.1 miles south-southwest of the town of Virgilina and 6.5 miles northeast of Oak Hill. The pit is located 50 feet N. 35° - 40° E. from SR 1328, 0.23 mile south-southeast of the intersection of SR 1328 with SR 1330.

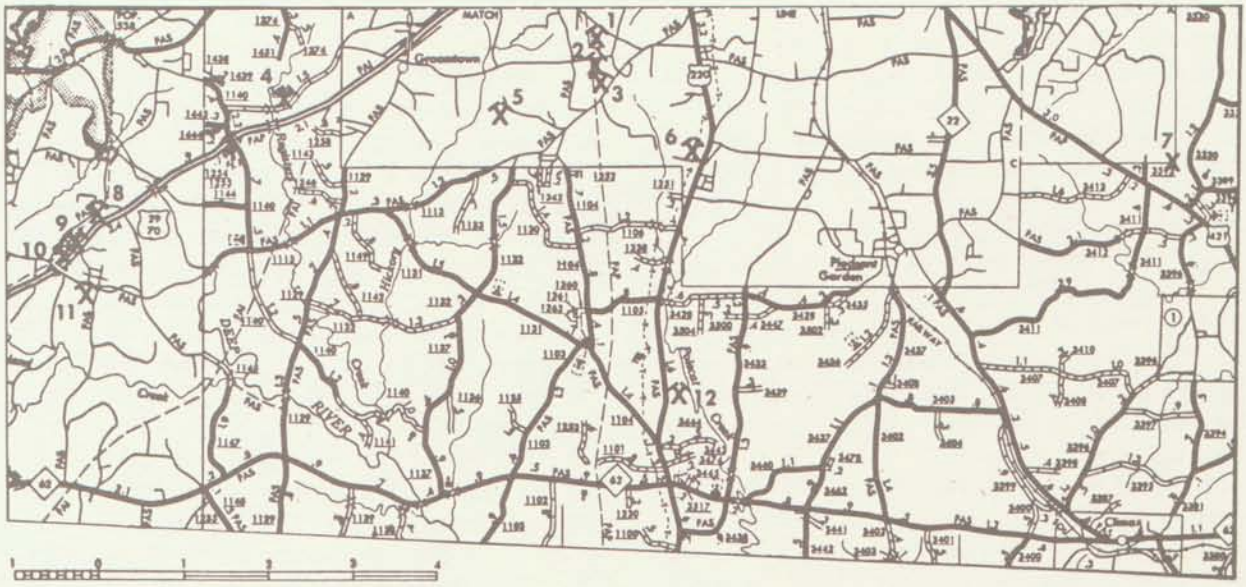
Workings: These prospects were opened in the summer of 1907 by Mr. W. M. Pannebaker. In 1966, all that remained was one 15 foot by 15 foot by 5 foot pit. Several other Pannebaker prospects are known but could not be located.

Geology: The prospects were opened in sheared, chloritized, sericitized, banded felsic tuff or possibly bedded argillite or graywacke. No metallization was observed during the present investigation. The prospects were reportedly (Laney, 1917, p. 155) opened in copper-stained, epidotized country rock. Native copper and cuprite were present but no sulphides were noted. The native copper occurred mainly as thin plates in planes of schistosity in the country rock and as irregular grains and elongated areas in quartz and epidote.

GUILFORD COUNTY

Guilford County lies mostly within the slate belt, except for the northwest corner of the county (figure 1). Much of the county is underlain by igneous rocks, primarily granitic-type rocks (in places porphyritic) and diorite. Granite in the southeastern half of the county is normally sheared and occasionally gneissic. Volcanic rocks crop out in irregular patches and have been metamorphosed to chlorite and sericite schists and phyllites. Rocks of the Charlotte belt, consisting predominantly of quartz-mica gneisses and schists, crop out in the northwest corner of the county.

The metal mines, primarily gold-copper deposits, are in the southern portion of the county (figure 8). These



1 Fisher Hill
2 Millis Hill
3 Pucket
4 Gardner Hill
5 Beard
6 Hodges Hill
7 Pine Hill
8 Jacks Hill
9 North State
10 Lindsay
11 Deep River
12 Fentress

Figure 8. **Guilford County Deposits**

deposits are located in quartz veins within the igneous bodies.

Beard Mine (Au, CuM)

Location: The Beard mine is in southern Guilford County, 6.9 miles southwest of Greensboro and 4.2 miles east of Jamestown. To reach the mine, travel 0.75 mile west-northwest on SR 1128 from the intersection of SR 1128 and SR 1113, then go 300 feet S. 40° W. to the mine.

Workings: There has been little recorded concerning the workings of the mine, but it was apparently active prior to 1856. During the present investigation, two choked shafts partially filled with water were located. Numerous other pits and a large dump remained.

Geology: Mining was carried out in a quartz vein containing bornite, chalcocite, chalcopyrite and pyrite (auriferous?). The vein is bordered by a sericite selvage, and sheared quartz monzonite or granodiorite forms the country rock. Calcite fills fractures in the country rock, and some malachite is also present.

Gangue minerals in the vein include siderite, specularite, pyrite and chlorite. Fractures in the pyrite have been filled with clear quartz.

Deep River Gold Mine (Au, CuM)

Location: The Deep River mine, in southwestern Guilford County, is 11.3 miles southwest of Greensboro and 4.2 miles east of High Point. The mine is located on the east side of a private farm road, 0.15 mile due south from the intersection of SR 1113 with SR 1153.

Workings: The Deep River mine was apparently active around 1895, but operations ceased in 1905. The main shaft was 200 feet deep with levels and cross-cuts driven to the vein at 80 feet and 100 feet. The workings in 1966 consisted of a series of north-northeast-trending pits and choked shafts.

Geology: The country rock is a gneissic biotite granite

or quartz monzonite. Mining was carried out in a milky-quartz vein containing magnetite, siderite, chlorite and sericite. The selvage along the vein is bleached, sericitized, chloritized and silicified. The country rock is sheared next to the vein and in places the vein is sheared. Some of the fractures in the quartz are filled with siderite. A small amount of malachite was noted in one sample of country rock.

Pratt (1907, pp. 37-38) described the vein as ranging from 18 inches to 12 feet in thickness and averaging about 8 feet. The vein dipped at 45° (direction?) and contained chalcopyrite, pyrite, limonite and gold. A second vein some thousand feet north of the first was also mentioned, and an inclined shaft was opened in this vein. This vein also dipped 45°. The vein was reported to yield $10 a ton with concentrates of $40 to $60 a ton.

Fentress (North Carolina) Mine (Au, CuM)

Location: The Fentress mine is in southern Guilford County, 9.3 miles south of Greensboro and 8.1 miles southeast of Jamestown. To reach the mine, go 1.15 miles south on U. S. Highway 220 from the intersection of U. S. Highway 220, SR 1105 and SR 3428. Turn east (left) and go east-northeast for 0.2 mile to the mine workings.

Workings: The Fentress mine was originally opened prior to 1853 as a gold mine, but at a depth of approximately 50 feet, copper sulphides were encountered. The deposit became the first copper mine in the State. Up until 1855, the mine had produced $133,000 of ore. It has been idle most of the time since 1865, except for the period 1901-1907 when $26,000 of ore was produced. Total production through 1935 has been estimated at $175,000.

Three main shafts were opened at the mine. The Engine shaft was opened to a depth of 400 feet with four levels totaling 300 to 500 feet in length. When visited in 1966, three shafts were visible. Some exploration was being carried out in 1971 by H. T. Jackson and Bill O'Daniel who formed the Irish Mining and Exploration Company. Two diamond drill holes were put down, and the vein was intersected below the old workings.

Geology: The country rock is medium- to fine-grained altered and sheared diorite. A brownish-black to brick to reddish-brown gossan is in brecciated milk quartz. The gossan contains coarse boxwork structure. The vein quartz contains brown and yellow siderite, limonite, chlorite and sericite. Ore minerals are auriferous pyrite, chalcopyrite, minor malachite and traces of chalcocite, covellite and cuprite.

The sulphides are primarily confined to fractures in quartz and siderite. One specimen of quartz had siderite along both walls and siderite veinlets in the selvage as well as siderite in what appear to be fractures in quartz. The sulphides seem to be replacing the siderite. The selvage is composed of quartz and sericite with quartz veinlets. Antlerite or brochantite stain is in some cavities.

Earlier reports state that the vein strikes N. 25° E. and dips northwest at 36° to 60°. At the southwest end of the vein, the ore body was 3 to 4 feet thick at a depth of 40 feet, and at the northeast end, it was 3 feet thick at a depth of 55 feet. At a depth of 310 feet, the vein was from 7 to 13 feet wide, but copper values did not increase. The sulphides shifted in location within the vein and were unpredictable as to their location. In 1855-1856, 1,400-1,500 tons of 14 to 23 percent copper ore was shipped. Pratt (1907, p. 38) stated that the vein consisted of numerous stringers in altered and decomposed granite.

Fisher Hill Mine - Millis Hill Mine - Pucket Mine (Au, CuM)

Location: The Fisher Hill mine is located in southwest-central Guilford County, 5.4 miles south-southwest of Greensboro and 6.1 miles east of Jamestown. The mine can be reached by travelling 0.2 mile northwest on SR 1117 from the intersection of SR 1117 and 1115, then go 250 feet south-southwest to the mine.

The Millis Hill mine is 0.4 mile south of the Fisher Hill and is on both sides of SR 1116, 0.19 mile west of the intersection of SR 1115 and SR 1116. The Pucket mine is approximately 1000 feet S. 18° E. from the Millis Hill mine.

Workings: The Fisher Hill, Millis Hill and Pucket mines were originally located on a mining tract comprising 900 acres. The Fisher Hill property was worked as early as 1856. Little has been written concerning the workings at these mines but Kerr and Hanna (1893, p. 279) stated that the Millis Hill consisted of four shafts of much shallower depth than those at the Fisher Hill. Four levels were run from the main shaft.

In 1966 at the Fisher Hill mine, there remained many pits and shafts choked or filled with debris to within a few feet of the surface. The main workings appear to trend north-south and are considerably overgrown. The Millis Hill workings are due south of the Fisher Hill and in 1966 were also overgrown. Three small pits remained at the Pucket mine and these were filled with trash and debris.

Geology: There is reported to be a total of 15 quartz veins on the property with two major groups, one group trending north-south and the other trending northeast-southwest. The north-south group was apparently the most extensively worked. The two Hill veins were reported to dip at 15° to 20° (direction?), and the ore body varied from 4 inches to 10 feet in thickness. Copper content was said to increase to the south with the Fisher Hill carrying the least copper and the Pucket carrying the most.

The country rock is quartz monzonite or granite which is foliated in places and contains disseminated bornite (?), chalcocite (?), and magnetite, at times altered to hematite. There is lineation of the biotite in the granite which could indicate shearing. Some of the granite that shows definite lineation of biotite is fine grained with saccharoidal quartz and feldspar, indicating deformation after cooling (some specimens grade into coarse-grained lineated granite so it could be a cooling effect near the contact with the country rock).

In places, the quartz veins are sheared and brecciated and are healed with chlorite and sericite, with the chlorite altering to hematite and limonite; there is also secondary manganese coating on the quartz and iron oxide. Secondary quartz crystals are in vugs in limonite. Pyrite has been introduced along with quartz in fractures of the quartz vein. The pyrite has been fractured and altered to hematite with some silicification (?). Bornite along fractures in the quartz vein seems contemporaneous with the pyrite. The bornite appears to be altering to covellite. Some chalcopyrite is present as blebs in fractures. A selvage of quartz, sericite, limonite and hematite after chlorite is present. Specularite is in the quartz vein.

Gardner Hill Mine (Au, CuM)

Location: The Gardner Hill mine is in southwestern Guilford County, 8.1 miles southwest of Greensboro and 2.6 miles east-southeast of Jamestown. To reach the mine, travel 0.8 mile west-southwest on SR 1383 from the intersection of SR 1383 and SR 1365. Go 0.2 mile S. 80° W. on the road to the Modern Garbage Service dump. The mine is being covered by the dump.

Workings: The mine was most productive during the period prior to 1856, and little work has been done since that time. Emmons (1856), estimated that by 1854, $100,000 in gold had been produced. The ore yielded about 1 ounce per ton, and the sulphide yielded as much as 30 percent copper. During peak production, 40 tons of copper ore averaging 20 to 25 percent copper were shipped per week.

Six shafts were opened in the property including the Creek shaft, 110 feet deep; the Underlay shaft, 175 feet deep; the Old Engine shaft, 175 feet deep; the New Engine shaft, 258 feet deep; the No. 2 shaft, 110 feet deep; and the White Oak shaft, 150 feet deep. There were four levels averaging 500 feet in length. The gold ore was free milling to a depth of 60 feet, at which point copper sulphide was encountered. After this, little attempt was made to recover gold. Some development work was carried out in 1914 and 1920. In 1934, the mine was unwatered, and a Brunton compass survey was made of the 95-foot level.

In 1966, little could be seen of the workings due to the mine being partially covered by a garbage dump. Some of the workings weren't covered and a small amount of dump material from the mine remained.

Geology: The mine is located in an area underlain by coarse- to fine-grained diorite and granite or granodiorite. Mining was in a milky quartz vein containing chlorite, sericite, specularite, magnetite and limonite. Next to the vein, the country rock is altered and sheared. Ore minerals include auriferous pyrite, chalcopyrite and malachite. Sulphides appear as blebs and crystals in quartz and are minor to the amount of gangue. Chlorite and sericite are incorporated into the quartz and often fill fractures and shears. Some large terminated quartz crystals are completely surrounded by sulphide.

Earlier reports described the main vein as striking N. 20° E. and dipping westerly. The vein is rarely more than 3 feet wide. Three veins were reported on the property. One vein was completely worked out, and little is known about a third, smaller vein.

The Brunton survey in 1934 showed the vein to be striking N. 20° E. and dipping 20° to 25° NW. The size of the stopes indicated that the ore bodies were 1 foot to 6 feet or more in thickness, and one of them was 60 to 120 feet long and 270 feet or more in depth. Parts of the vein remaining in 1934 were 1 to 7 feet in width.

Hodges Hill (Hodgins) Mine (AuM)

Location: The Hodges Hill mine is in southern Guilford County, 6.5 miles south of Greensboro and 7.4 miles east of Jamestown. The mine is located by turning onto a farm road west of the intersection of U. S. Highway 220 and SR 3430. Follow the road for approximately 1300 feet to the mine.

Workings: The Hodges Hill vein was worked along its outcrop length for 800 to 900 feet. In 1966, two shafts were present, one of which was 12 feet by 12 feet and filled to the surface with trash. The other shaft was 6 feet by 6 feet and filled with water to within 2 feet of the surface. The workings were considerably overgrown. A portion of a Chilean mill remained.

Geology: Mining was carried out in a 6-inch to 12-foot wide quartz vein that is essentially horizontal. Quartz monzonite forms the country rock and contains disseminated bornite, chalcocite and pyrite. Minerals present in the milky vein quartz include siderite, limonite, malachite, pyrite and a silicified manganese oxide. In places, the siderite, manganese oxide and pyrite heal fractures in the quartz. Chalcopyrite is also reported to be present.

Jacks Hill Mine (Au, CuM)

Location: The Jacks Hill mine is in southwestern Guilford County, and is 0.45 mile north-northeast of the North State mine. The mine is 10.6 miles southwest of Greensboro and 1.8 miles south of Jamestown. The mine is 100 feet east of SR 1352, 0.1 mile south of the intersection of SR 1352 and SR 1145.

Workings: The Jacks Hill mine is the northern extension of the North State mine. A shaft was sunk here on the top of a hill to a depth of 75 feet. At the point where the shaft intersected the vein, the vein was 17 feet thick. The shaft was choked and caved in 1966 and only minor dump remained.

Geology: This mine is in the same structure and lithology as the North State and Lindsay mines, and the reader is referred to those descriptions for details.

Lindsay Mine (Au, CuM)

Location: The Lindsay mine is in southwestern Guilford County, 0.15 mile south-southwest of the North State mine. The mine is 11.3 miles southwest of Greensboro and 3.9 miles east of High Point. To reach the mine, go 0.25 mile east of the intersection of SR 1352 and SR 1353 and to the point where Interstate 85 and SR 1353 intersect.

Workings: The Lindsay mine is the southern extension of the North State mine. At least four shafts were sunk on the property with the South shaft No. 2, opened to a depth of 100 feet, being the most important. Other shafts were sunk to depths of 90 feet, 150 (+) and 110 feet. A series of 87 assays taken from all parts and classes of ore ranged from $4 to $100 per ton. In 1966, the main shaft was covered over, owing to highway construction. Three choked shafts or pits were at the southwest end of the workings.

Geology: The mine was opened in an area of biotite granite, which is in places gneissic. The granite contains chlorite and biotite with some epidote forming dark bands. Orthoclase near these bands have alteration rings around the crystals and epidote is, in a few specimens, in the center of the crystals. Pyrite has been deposited in fractures in the granite.

The vein quartz is clear to milky and brecciated. Minerals most commonly associated with the vein include siderite, specularite, chlorite, limonite, hematite, calcite and malachite. In some portions of the vein, pyrite, minor arsenopyrite, chalcopyrite, chlorite, malachite and azurite coatings, siderite and limonite are most abundant. Brochantite or ankerite coats some pyrite and chalcopyrite. Minor sericite and epidote also are in the vein.

The selvage is composed primarily of chlorite with clay minerals, ankerite, sericite, limonite and epidote. Some quartz in the selvage is granular. Shears and slickensides in the selvage are coated with hematite.

North State (McCullough) Mine (Cu, AuM)

Location: The North State mine, in southwestern Guilford County, is 11.0 miles southwest of Greensboro and 4.1 miles east of High Point. The mine is located 0.1 mile due east of the end of SR 1410, 0.2 mile east of the intersection of SR 1410 and SR 1352.

Workings: The mine was worked prior to the Civil War with nearly $35,000 in gold and more than $10,500 worth of copper being produced between March and November, 1854. Total production is estimated at $125,000. The deepest shaft was sunk to 350 feet with several thousand feet of underground workings. Two other shafts were sunk to depths of 200 and 240 feet. Little work has been done since 1860, except in 1883 when the old mine dumps were worked. This work was abandoned in 1885. In 1966, there were three filled shafts trending in a line N. 35° E.

Geology: The veins on the property were described in earlier reports as being 2 feet to 24.5 feet wide and containing streaks of "brown ore" 6 inches thick and rich in gold. In general, the major portion of quartz was poor in gold. The vein dipped to the southeast at about 45° -80° Gold was most abundant to a depth of 50 feet, and copper was the primary ore between 50 feet and 100 feet. The ore occurred in shoots and pockets. The vein at the surface was 2 feet wide increasing to 24.5 feet wide at the 130-foot level and decreasing to 4 to 8 feet at a depth of 325 feet. To the southwest, the vein runs into the Lindsay mine and to the north into the Jacks Hill mine.

An examination of the dump material in 1966, showed that the country rock is a biotite granite or granodiorite containing blebs of pyrite and minor amounts of phlogopite. The vein quartz contains slickensides of sericite and chlorite. Pyrite is primarily concentrated in quartz and along the contact between the quartz and selvage. Pyrite is also along fractures in the quartz and is associated with chlorite and large amounts of honey-colored siderite. Specularite altering to red hematite and limonite occurs in the vein. The ore appears to be a mixture of siderite, pyrite and chalcopyrite associated with sericite and chlorite.

Pine Hill Mine (AuP)

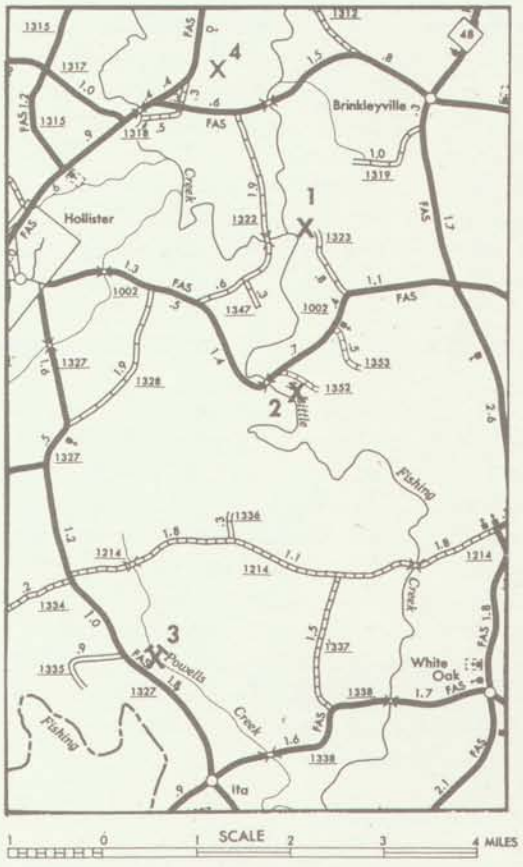
Location: The Pine Hill mine, located in southeastern Guilford County, is 8.3 miles southeast of Greensboro and 5.4 miles northwest of Julian. To reach the mine, travel 0.34 mile northwest on U. S. Highway 421 from the intersection of SR 3330 and U. S. Highway 421. Turn north (right) onto a private road and go 0.1 mile to a trailer. From the back of the trailer go approximately 250 feet to a road trending N. 40° W. and continue 550 feet along the road to the mine.

Workings: When visited in 1966, the mine consisted of a series of shallow pits trending N. 45° W. and trenches, the largest of which was 20 feet by 12 feet by 20 feet. Most of the workings were old, and apparently there was little production.

Geology: The prospects were opened in milky-quartz veins enclosed by mylonite (sheared felsic volcanic rocks). The quartz contains hematite and limonite, sometimes forming rectangular outlines. Psilomelane and

actinolite are also present in the quartz.

It is possible that the vein was originally a hornblende-quartz vein that was metamorphosed. The hornblende was altered to actinolite which in turn decomposed freeing iron, manganese and silica which formed limonite, hematite, psilomelane and quartz crystals stained with iron and manganese. The residual iron gives a gossan appearance, but in all probability there were no primary metallic minerals associated with this deposit.



1 Boy Scout-Jones
2 Moss-Richardson
3 H and H
4 Ellis

Figure 9. **Halifax County Deposits**

HALIFAX COUNTY

Halifax County is in the eastern zone of slate belt rocks (figure 1). Slate belt rocks, mica gneisses and schists crop out in the western one-third of the county, but to the east these crystalline rocks are overlain by sediments of the Coastal Plain. The slate belt rocks are intruded by a northeast-trending granite body approximately 2 miles long and one-half mile wide. Siliceous chlorite schist is common around the margin of the granite body.

Gold, lead and zinc have been obtained from quartz veins at the House mine in Halifax County, and molybdenum has been of considerable interest since about 1939, although there has been no production. The molybdenum deposits are associated with quartz veins, primarily in schist around the margin of the granite body.

Boy Scout-Jones and Moss-Richardson (Dryden) Molybdenum Deposits (MoP)

Location: The Boy Scout-Jones and Moss-Richardson molybdenum deposits are in southwestern Halifax County. The Boy Scout-Jones is 1.9 miles southwest of Brinkleyville and 3.0 miles east-northeast of Hollister, and the Moss-Richardson is 3.3 miles southwest of Brinkleyville and 3.2 miles southeast of Hollister.

The Boy Scout-Jones deposit is at the north end of SR 1323. The Moss-Richardson deposit is due south of SR 1352 and SR 1002.

Workings: The presence of molybdenite in the area was first recognized about 1935 by D. J. Smith, who was prospecting for gold. The America Zinc Company sampled the property in 1939, but their results were disappointing. Charles Mitchell dug several small trenches in the main outcrops on the Jones and Richardson properties, and Southgate Jones prospected the properties in early 1943 by digging a pit to a depth of 10 feet and sinking a shaft to approximately 38 feet. Soon after Jones' work, the U. S. Geological Survey examined the area and collected 10 samples from the quartz veins that contained 0.2 to 1.15 percent molybdenite. They recommended further sampling.

From July, 1943 until December, 1944, and from July, 1946 until December, 1946, the U. S. Bureau of Mines explored the deposits. The Bureau excavated 950 feet of trenches and drilled 32 holes totaling 7,701 feet. Samples from the trenches and drill holes were collected for assay. The results of the work indicated an estimated 549,300 tons of indicated or inferred ore with an estimated grade of 0.4 percent Mo or 0.67 percent MoS_2. In 1967 and 1968, Bear Creek Mining Company and New Jersey Zinc Company carried out exploration on the property. In 1974 the State had purchased the property, also known as Medoc Mountain, and plans were to develop the property into a State park.

Geology: The molybdenum deposits are located in a small granite body bordered by chlorite schist. The Boy Scout prospect is at the northern end of the body and the Moss-Richardson prospect is near the southern end. Molybdenite is found primarily in quartz veins, but some also occurs in the schist and granite. The schist trends almost due north and dips 60° to the west or east, except around the north nose of the body where the schist strikes eastwest and dips north.

The Moss-Richardson prospect was opened in the Dryden vein, which trends easterly and has been traced for about 1800 feet. The width averages about 7 feet, and the vein dips from 65° to 89° north. Two pits were

opened in another vein 650 feet north of the Dryden vein. This vein is about 1.4 feet wide and assayed 0.19 percent Mo at 80 feet. Drill hole samples from the Dryden vein showed a decrease in molybdenum from 0.74 percent at 88 feet to 0.15 percent at 210 feet. Other samples showed a decrease from 0.41 percent at 63 feet to 0.06 percent at 380 feet.

Numerous quartz veins occur on the Boy Scout-Jones property. There are three large veins. The Jones vein is the principal vein and is about 8 feet wide and dips 70° to the west. The Boy Scout vein can be traced for about 200 feet northwest with a dip of 70° southwest. Assays from the Boy Scout-Jones veins show a decrease in mineralization at depth. The thickness of the veins also decrease at depth.

Metallization consists of molybdenite as small stringers, segregated masses, disseminated grains or as a gray to blue coloration in the quartz. Molybdenite is also disseminated in the granite and schist. Pyrite and minor chalcopyrite are accessory minerals.

R. A. Ellis Prospect (MoP)

Location: The R. A. Ellis prospect is located in western Halifax County, 2.0 miles west-northwest of Brinkleyville and 3.7 miles northeast of Hollister. The location is approximately 1500 feet north of N. C. Highway 561 where the highway crosses Bear Swamp Creek and is on the R. A. Ellis farm. Access to the site is by a farm road which trends eastward from N. C. Highway 4 at a point approximately 0.45 mile north of the intersection of N. C. Highway 4 and SR 1318.

Workings: Seven diamond drill holes totaling approximately 4,635 feet were drilled in 1971 by Perry, Knox, Kaufman, Inc. of Tucson, Arizona.

Drill Hole	Core Footage	Core Recovered	Orientation of Drill Hole
1E	38' - 904'	866'	45° northeast
2E	92' - 427'	335'	45° northeast
3E	28' - 429'	401'	45° northeast
4E	30' - 996'	966'	Vertical
5E	65' - 652'	587'	Vertical
6E	38' - 904'	886'	Vertical
7E	Top - 614'	614'	Vertical
	Total 4,635 feet		

The cores from these drill holes are on file in the sample storage laboratory of the N. C. Division of Resource Planning and Evaluation.

The U. S. Geological Survey sampled and ran chemical and spectrographic analyses of one ten-foot interval of core #4E and three ten-foot intervals of core #5E. The results of those analyses are reported in the following tables.

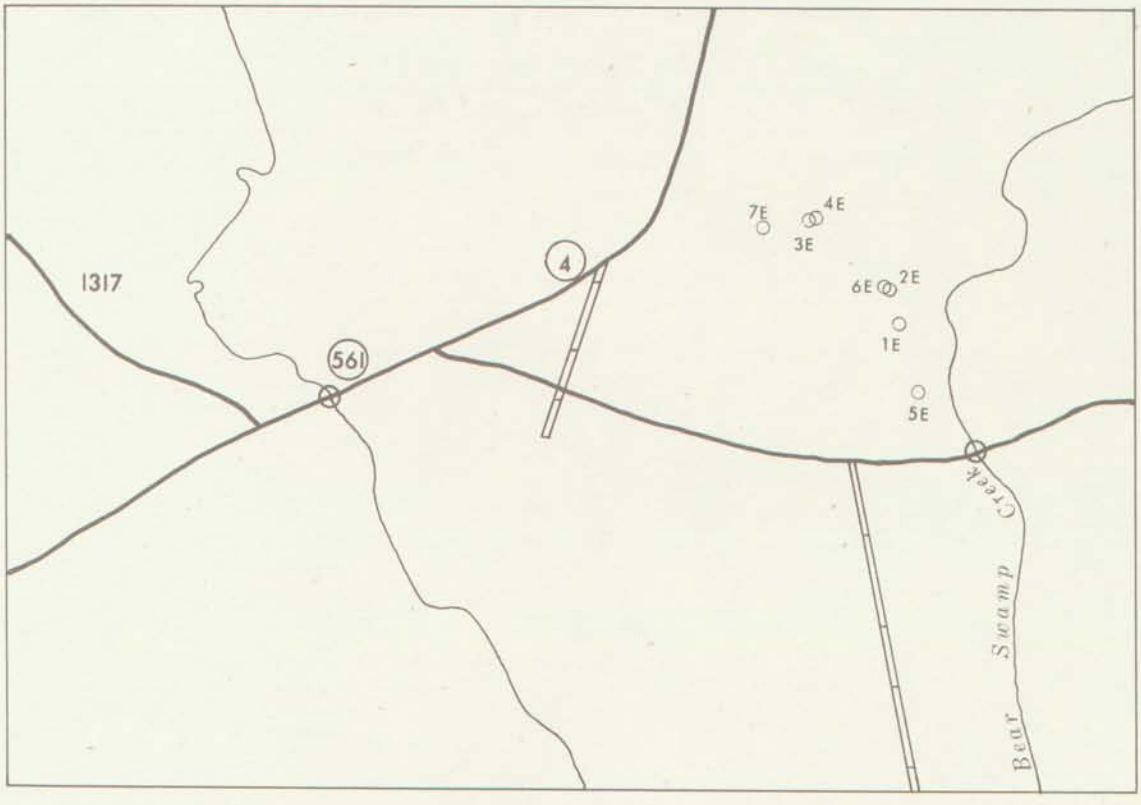


Figure 10. **Location of Drill Holes on the Ellis Property, Halifax County**

Table 3: Semiquantitative Analyses of Diamond Drill Hole Cores from Ellis Prospect

Element	Drill Hole Number and Footage		Drill Hole Number and Footage	
	#4E, 650'-660'	#5E, 550'-560'	#5E, 560'-570'	#5E, 590'-600'
Cu	330 (ppm)	180 (ppm)	130 (ppm)	260 (ppm)
Pb	10	20	15	15
Zn	25	120	110	150
Hg	.06	.06	.08	.13
W	(H) (N) (20)	(H) 80	(H) L (20)	(H) 20
Ag	L	L	L	L
Bi	N	N	N	N
Co	L	10	15	15
Cr	70	200	200	200
Mo	10	700	150	500
Ni	10	50	30	30
Sn	N	10	N	N
V	50	150	150	300
Mn	300	1000	1000	1000
Ba	300	150	150	150
Be	3	3	3	3
Sr	300	100	100	150
Zr	70	100	150	70

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Table 4: Quantitative Analyses for Selected Elements in Diamond Drill Hole Cores from Ellis Prospect*

Element	Drill Hole Number and Footage			
	#4E, 650'-660'	#5E, 550'-560'	#5E, 560'-570'	#5E, 590'-600'
Bi	0.48 (ppm)	1.6 (ppm)	0.89 (ppm)	1.1 (ppm)
Cu	250	170	23	240
Mo	3.8	1400	270	550
W	<2	6.4	10.2	21.4

U. S. Geological Survey Laboratory Report

*Bismuth was determined by substoichiometric isotope dilution technique. Copper was determined by atomic absorption spectrometry. Molybdenum and tungsten were determined by newly developed isotope dilution spectrophotometric techniques.

Table 5: Whole Rock Chemical Analyses of Diamond Drill Hole Cores from Ellis Prospect

Constituent	Drill Hole Number and Footage			
	#4E, 650'-660'	#5E, 550'-560'	#5E, 560'-570'	#5E, 590'-600'
SiO_2	76.1 (%)	62.0 (%)	62.2 (%)	60.0 (%)
Al_2O_3	11.1	13.5	13.6	14.6
Fe_2O_3	.50	4.6	3.5	3.3
FeO	1.3	4.3	4.9	4.8
MgO	.38	2.5	2.4	3.6
CaO	1.3	2.2	2.4	3.5
Na_2O	2.6	2.0	2.4	2.3
K_2O	4.0	3.7	2.6	3.1
H_2O+	.92	2.2	2.0	2.4
H_2O-	.05	.14	.10	.16
TiO_2	.19	1.0	.96	.88
P_2O_5	.07	.35	.23	.13
MnO	.08	.19	.15	.15
CO_2	.02	.04	1.1	.02
Sum	99	99	99	99

U. S. Geological Survey Laboratory Report

Results of the exploration on the Ellis property apparently did not indicate commercial quantities of molybdenum, and no additional work was carried out on the property. On April 15, 1973, information obtained from the exploration program was available for release to the public.

Geology: Drilling on the Ellis property was carried out near the contact between felsic volcanic rocks and a granitic body. Volcanic rocks along the granite contact are typically sheared, and many small faults crosscut the rocks. Portions of the volcanic rock are brecciated. Much of the volcanic rock is sericite phyllite and chlorite-sericite phyllite. The granite apparently dips beneath the phyllite since vertical drill holes in the phyllite have penetrated granite at depth. Diabase dikes have intruded both the phyllite and granite, and contacts adjacent to the dikes are normally sheared.

Quartz veins crosscut both the phyllite and granite and it is associated with these quartz veins that most of the molybdenum occurs. The molybdenum occurs as small grains, fracture coatings and veinlets most commonly in the quartz veins but also in the phyllite and granite. In places good concentrations of molybdenite are present, but these concentrations are not extensive and are not numerous.

Minor amounts of chalcopyrite are with the molybdenite, and tiny cubes of pyrite are disseminated throughout the phyllite, granite and quartz. In places the cubes become larger and more densely concentrated. Minor calcite occurs in veinlets.

Gaston ore beds (FeP)

Location: The Gaston ore beds are on the south bank of the Roanoke River, approximately 8 miles west of Roanoke Rapids. The deposits are north of N. C. Highway 158 near Summit and Thelma.

Workings: The deposit consists of two beds, only one of which was opened. The eastern bed was 18 inches to 2 feet thick at the surface and was opened by a 25 foot deep shaft. The bed was reported to widen at depth.

Geology: Specular hematite is the principal mineral in the deposit and occurs in two beds striking N. 20° E. and dipping 80° SE. The eastern bed extends to the northeast across the Roanoke River and is reported to be 8 feet thick in the bed of the river. Kerr and Hanna (1893, p. 127) described the country rock as a "gray gneissoid quartzite." The bed is also reported to outcrop 5 miles south of the river and is 3 to 4 feet thick.

H and H (House) Mine (Au, Pb, ZnM)

Location: The H and H or House Mine is in southwestern Halifax County, 4.2 miles southeast of Hollister and 4.2 miles southwest of Ringwood. From the intersection of SR 1327 and SR 1335, take the telephone line road due east for 0.2 mile. Turn onto a road trending S. 25° E. and go 0.05 mile to the mine. The mine is near Powells Creek.

Workings: Production of gold and lead was reported at this mine during the years 1953-1957. Zinc was produced in 1957. The U. S. Bureau of Mines drilled an exploratory hole on the property about 1946. In 1966,

an open pit 300 feet long and 60 feet wide was filled with water. The pit trends N. 5° W. A large dump, 100 feet by 150 feet, remains.

Geology: The country rock is silicified, sericitized phyllite that has formed from a felsic volcanic rock or argillite. Mining was apparently carried out in a quartz vein carrying epidote, chlorite and calcite as well as galena, sphalerite, chalcopyrite, bornite, gold and pyrite. Next to the vein, the country rock contains chlorite, quartz, epidote and calcite. In the vein, pyrite appears to be replacing galena and filling fractures in the quartz. Galena is in pockets along fractures in the quartz. Pyrolusite fills some small vugs and cavities and minor aurichalcite is present.

HARNETT COUNTY

Harnett County is primarily within the Coastal Plain Province (figure 1). Slate belt and higher rank metamorphic rocks are exposed only where the drainage has cut through the sedimentary veneer of the Coastal Plain. The only metallic mineral produced in the county was iron from deposits associated with crystalline rocks along the Cape Fear River.

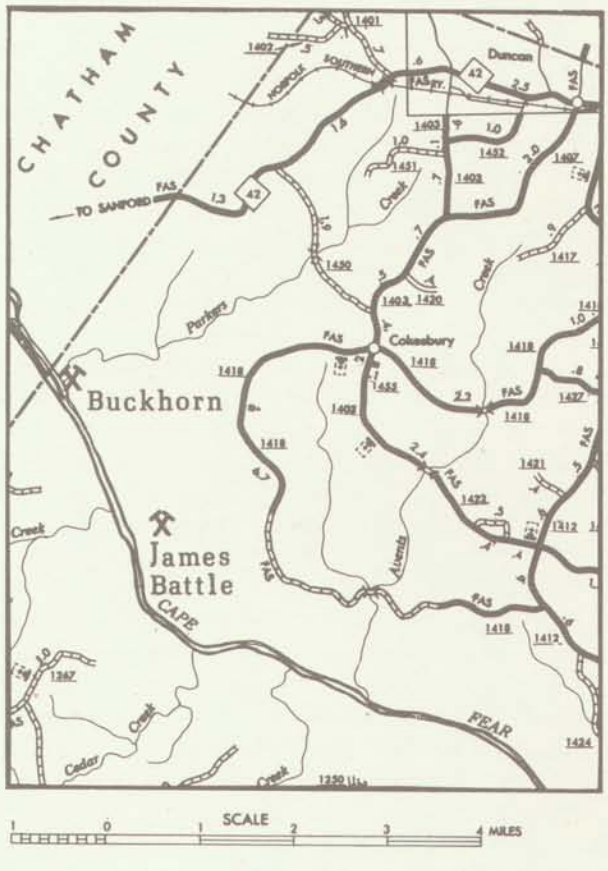


Figure 11. **Harnett County Iron Mines**

Plate 5A. Boulders of iron "ore" at the James Battle Mine

James Battle Iron Mine (FeM)

Location: The James Battle Iron mine is in northwestern Harnett County, 10.7 miles northwest of Lillington and 12.0 miles west of Angier. The mine is located by travelling 2.25 miles west-southwest on SR 1418 from the intersection of SR 1418 and SR 1403. Turn southwest (right) from SR 1418 and go for 0.9 mile to a fork in the road. At this point, take the right fork and travel S. 60° W. for 0.3 mile. From this point, the mine is located on a ridge N. 55° W. and 600 feet away.

Workings: The workings at this mine consist of an open pit covering approximately 1.5 acres. The ore was reported to terminate against a fault. The ore was carried to the Buckhorn furnace, and a considerable amount of iron was produced for the confederacy during the Civil War.

Geology: The country rock is iron-stained quartz-mica schist with mica altering to clay minerals. Minor pieces of magnetite and magnetite crystals are scattered through the rock. Some limonite is deposited on shears and disseminated through the schist. There appears to be some solution channels cross-cutting the schist. These solution channels are filled with "book" mica much larger in size than the mica in the schist (possibly pegmatite type deposition). Some of the schist is friable; other pieces are well silicified. The more silicified material appears to have a higher iron content.

An equigranular quartz-magnetite rock is composed of 50-60 percent quartz and 40-50 percent magnetite. Possibly both the quartz and the magnetite were emplaced together but more probably the magnetite was emplaced in a saccharoidal quartz vein.

Some of the quartzose iron ore has marcasite on fractures and minor smithsonite(?) or hydrozincite(?) in some of the cavities. In other specimens, iridescent lim-

onite coats fractures. Minor pyrite and sphalerite(?) have been observed in other pieces of ore. Some of the iron ore is massive, hard (4.5-5), purple-red hematite and some is specularite. There is some minor epidote in the quartz-magnetite-sericite selvage(?); also some trapezohedron-shaped garnet, cinnamon-brown in color, was observed. The deposit seems to have hydrothermal hypothermal replacement in pre-existing fault zones.

Plate 5B. Remains of furnace at the Buckhorn Mine

Buckhorn Iron Mines (FeM)

Location: The Buckhorn Iron mines are in northwestern Harnett County, 12.9 miles west of Angier and 12.2 miles northwest of Lillington. The mines are reached by travelling west for 0.7 mile on N. C. Highway 42 from the Harnett-Chatham County line. Turn onto a farm road trending S. 30° W. from Highway 42 and continue for 1.15 miles. At the private property sign, walk 380 feet N. 80° W. to a large tree near a house. From this point, walk 450 feet S. 35° W. to the canal road. The mines are 4,000 feet S. 20° E. along the canal.

Workings: The workings consist of several small pits located behind the furnaces. The original Buckhorn furnace was built in 1862 by John Colville. The furnace was a primitive stack built of logs and lined with rock and mortar. In 1873, the American Iron and Steel Company built an iron furnace that was 54 feet high and 10 feet in diameter. This furnace was in operation only three months. Pieces of iron slag from the furnaces contain some magnetite indicating poor reduction in the smelting stage. The Buckhorn mines reportedly ran out of valuable ore.

Geology: The mine was opened in a sheared quartz monzonite or granodiorite. This intrusive rock shows definite foliation with mica aligned parallel to shears. In some specimens, feldspar is altering to sericite and kaolin, and biotite and magnetite are altering to "limonite." Some magnetite has been smeared out and concentrated along shears with quartz and sericite. Some magnetite crystals are octahedral.

Altered quartz-sericite mylonite selvage with minor magnetite and "limonite" in cubic outline after pyrite(?) or octahedral magnetite is present. Minor seybertite(?), a reddish brown to copper-red brittle mica of the Clintonite group (Ford, 1958), was noted. The mylonite is friable, crumbling along shear planes to a sandy powder. Barren sheared vein quartz contains smaller fractures headed by silica and larger fractures healed by sericite.

Earlier reports describe the ore as occupying a bed, capping a hill near the river. The lower part of the bed was said to contain much manganese, occasionally occurring as thin sheets. The ore was described as being specular.

JOHNSTON COUNTY

Johnston County is at the southern end of the eastern zone of slate belt rocks (figure 1). Most of the county is underlain by Coastal Plain sediments, but crystalline rocks are exposed in the western portion of the county and in the eastern portion where the drainage has cut through the Coastal Plain sedimentary veneer. Iron was at one time mined from a deposit near the center of the county.

Figure 12. **Wilson Iron Mine, Johnston County**

Wilson Iron Mine (FeM)

Location: The Wilson mine, in central Johnston County, is 4.7 miles northwest of Smithfield and 6.8 miles southeast of Clayton. The mine is east of U. S. Highway 70 approximately 1.0 mile north of the intersection of U. S. Highway 70 and SR 1501. To reach the mine travel 0.65 mi. north on U. S. Highway 70 from the intersection of U. S. Highway 70 and SR 1501. Turn right (east) onto a farm road road beside a house. Continue 0.4 mi. across a field. Turn left (north) and go 50-100 yds. to the open cut in the woods.

Workings: The mine was worked almost continuously for the first 6 months of 1903 but was closed down when the furnaces shut down at Greensboro. A trench and a pit were at the mine in 1966. The trench strikes N. 80° W., is 170 feet long and 20 feet at the maximum width and opens into the pit.

Geology: Material in the pit consists of limonite-sericite schist, iron-stained granular vein quartz and residual limonite and hematite nodules in the soil. The ore from the mine was limonite (Pratt, 1904, p. 23) containing 49 to 51 percent metallic iron, 0.3 to 0.55 percent phosphorus, trace to 0.3 percent manganese and 4 to 18 percent silica. The ore body was reported to be large, and the mine closed only because the smelter closed.

LEE COUNTY

Much of Lee County (figure 1) is underlain by Triassic sedimentary rocks of the Sanford basin, but slate belt rocks are exposed in the extreme northwest corner and, also, along the eastern edge of the county. Coastal Plain sediments cap upland areas to the east and southeast. Copper was mined prior to 1890 from a deposit in the northwest corner of the county.

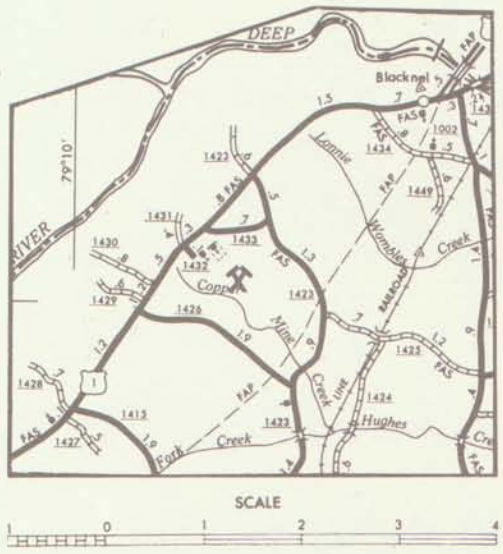


Figure 13. **Clegg Mine, Lee County**

Clegg Copper Mine (CuM)

Location: The Clegg copper mine, in northern Lee County, is 8.3 miles north of Sanford. To reach the mine, go 0.09 miles east on SR 1433 from the intersection of SR 1433 and U. S. Highway 1. Turn south (right) onto a logging road and go 2700 feet to the mine workings.

Workings: The Clegg mine was worked prior to 1890 to a depth of 200 feet. When Willard Berry visited the property in 1943, it was reported that the mine had been worked to a depth of 800 feet with drifts one-half mile long. There were four main shafts in a line trending north-south, and the main shaft was the third shaft to the south. When visited in 1968, all the shafts were caved and filled with water to within 10 feet of the surface (Plate 6). A small prospect pit north of the main workings was 20 feet in diameter and 8 feet deep. Some prospecting and core drilling were carried out in 1969 and 1970, but the results of this work are not available.

Plate 6. Mine dumps at the Clegg Mine

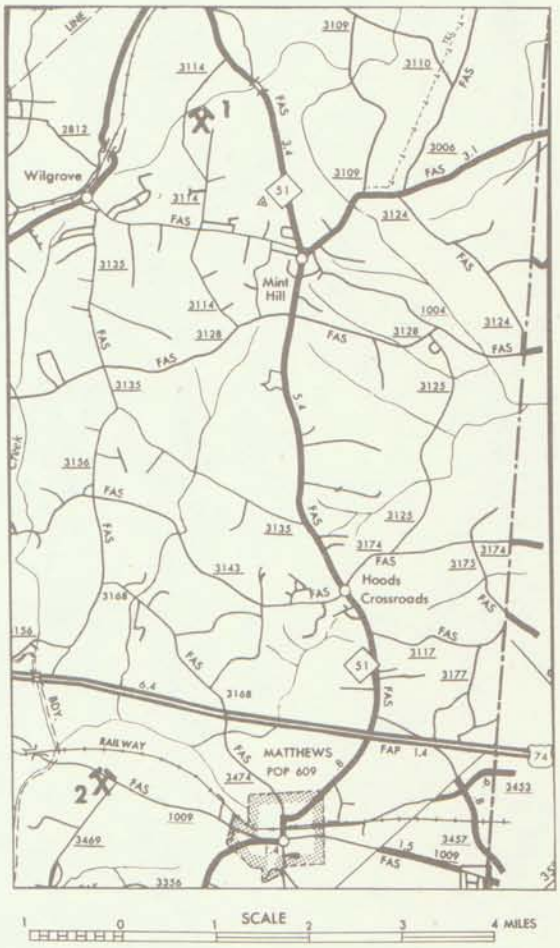
Geology: Mining was carried out in a 3 to 6 foot wide quartz vein enclosed by felsic lithic-crystal tuff and tuff breccia. In places, the tuff has been bleached and sheared and contains pyrite, chalcopyrite and bornite. Vugs in the tuff are filled with quartz crystals.

The quartz vein is brecciated in places and iron stained. Metallization in the vein consists of pyrite, chalcopyrite and bornite. Malachite and azurite are often on weathered, fractured quartz. Cuprite, limonite and chalcocite also occur as secondary minerals. The gangue includes quartz and calcite with chlorite, specularite, epidote and sericite. Bornite occasionally encloses and fills fractures in pyrite. Kerr and Hanna (1893, p. 213) stated that a fault displaces the vein to the east about 25 feet. Except for this displacement, the vein was regular in strike and the dip was vertical.

MECKLENBURG COUNTY

Mecklenburg County lies near the southwestern border of the slate belt (figure 1). With the exception of the metavolcanic rocks in the eastern corner of the county, the county is entirely within the Charlotte belt. Mecklenburg County probably contains more inactive gold mines than any other county in the State, but because most of the county is within the Charlotte belt,

few of the mines were included in this report. Because of the widespread growth of Charlotte and the surrounding areas, most of the remains of the old mines in this county have been destroyed.



1 Surface Hill
2 Ray

Figure 14. **Eastern Mecklenburg County Mines**

Ray (Rhea) Mine (AuM)

Location: The Ray mine is located 8.3 miles east of Charlotte and 2.1 miles west of Matthews. The mine is 200 yards southwest of the intersection of SR 3469 and SR 1009. To locate the mine, travel 0.1 mile southwest on SR 3469 from its intersection with SR 1009 and turn west (right) onto a dirt road. Follow the dirt road 0.2 mile to the mine on the south side of the dirt road.

Workings: Five veins are located at the Ray mine. The most extensively worked is the Ray vein which has been opened by six shafts, the deepest of which is 250 feet. Most of the veins form narrow ridges, and numerous pits and trenches trending east-west have been opened along the ridges. In 1970, all of the shafts were choked and little dump material remained. Vegetation was thick around the mine.

Geology: Little information is available concerning the geology at the Ray mine. The mine was apparently opened near the contact between felsic tuff and granite. The ore seam at the Ray vein was 6 to 8 inches wide and filled with sulphides, including auriferous chalcopyrite. Earlier reports state that the ore was stoped out to the 150 foot level. Samples from the dump consist primarily of limonite and pyrite in milky quartz. The felsic tuff contains disseminations of magnetite.

Surface Hill Mine (AuM)

Location: The Surface Hill mine is 1.5 miles northeast of Wilgrove and 1.8 miles northwest of Mint Hill in southeastern Mecklenburg County. The mine is reached by travelling 0.55 mile north on SR 3115 from the intersection of SR 3115 and SR 3114. At the north end of SR 3115, turn west (left) and continue 50 yards to a house. The mine is on a low ridge 100 yards northwest from the house.

Workings: The workings consist of a series of shafts or pits near the northwest nose of a northwesterly trending ridge. The pits are shallow and overgrown. Little dump material remains.

Geology: The mine was opened in a quartz vein enclosed by diorite. Much of the quartz is iron stained and contains many vugs lined with tiny quartz crystals. Metallization includes magnetite, hematite, pyrite, chalcopyrite and minor malachite. Much of the magnetite is altered to hematite and limonite.

The mine was noted primarily for its large yield of gold nuggets which reportedly came from a pocket near the intersection of two quartz veins and a diabase dike.

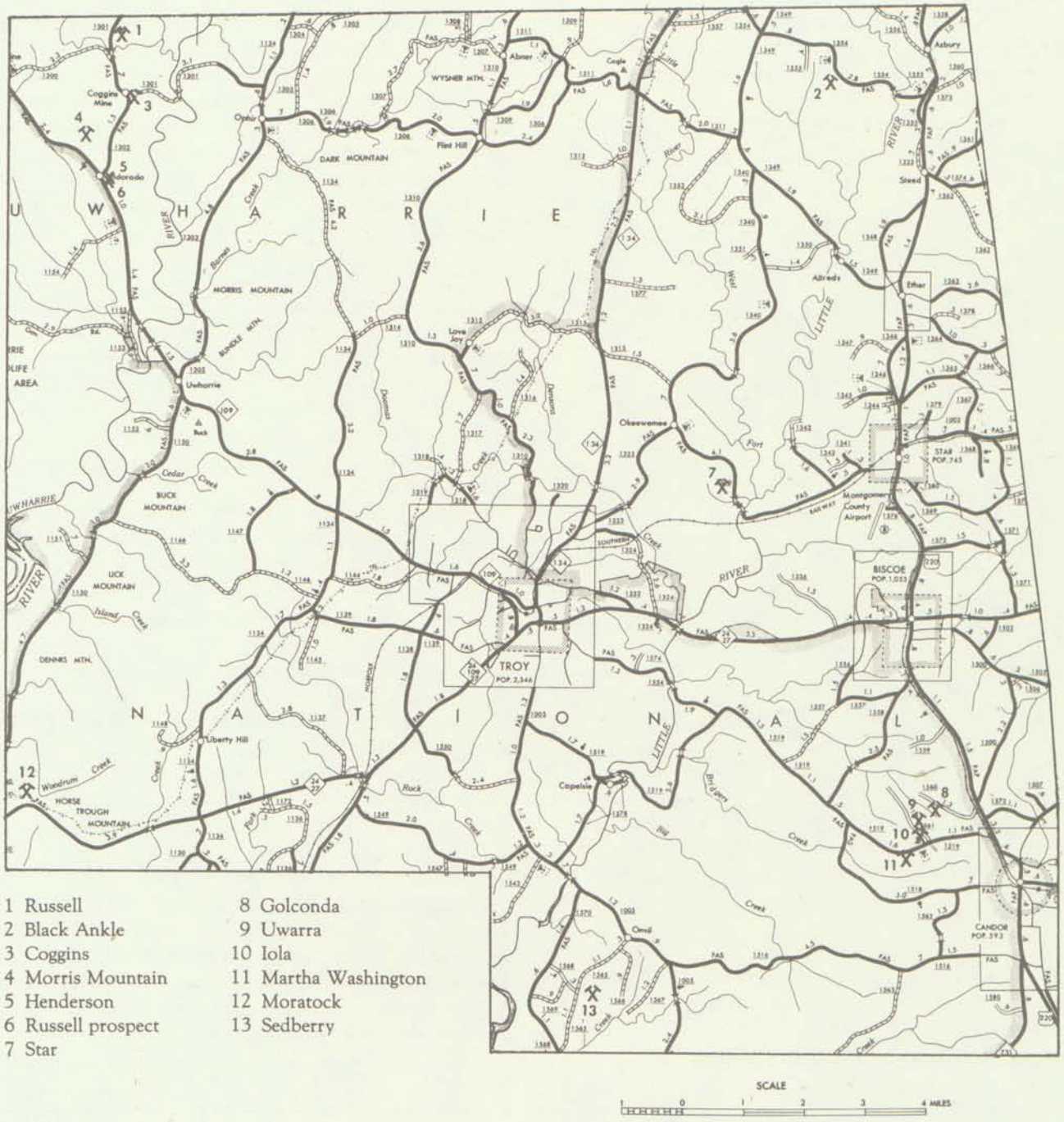
MONTGOMERY COUNTY

Montgomery County, in the south-central portion of the slate belt (figure 1), is almost entirely underlain by interbedded metavolcanic and metasedimentary rocks. Triassic sediments underlie a small portion of the southeastern corner of the county and are covered in part by sediments of the Coastal Plain.

Gold was mined at various sites throughout the county, but probably one of the best known deposits was the Coggins mine near Eldorado in the northwest corner. Important mines were also located near Candor in southeastern Montgomery County.

Black Ankle Mine (AuM)

Location: The Black Ankle mine is in northeastern Montgomery County, 6.5 miles northwest of Star and 10.5 miles northeast of Troy. The mine is reached by travelling on SR 1354, 1.8 miles from the intersection of SR 1354 and SR 1353. At this point, turn left (southwest) onto a logging road and follow the road approxi-



1 Russell
2 Black Ankle
3 Coggins
4 Morris Mountain
5 Henderson
6 Russell prospect
7 Star
8 Golconda
9 Uwarra
10 Iola
11 Martha Washington
12 Moratock
13 Sedberry

Figure 15. **Montgomery County Deposits**

mately one-half mile to the mine. The logging road will go through the woods, then along the left side of an open field and finally into the woods to the mine.

Workings: the mine was not opened until 1928 and was worked intermittently until 1935. A pit 225 feet long, 120 feet wide and 50 feet deep was opened and two shafts were opened in the pit. The pit is now completely full of water, forming a small pond. Small piles of dump material are found at various locations around the pond.

Geology: The mine was opened in a mineralized zone enclosed by felsic tuff or rhyolite that is bleached and sheared in metallized areas. The main shaft follows a quartz stringer in this zone. Tiny pyrite cubes disseminated through the siliceous tuff are the only indications of metallization. Pyrite is particularly abundant in bleached portions of the rock.

Gold was reported in the quartz stringer and in seams in the mineralized zone and country rock. The body was of low grade and recovery of the gold was hampered by the fine subdivision of the gold and the slime produced by the clay-like saprolite.

Plate 7A. Remains of buildings at the Coggins Mine

Coggins (Rich Cog, Appalachian) Mine (AuM)

Location: The Coggins mine is in northwestern Montgomery County, 11.3 miles northwest of Troy and 1.3 miles northeast of Eldorado. The Russell Mine is 1.1 miles north of the Coggins and the Morris Mountain mine is 0.9 mile to the southwest. The Coggins mine is 100 yards southeast of the intersection of SR 1302 and 1301, approximately 50 yards east of SR 1302. Several of the old buildings can be seen from the road.

Workings: The mine was first operated in 1882 and was worked intermittently until 1934. One large shaft was opened and most of the development carried out from this shaft; however, several smaller shafts are along the strike of the ore zone. The shafts form a line striking N. 45° E. The main shaft was enclosed by a building which has collapsed, as have several other buildings on the property. The southernmost shaft is 25 feet in diameter and filled with water to within 35 feet of the surface. The northernmost shaft is 50 feet long and 30 feet wide. Dump material is overgrown but a large amount remains.

Geology: The Coggins mine is in the same argillite unit as the Russell mine. This argillite is dark gray and contains disseminated pyrite and pyrrhotite. The ore was apparently in a siliceous zone in the argillite.

Some shearing and brecciation of the siliceous material has occurred and in some instances fractures have been healed with calcite. Pyrrhotite and pyrite are in the siliceous rock and in clacite, and chalcopyrite forms intergrowths with pyrite. Joint surfaces of the argillite are commonly coated with pyrite and pyrrhotite. Two tiny specks of gold were found in the siliceous material. Pyrite also contains some gold. Diabase on the dumps is apparently from the dikes which cross-cut the ore body.

Golconda Mine (AuM)

Location: The Golconda mine is in eastern Montgomery County, 7 miles southeast of Troy and 2.4 miles northwest of Candor. The Uwarra, Iola and Washington mines are within a distance of 1.5 miles south of the Golconda. The Golconda mine is located by turning onto SR 1560 from U. S. Highway 220. Travel 0.6 mile and turn west (left) onto a dirt road. Follow the dirt road, taking the left fork, and pass across a small creek. The mine is located on the north side of the dirt road, north of an open field.

Workings: Most of the work at the Golconda was done from 1904 to 1910. The main inclined shaft is caved and little dump remains. Four other shafts are present, one is 250 feet northeast of the main shaft, another is 150 feet east of the main shaft and two shafts are west of the main shaft.

Geology: The Golconda mine was opened in a quartz vein enclosed by felsic crystal tuff. The tuff is bleached and sheared and contains much sugary quartz and minor chlorite. Numerous quartz-lined vugs are in the quartz. Pyrite, the only indication of metallization, is disseminated along zones in the sheared tuff and, upon weathering, stains the rock yellowish-brown.

Henderson (Eldorado) Mine and Russell Prospect (Pb, Zn, AuP)

Location: The Henderson mine and Russell prospect are 100 yards southeast of Eldorado and 10.6 miles northwest of Troy in northwestern Montgomery County. The mine is south of the old Eldorado school (0.1 mile northeast of the intersection of SR 1302 and N. C. Highway 109) and is accessible by a foot path behind

the school. The Russell prospect is 200 feet southwest of the Henderson shaft. The property is 1.3 miles south of the Coggins mine.

Workings: The Russell prospect is a trench 50 feet long, 15 feet wide and 6 feet deep filled with water to within 5 feet of the surface. The West end of the trench opens into a small creek. The trench is cut parallel to the country rock which strikes N. 45° E. and dips 75° NW.

A vertical shaft, 10 feet by 10 feet, represents the Henderson mine. The shaft is filled with water to within 6 feet of the surface. A limited amount of dump material remains. The shaft was dewatered in 1957, but no further development was carried out.

Geology: The prospects were opened in gray argillite which is iron stained, particularly on cleavage surfaces. Milky vein quartz and diabase are on the dumps. The ore consists of 1/8 in. wide veinlets of subhedral galena, sphalerite and pyrite in vein quartz. Chalcopyrite is sporadically present and chalcocite(?) forms thin coatings on other minerals. Actinolite and chlorite in many cases form narrow borders along margins of the veinlets. Galena contains inclusions of pyrite. Small amounts of pyrite, chalcopyrite and pyrrhotite are disseminated through the argillite. Malachite and azurite form thin crusts on the surface of weathered samples. Some bleached portions of argillite primarily contain galena and reddish-brown sphalerite.

Iola Mine (AuM)

Location: The Iola mine is in eastern Montgomery County, 7.2 miles southeast of Troy and 2.2 miles northwest of Candor. The mine is reached by travelling west on SR 1519 from U. S. Highway 220. Turn right onto a dirt road 0.1 mile west of SR 1561. The mine is north of the house at the end of this dirt road and is on the Dickens property.

Workings: The Iola mine was discovered in 1901 and was worked until 1916. Little remains of the original workings, and the dumps have been completely removed. The main shaft, located 75 yards behind the house, is filled with trash, and the other two shafts, northeast of the main shaft, were inaccessible.

There were numerous veins on the property, and the Iola vein was developed 2,000 feet along its strike and 650 feet down dip. It has been estimated that in excess of $900,000 in gold was produced from the Iola mine, primarily from 1901 through 1915. Mill recoveries by amalgamation and cyanidation ranged from 0.43 to 2.50 ounces of gold per ton and averaged about 0.50 ounce.

Geology: The mine was opened on a quartz vein enclosed by mafic crystal tuff. The vein strikes northeast and dips 45° NW. and contains free gold. Coastal Plain sediments overlie the tuff, and the late discovery of this deposit has been attributed to this sedimentary cover (Pardee and Park, 1948, p. 82). Thin slabs of yellow-and red-stained sericite phyllite indicate shearing of the country rock. No metallization was noticed other than tiny cubes of pyrite disseminated through the tuff.

The main vein averages about 3 feet in width for a distance of 2,000 feet. Several ore shoots were mined, one of which was 100 to 150 feet long and 350 feet deep. Pardee and Park (1948, p. 83) describe samples of the vein rock as fine grained, some of which are "banded quartz containing shreds of chlorite that represent unreplaced parts of the country rock, some are pearly-gray flinty-appearing quartz containing chalcedony that has filled cavities, and some are banded pink to red rock made up of sugary quartz and later calcite." The veins have been crossed by diabase dikes and are faulted.

Moratock Mine (AuM)

Location: The Moratock mine is in western Montgomery County, 9.5 miles southwest of Troy and 7.5 miles northwest of Mount Gilead. The mine is reached by travelling 0.75 mile east on N. C. Highway 24-27 from the intersection with SR 1150. Turn left (north) onto a logging road just east of the State Highway Commission quarry and follow the logging road for approximately 0.25 mile to the mine.

Workings: The mine was first operated in 1892 as an open quarry and one shallow shaft was also sunk. A series of open trenches remains, the largest of which is 200 feet long, 25 feet wide and 25 feet deep. Numerous small dumps are scattered about. Mining was abandoned because of the low grade of ore (less than $1.00 per ton).

Geology: The mine was opened in a white felsic lithic-crystal tuff that is sheared in places. Small quartz veins cut through the tuff and contain gold. Chalcopyrite, malachite and pyrite are present in small amounts.

Morris Mountain Mine (Davis or Dutton) (AuM)

Location: The Morris Mountain mine is located 0.7 mile northwest of Eldorado and 0.9 mile southwest of Coggins mine. The mine is located by travelling 0.9 mile north on N. C. Highway 109 from Eldorado (intersection of SR 1302 and N. C. Highway 109). Turn right onto the property of Mr. Turner. Follow a logging road behind Mr. Turner's house eastward around the mountain. Continue for approximately 1 mile and pass an old lumber mill on the left. The mine is located 150 feet up the mountain from the mill. (There may be an easier way to get to this mine). The mine is on the property of Mrs. Boatride of Troy. The Eldorado mine is 1 mile southeast of the Morris Mountain mine.

Workings: A trench 100 feet long, 15 feet wide, and 30 feet deep was opened on the property, and a 10 foot by 10 foot shaft is located near the north end of the trench. The shaft is filled with water to within 1 foot of the top. The trench is cut oblique to the strike of the

country rock. A small prospect pit is 50 feet east of the trench.

Geology: The mine is located near the contact between argillite and rhyolite, which caps the mountain. Both rock types are scatterd about. Little metallization is present in any of the rocks; however, the dark gray rhyolite contains more metallization than does the argillite. Shearing is noted in some rocks. Quartz veins cut portions of the rhyolite but the veins are not mineralized. The rhyolite in some specimens contains the remains of pyrite cubes, and manganese oxide coats the more weathered samples. The rhyolite is dark gray and massive but is in some places white, seeming to have been bleached. Pyrrhotite and minor pyrite are disseminated through the rhyolite, and calcite and quartz fill tiny fractures. Narrow, vein-like concentrations of pyrrhotite and a brownish, opaque mineral occur in the rhyolite.

Russell Mine (AuM)

Location: The Russell Mine is 12.4 miles northwest of Troy and 2.5 miles north of Eldorado, approximately 0.25 mile south of the Montgomery-Randolph county line. The mine is reached by travelling north on SR 1301, 0.6 mile north from SR 1300. Turn east (right) at this point onto a dirt road and continue for 0.05 mile to a fork point in the road. Take the right fork and continue 0.05 mile to the mine. The Coggins mine is 1.1 miles south of the Russell and the Morris Mountain mine is 1.8 miles southwest of the Russell.

Plate 7B. East Wall of the "Big Cut," Russell Mine

Workings: The Russell mine was in operation around 1894 and was worked by a series of pits and shafts aimed at developing six northeast-trending parallel ore zones. The largest pit, the "Big Cut," (Plate 7, B) is 300 feet long, 150 feet wide and 60 feet deep. The workings are overgrown and large trees have grown in the "Big Cut." Numerous smaller pits and trenches are along a ridge 200 feet west of the "Big Cut."

Geology: The mineralized zones are white, iron-stained, siliceous material bordered by sericite phyllite. Pyrite is disseminated through the zone and is concentrated in some portions. The zones of phyllite contain tiny cubes of pyrite concentrated along the foliation and particularly along joint planes. Chalcopyrite occurs in minor amounts. The country rock is pink to brown, bedded argillite which often has zones of pyrite parallel to the bedding. Six of the mineralized zones are concentrated over an area 2,000 feet wide and are generally parallel to the strike of the argillite.

Sedberry Mine (AuM)

Location: The Sedberry mine is in southern Montgomery County, 7.8 miles southwest of Candor and 6.4 miles south of Troy. The mine is reached by travelling 0.4 mile north on SR 1565 from the intersection of SR 1565 and SR 1568 and turning east (right) onto a logging road. Follow the logging road for approximately 0.4 mile to the mine.

Workings: The workings consist of three main shafts or pits, two of which are connected by a trench. The third shaft is 15 feet south of the other shafts. Together, the shafts form a line trending north-south. Several smaller pits are farther south up the hill. The workings are considerably overgrown but some dump material remains.

Geology: The country rock is a felsic tuff, in places porphyritic, and is sheared and brecciated in places. A small amount of argillite is present. The tuff strikes N. 15° W. and joints in the tuff are coated with yellowish-brown biotite (phlogopite?). No metallization was noted in the tuff or argillite.

Star (Reynolds) Mine (AuM)

Location: The Star mine is 3.1 miles west of Star and 3.9 miles northeast of Troy in eastern Montgomery County. The mine can be reached by travelling north on SR 1340, 0.5 mile from Little River. Turn west (left) onto a gravel surfaced road and follow the road approximately 0.25 mile to the mine.

Workings: The mine was originally operated in the late 1800's as the Reynolds mine and a shaft was developed to 80 feet. Some open cut work was done at the mine in 1954 and 1955, and the mine was known as the Star mine. In 1958 or 1959, exploration was continued on the property with a shaft being developed (Plate 7C, D). The shaft follows a fault zone down dip with drifts along the zone at 108.5 feet, 150 feet and 271 feet from the collar. The last reported production from the mine was in 1963. A large amount of fresh dump material remains near the shaft.

Geology: The mine is situated in a 6 to 8 foot wide

Plate 7C. Mine dumps and storage bin, Star Mine

Plate 7D. Inclined shaft and storage bin, Star Mine

fault zone that has been mylonitized, sericitized and silicified. The fault strikes N. 33° E. and dips 45° - 50° northwest. Metallic minerals present in the fault zone include pyrite, chalcopyrite, minor bornite, chalcocite and possibly gold telluride. Quartz veins contain auriferous pyrite, minor chalcocite, specularite, molybdenite and ferrimolybdite on fractures. The gangue consists chiefly of quartz, chlorite, sericite and calcite. The country rock is a gray felsic volcanic rock.

Uwarra (Montgomery) Mine (AuM)

Location: The Uwarra mine is located in east-central Montgomery County, 2.1 miles northwest of Candor and 3.5 miles south of Biscoe. The mine can be reached by turning north onto SR 1561 from SR 1519 and continuing for approximately 0.25 mile to the mine. The mine workings are east of the road.

Workings: The lode in which the Uwarra mine is located was not discovered until 1901. Approximately $100,000 of ore was produced before the mine became inactive, around 1916. The vein was worked to a depth of 400 feet with drifting along the strike of the veins. In 1971, numerous large dumps overgrown with vegetation remained at the mine site. Numerous caved shafts or prospect pits were also on the property, and it appeared that some placer work had been carried out in the creek east of the mine.

Geology: Two shafts were opened in quartz veins striking northeast and dipping approximately 45° NW. The veins carry free gold along with calcite, chlorite and pyrite and are enclosed by andesitic tuff. Pods and stringers of calcite and small crystals of pyrite are also in the andesite. Overlying the rocks in the vicinity of the mine is a thin veneer of Coastal Plain sediments. Earlier reports state that the ore was almost free of sulphides and was successfully treated by the cyanide process.

Martha Washington Mine (AuM)

Location: The Martha Washington mine is in southeastern Montgomery County, 4.2 miles south of Biscoe and 2.0 miles west of Candor. To reach the mine, travel 0.95 mile southeast on SR 1519 from the intersection of SR 1519 with SR 1518. The mine is near the southwest side of the road, approximately 50 feet from the road. The mine is less than 0.5 mile southwest of the Iola mine.

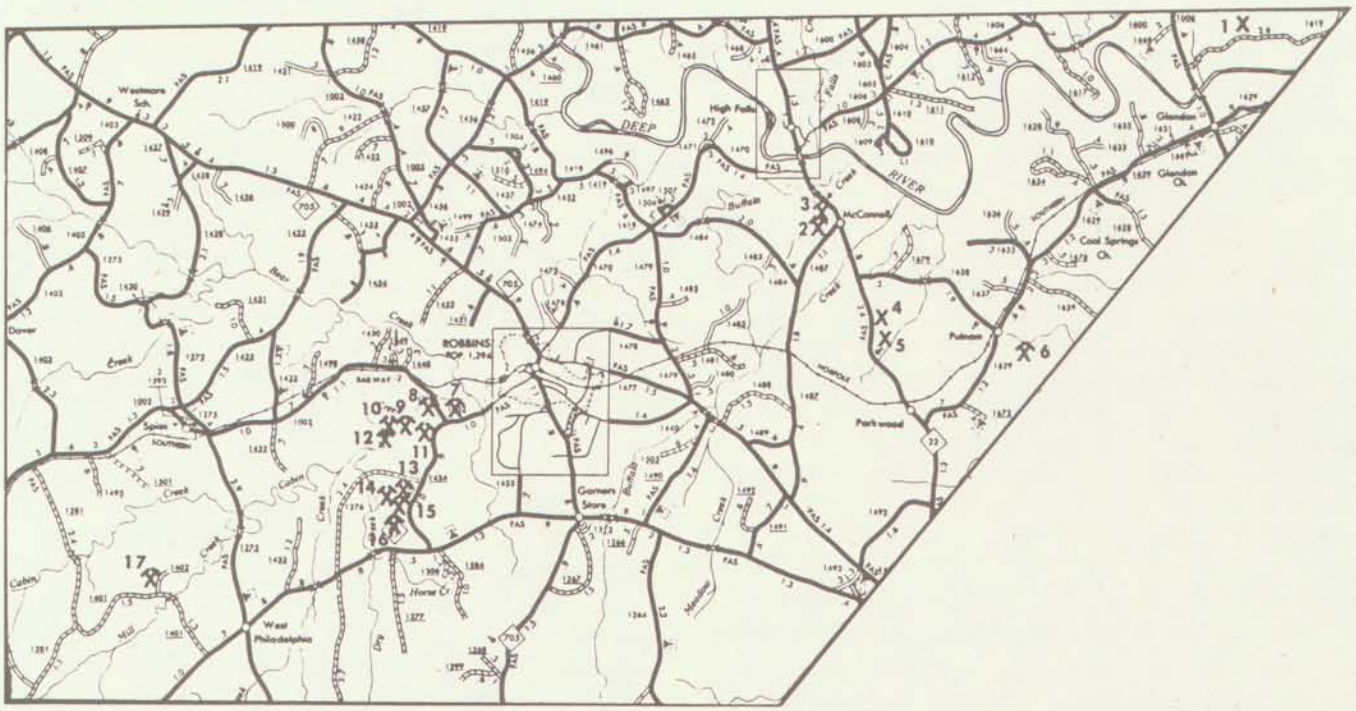
Workings: The Martha Washington mine was worked during the time that the Iola, Golconda and Uwarra mines were active. In 1971, the dumps were overgrown with vegetation, and all the shafts were caved.

Geology: The mine is located on what seems to be the southwest extension of the Iola vein, and the geology is similar to that described at the Iola.

MOORE COUNTY

Northeast-trending slate belt rocks underlie most of the northwest corner of Moore County (figure 1) and are bounded to the southeast by Triassic sediments. Coastal Plain sediments cover both Triassic sediments and slate belt rocks in the southern and eastern portions of the county.

The slate belt rocks were subdivided by Conley (1962) into slate, andesitic tuff, mafic tuff, rhyolite flow and felsic tuff. These rocks have been intensely folded and faulted. With the exception of one copper prospect, all the metal mines and prospects in Moore County were



1 Copper prospect
2 Cotton
3 Ritter
4 Sewell
5 Grampus
6 Bell
7 Cagle
8 Red Hill
9 Burns
10 Brown
11 Allen
12 Shields
13 California
14 Jenkins
15 Dry Hollow
16 Richardson
17 Monroe

Figure 16. **Moore County Deposits**

for gold. Most of the gold deposits are in felsic tuffs on the northwest side of the Robbins fault along Cabin Creek.

Allen Gold Mine (AuM)

Location: The Allen mine is 1.7 miles southwest of Robbins and 3.4 miles east of Spies in northwestern Moore County. The mine is 0.2 mile southwest on SR 1434 from the intersection of SR 1434 and SR 1002. Turn right onto a dirt road trending west-northwest for 0.35 mile. The mine is north of the road.

Workings: A shaft was sunk to a depth of about 40 feet with drifts to the northeast and southwest along the vein. A crosscut was driven into the west side of Laurel Hill, opposite the main shaft, but failed to intersect the shaft. In 1966, there was a series of trenches 100 feet long, 8 feet wide and 10 feet deep trending N. 45° W.

Geology: The shaft was opened in a 35 foot wide silicified zone of felsic tuff. The zone strikes N. 25° E. and is apparently an extension of the Red Hill vein.

Belle (Bell) Mine (AuM)

Location: The Belle mine is in north-central Moore County, 6.9 miles northwest of Carthage and 6.0 miles east of Robbins. The mine is reached by travelling 100 feet south on SR 1629 from the intersection of SR 1629 and SR 1638. Turn east (left) onto a farm road and continue for 0.7 mile to the mine road. Follow the mine road for 150 feet N. 50° W. to a trail and continue for 195 feet N. 20° W. to the mine.

Workings: The Belle mine consists of eight pits or shafts striking N. 50° E. and one trench trending N. 40° W. from the northeast end of the workings. The main shaft is vertical, 6 feet by 8 feet, and filled with water to within 30 feet of the surface. There are other pits to the south but these seem to be stopes opening to the surface. The vein is reported to have assayed $12 a ton and was worked to a depth of 110 feet and for a length of 800 feet.

Geology: The country rock is chlorite-sericite phyllite and schist which is interpreted as a sheared porphyritic felsic tuff or an altered crystal tuff. The phenocrysts seem to have been silicified and the matrix sericitized. Calcite has been emplaced along some of the shears and vugs. Some of the phenocrysts seem, from their outline, to be silicified feldspar crystals. There was no bull quartz noted on the dump. The selvage is sericite, quartz and chlorite containing disseminated hematite and limonite after pyrite(?).

The ore seems to have been in a shear zone in the volcanic rock. However, although minor pyrite was observed, the limonite after pyrite did not appear to be auriferous. No free gold was observed in the samples. Minor amounts of biotite, garnet, magnetite and epidote are present. The ore included mineralized phyllite and siliceous zones within the phyllite. The pay streak averaged 4 to 8 inches in width.

Brown Mine (AuM)

Location: The Brown mine is in northwestern Moore County, 2.1 miles southwest of Robbins and 2.9 miles east of Spies. To reach the mine, travel 0.65 miles south-southwest on SR 1434 from the intersection of SR 1434 with SR 1002. Turn west (right) onto Standard Mineral's mine road for 0.05 mile and take a left at the fork. Go 0.1 mile and bear right at the fork. Continue 0.2 mile to the end of the paved road at a concrete block home. Continue on the dirt road for 0.35 mile to the old Burns home (two story frame house). From the home go N. 80° W. on an old dirt road for 0.2 mile to the mine. The mine is 780 feet southwest of the Burns mine.

Workings: The mine was worked by an open cut about 350 yards long. A few shallow shafts or prospect pits were put down to depths of less than 40 feet. The mine was last operated in 1905.

In 1967, the workings consisted of a series of pits and caved shafts trending N. 45° E. There was a long trench trending N. 40° E. from the old workings to Cabin Creek. It appeared that there had been some recent prospecting.

Geology: The ore body was about three feet thick and relatively flat lying. The pay seam was a quartz vein. The felsic tuff country rock is brecciated, silicified and sericitized and contains disseminated gold. The gold was extracted by passing the ore over riffle boxes charged with mercury. The vein was worked for a distance of 300 yards along strike and to a depth of about 40 or 50 feet. Gangue minerals in the quartz include sericite, chlorite and pyrite.

Burns Mine (AuM)

Location: The Burns mine is in northwestern Moore County, 2.1 miles southwest of Robbins and 2.9 miles east of Spies. To reach the mine, follow the directions to the Brown mine to the old Burns house. Then go around behind the house, along the ridge line (power poles) for 0.2 mile to the mine site.

Workings: The mine was operated during the 1890's but was reopened in 1906 and again in 1915. During the last operation, it was active for 18 months. At first, the ore was ground in Chilean mills, but later, in 1895, a ten stamp mill was installed. There was a series of pits, stopes and trenches and one open drift at the workings in 1968.

Geology: Mining was carried out in an ore body striking N. 20° E. and dipping 55° NW. The ore zone consists of quartz veins enclosed by chlorite and sericite phyllite.

Cagle Mine (AuM)

Location: The Cagle mine, in northern Moore County, is 1.2 miles southwest of Robbins and 3.7 miles east of Spies. To reach the mine, follow the power line from the intersection of SR 1002 and SR 1434 for 0.3 mile N. 10° E. The mine is in the woods just west of the power line right-of-way.

Workings: the mine was operated around 1865 by Charley Overton and continued sporadically until about 1900. Some prospecting was carried out in 1906. Three main shafts are on the property, one was inclined to a depth of 171 feet, a second shaft was 265 feet deep and a third shaft was 180 feet deep with a 200 foot drift to the southwest. There are six open cuts averaging 30 feet deep along the vein. Northeast of the first shaft is a cut extending 300 feet along strike. In 1966, the workings were overgrown with vegetation, and the shafts were caved.

Geology: Mining was carried out in a gold-bearing quartz vein approximately 30 inches wide. Gold was also found in the sheared felsic tuff bordering the vein. The ore body strikes N. 27° E. and dips 50° NW. Some silver was also obtained from the mine.

California Mine (AuM)

Location: The California mine is in northwestern Moore County, 2.5 miles southwest of Robbins and 3.1 miles east-southeast of Spies. The mine is in the south end of Standard Mineral's pit, 100 feet south of SR 1276, 0.15 mile west of the intersection of SR 1434 and SR 1276.

Workings: A shaft was sunk to a depth of 75 feet by Peter Shamburger about 1896. The mine was closed because of low yield.

Geology: The shaft was opened in sheared felsic tuff.

Copper Prospect (CuP) (Tennessee Copper Company)

Location: The Old Copper prospect is 11.1 miles northeast of Robbins and 10.8 miles north of Carthage. To reach the mine, travel 1.2 miles east on SR 1619 from the intersection of SR 1619 and SR 1006. Turn north (left) and follow a logging road for 1200 feet. The mine lies 150 feet north of the logging road.

Workings: The Old Copper prospect includes one shaft, one pit and one trench. The shaft is at least 100 feet deep and is 6 feet square. Water is in the bottom. Two hundred feet southwest of the shaft is a small northwest-trending trench and 5 feet southwest of the trench is a 10 foot by 10 foot by 6 foot pit.

Geology: The country rock is silicified felsic lithic tuff and tuff breccia containing minor epidote, chlorite and sericite. Milky vein quartz with siderite(?) and/or fluorite(?) is also present. At the prospect, the country rock is brecciated, silicified, sericitized, chloritized and bleached. Vein quartz with inclusions of chlorite and calcite have been introduced along the structure.

The metallized zone strikes N. 30° E. and dips 60° NW. and appears to be a silicified breccia or tuff breccia with chlorite, saccharoidal quartz, orthoclase, calcite, epidote, sericite, biotite and kaolin. The main copper mineral appears to be malachite with minor cuprite and azurite. Also present is limonite (after pyrite) and a calcite coating on some fractures. Other mineralization includes chalcocite and finely disseminated pyrite. An assay of the ore by Tennessee Copper Company ran 0.85 percent copper, 0.02 ounces of gold per ton and 0.18 ounces of silver per ton.

Cotton Mine (AuM?)

Location: The Cotton mine is in northern Moore County, 1.4 miles southeast of High Falls and 4.5 miles northeast of Robbins. The mine is 522 feet N. 85° W. from the shoulder of N. C. Highway 22, 0.1 mile north on N. C. 22 from the intersection of N. C. 22 with SR 1487.

Workings: The workings consist of a large group of deep shafts partially filled with water. Extensive dumps remain.

Geology: Mining was carried out in quartz veins in a zone of sheared felsic tuff. The veins are of massive, iron-stained vuggy quartz containing pyrite and malachite. The foliation of the country rock strikes N. 80° E. and dips 30° NW.

Dry Hollow Mine (AuM)

Location: The Dry Hollow mine is about 0.3 mile south of the Jenkins and California mines and about 0.3 mile north of the Richardson mine. The mine is west of SR 1434, 0.9 mile north from the intersection of SR 1434, N. C. Highway 24 and N. C. Highway 27.

Workings: The Dry Hollow was a placer mine operated along a small stream. The creek was mined until about 1907 at which time a stir mill was installed. The mine is now covered by pyrophyllite dumps.

Geology: Material from the mine consisted of placer material containing gold from the small stream.

Grampus (Grampusville) Mine (AuP)

Location: The Grampus mine is located 5 miles east of Robbins and 8 miles northwest of Carthage. To reach the mine, travel 0.8 mile southeast on N. C. Highway 22 from the intersection of N. C. Highway 22 and SR 1638. There is an old church that is being used as a residence east of the road. From behind the Church, follow a farm road for 340 feet S. 75° E.

Workings: The Grampus mine consists of 2 pits trending N. 40° E. The smaller pit is 6 feet deep and 10 feet square, and the larger pit is 15 feet by 25 feet by 8 feet and 10 feet deep. There was apparently no production from this mine.

Geology: The country rock appears to be a sheared fine-grained saccharoidal quartz with minor sericite and iron staining on the fractures (limonite). The vein material is massive milky quartz with minor limonite and hematite in vugs and along fractures. The saccharoidal quartz may be from a mylonite zone. Also present is a sericite-quartz-chlorite phyllite. Cleavage in the country rock is N. 32° E. and vertical. No metallization was noted but the gold is apparently in pyrite, most of which is altered to limonite.

Jenkins Mine (AuP)

Location: The Jenkins mine, in northwestern Moore County, is 2.7 miles southwest of Robbins and 2.9 miles east-southeast of Spies. To reach the mine, travel 0.4 mile south on SR 1434 from the intersection of SR 1434 and SR 1276. Turn west onto a dirt road and go past the Richardson mine road. At the end of the road, go 465 feet N. 65° E. to the mine.

Workings: The mine was opened prior to 1865 and was worked intermittently until 1890. In 1912, the shafts were unwatered by Charlie and Paul Gerhardt, but no development was undertaken. Two shafts had been sunk; one shaft was of unknown depth, but the southwestern shaft was 85 feet deep. Three levels of drifts, the longest of which was 300 feet, were supposedly driven along the vein. The creek south of the shaft was placer mined.

Geology: The shafts were sunk in silicified felsic tuff. The ore zone was 3 to 4 feet wide and locally known as crushed flint.

Monroe Mine (AuM)

Location: The Monroe mine is in northwestern Moore County, 2.2 miles south of Spies and 6.1 miles southwest of Robbins. The mine is 400 feet due west of SR 1402, 0.15 mile north of the intersection of SR 1402 and SR 1401.

Workings: Work here originally began in Mill Creek. After the vein was located, it was mined until about 1900. Two small pits and a trench trending N. 50° E. were opened on the property.

Geology: Gold occurred in a quartz vein and was also disseminated through the felsic tuff country rock. Total thickness of the ore zone was 30 inches. The body strikes N. 60° E. and dips 48° NW. Pyrite, chalcopyrite and possibly some chalcocite are disseminated in the tuff.

Red Hill Mine (AuM)

Location: Located in northwestern Moore County, the Red Hill mine is approximately 500 feet northeast of the Allen mine and 600 feet west of the Cagle mine. To locate the mine, go 0.2 mile northwest on SR 1002 from the intersection of SR 1002 and SR 1434. The mine is 366 feet from the edge of the pavement along an old abandoned road that trends S. 30° W. and then S. 30° E. 90 feet to the mine.

Workings: The mine was last operated in the early 1900's with a shaft having been developed to a depth of 100 feet. A drift was extended about 250 feet N. 10° E. of the shaft. In 1966, a series of pits and shallow trenches striking N. 55° - 65° W. were on the property. A 10 foot square shaft was filled to within 3 to 5 feet of the surface.

Geology: Gold was found disseminated through a 60 foot wide zone of sericite schist formed by shearing of a felsic tuff. The zone strikes N. 35° E. and dips 80° NW. Some vein quartz present contains limonite after pyrite.

Richardson Mine (AuM)

Location: The Richardson mine is in northwestern Moore County, 2.9 miles southwest of Robbins and 3.1 miles southeast of Spies. To reach the mine, go 0.4 mile south on SR 1434 from the intersection of SR 1434 with SR 1276. Turn west (right) onto a dirt road and go 0.1 mile, take the left fork and go 0.25 mile to the mine. The workings are on both sides of the road.

Workings: The mine was first worked possibly by the Marshall Mining Company about 1860. In 1906, it was worked by Steward and Hewes. Nine shafts were opened along the strike of the vein, and drifts were reportedly worked at several levels. The ore was ground by Chilean mills and the gold recovered in riffle boxes charged with mercury. In 1968, the workings consisted of a series of pits and shafts trending in a northerly direction.

Geology: The ore body is possibly a continuation of the Jenkins vein and is about 6 feet wide. The vein consists of a silicified tuff containing crosscutting quartz veins. The main vein strikes N. 15° E. In places, the tuff has been sericitized and chloritized.

Ritter (McDonald) Mine (AuM)

Location: The Ritter mine is in northern Moore County, 1.2 miles southeast of High Falls and 4.5 miles northeast of Robbins. The mine is 300 feet S. 45° W. from the shoulder of N. C. Highway 22, 0.2 mile south on N. C. Highway 22 from the south end of the bridge across Buffalo Creek south of High Falls.

Workings: The mine was opened prior to 1890, at which time it was reopened as the Teisson mine. Production continued until 1900. Two shafts were put down, the deepest of which was more than 100 feet. Eight stamp mills were employed to crush the ore. In 1966, the main shaft was open as far as could be seen and there were numerous smaller openings.

Geology: The ore body is a siliceous, sericitized felsic tuff about 3 feet wide, striking N. 10° E. and dipping 30° NW. Gold was in the quartz with a gangue of chlorite, calcite and sericite.

Sewell Mine (AuP)

Location: The Sewell mine is in northern Moore County, 4.9 miles east of Robbins and 8.4 miles northwest of Carthage. To reach the mine, travel 0.5 mile south on N. C. Highway 22 from the intersection of N. C. Highway 22 and SR 1638. Turn east (left) and go 1200 feet to the mine.

Workings: Workings at the Sewell mine consist of a trench 6 feet wide, 20 feet long and 4 feet deep trending N. 50° E.

Geology: Milky quartz with sericite and iron-stained kaolin in the fractures is on the dumps. Limonite, apparently the transported variety, lines vugs in the quartz. The rock surrounding the quartz vein appears to be a fine-grained sheared saccharoidal quartz (possibly mylonite) with sericite and iron-stained clay minerals. There appears to be relic biotite or chlorite structure in the quartz, but it is now mostly limonite and clay minerals. The country rock is quartz-sericite phyllite, probably after a felsic tuff. No metallization was noted during the present investigation.

Shields Mine (AuM)

Location: The Shields mine, in northwestern Moore County, is 2.7 miles southwest of Robbins and 2.6 miles east-southeast of Spies. The mine is about 700 feet S. 45° W. from the southwest adit of the Brown mine on Cabin Creek.

Workings: The mine was operated about 1895 by Cash Shields and consisted of an open cut and one shaft. The ore was ground in Chilean mills and either riffle boxes or copper plates were used to collect the gold. A series of trenches and small holes were on the property in 1968.

Geology: The ore shoot was about 30 inches wide and was a schistose sericitized mixture of rock and fine granular clay with numerous quartz veins.

NASH COUNTY

Slate belt rocks underlie most of Nash County, but upland areas are capped by a thin mantle of Coastal Plain sediments (figure 1). Gold mining was restricted to the Northwest corner where small prospects were numerous, but few deposits were actual producers. In addition to gold mining in the crystalline rocks, there was also some interest in placer deposits in gravels east of the lode deposits. In the southern part of Nash and northern Wilson counties, geochemical sampling has defined three areas of anomalous molybdenum-copper concentrations.

Argo or Mann-Arrington Mine (AuM)

Location: The Argo mine is in northwestern Nash County, 5.0 miles northeast of Castalia and 8.7 miles northwest of Red Oak. Go 0.2 mile north on SR 1004 from the intersection of SR 1004 with SR 1405. Turn east (right) onto a dirt road and go east 0.1 mile to the back of a pasture. The old diggings are behind the fence.

Workings: The mine was last worked in 1894; although, some exploratory work was done in the early 1930's. During the early work, a shaft was opened to a depth of 108 feet. In 1966, there was a pit 80 feet long by 18 feet wide and 7 feet deep striking due north. The remaining workings consisted of a series of pits, trenches and several shallow shafts caved to within 20 feet of the surface. The workings cover an area approximately 1500 feet long and 400 feet wide.

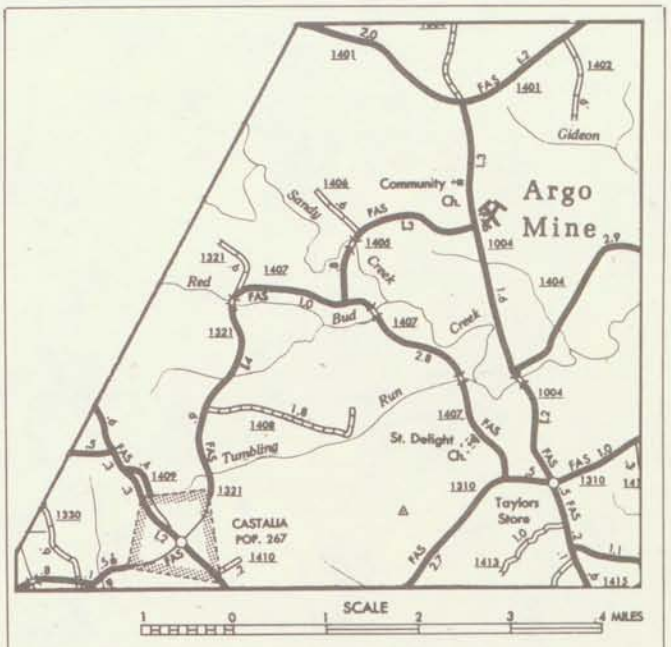


Figure 17. **Argo Mine, Nash County**

Geology: The country rock is sheared felsic tuff, in places sheared to chlorite phyllite, containing veins and stringers of saccharoidal quartz. Hematite and limonite occur in the quartz and some sulphides occur in the country rock. The country rock strikes N. 60° E. and dips 40° SE.

Molybdenum-Copper Mineralization

In southern Nash and northern Wilson Counties, prospecting by Lindgren Exploration Company has defined areas of anomalous molybdenum-copper concentrations (Cook, 1972). Sampling was conducted in the Conner stock, a porphyritic biotite granite, which has intruded into slate belt argillites and tuffs. Coastal Plain sediments partially cover the area.

Geochemical anomalies were identified at the Neverson Quarry in Wilson County, within a greisen zone at the southwest margin of the intrusive and in saprolite at the northwest slate belt-granite contact. Up to 0.380 and 0.192 percent molybdenite were found in quarry blocks and greisen float respectively. Thresholds of 35 ppm copper and 5 ppm molybdenum were obtained from approximately 1000 soil geochemical samples, and anomalous soil samples contained up to 80 ppm copper and 90 ppm molybdenum.

Soil-saprolite profiles in anomalous areas showed molybdenum and copper enrichment in the B soil zone with complementary depletion in the C zone. Fifteen diamond drill holes totaling 3,100 vertical feet in the stock and adjacent slate belt rocks intersected pyrite-chalcopyrite-molybdenite mineralization. The cores contained up to 127 ppm molybdenum and 650 ppm copper over 10-foot intervals with narrow zones of higher grade material. At the slate belt-granite contact were quartz veins containing minor galena, sphalerite, chalcopyrite and pyrite.

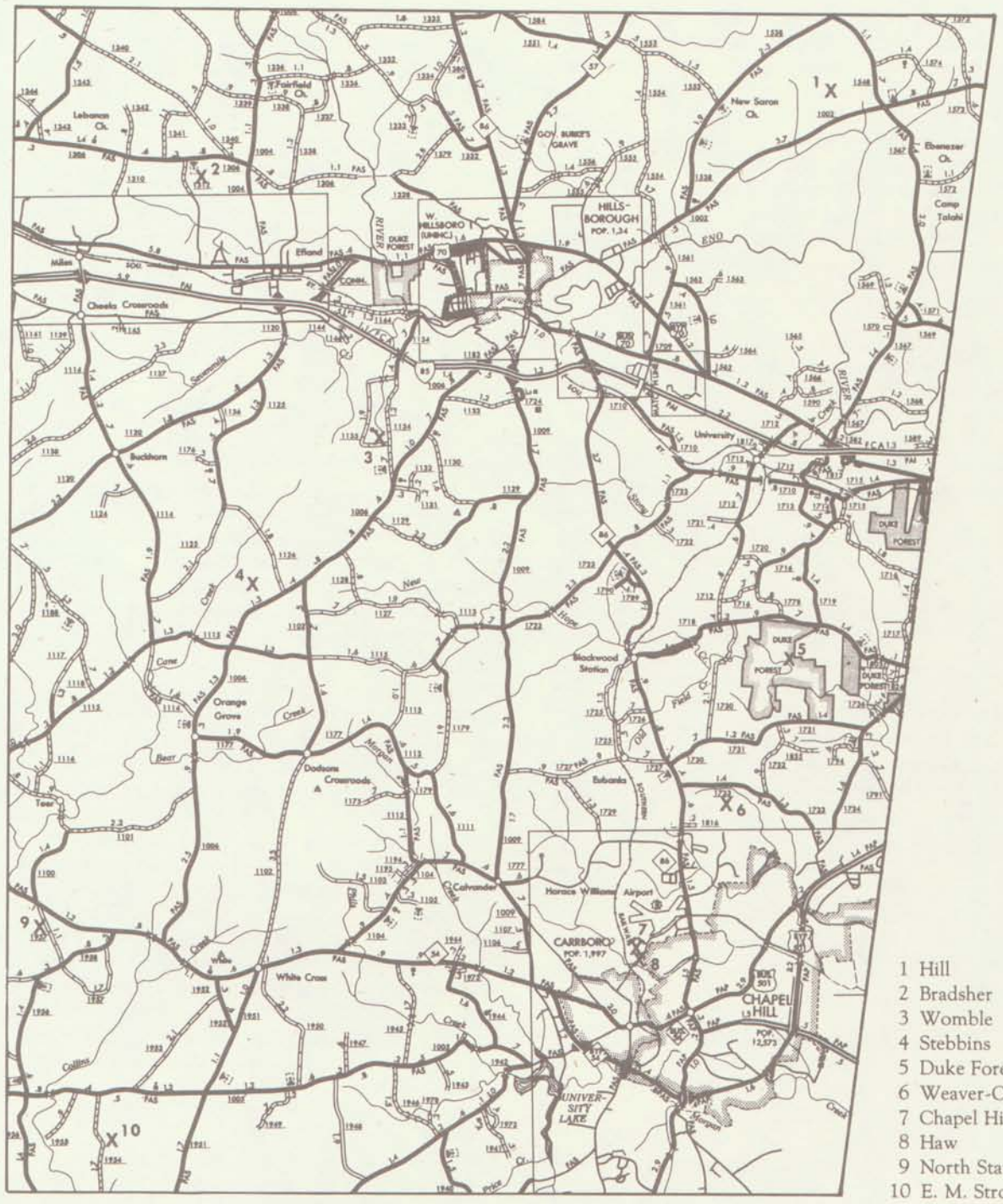


Figure 18. **Orange County Deposits**

ORANGE COUNTY

Orange County is situated in the north-central section of the slate belt. Rock types include metamorphosed mafic to felsic flow and pyroclastic rocks and metamorphosed epiclastic rocks (Allen and Wilson, 1968). Intrusive into this tightly folded sequence of rocks are igneous plutonic rocks ranging in composition from granitic to ultramafic. Triassic sedimentary rocks of the Durham basin crop out in the extreme southeastern corner of the county.

Deposits of gold, copper and iron have been worked in Orange County. The gold deposits are scattered throughout the county but are usually associated with felsic pyroclastic rocks in contact with igneous intrusive rocks (Allen and Wilson, 1968). Copper was prospected at three sites and iron was mined near Chapel Hill.

Bradsher Prospect (AuP)

Location: The Bradsher prospect is in west-central Orange County, 5.4 miles northwest of Hillsborough. To reach the mine, travel 0.25 mile east on SR 1306 from the intersection of SR 1306 and SR 1312. Turn onto an old road and go 0.35 mile south to a field. Continue south-southeast for 540 feet along an old road to the prospect.

Workings: The workings consist of a small rectangular pit approximately 20 feet long by 12 feet wide and 6 feet deep. The pit is now filled with trash. Several small dumps remain.

Geology: The prospect was opened in a quartz vein containing disseminated pyrite. The country rock is diorite.

Chapel Hill Iron Mine (FeM)

Location: The Chapel Hill iron mine is located on Iron Mine Hill, 1.3 miles northwest of Chapel Hill and 1.2 miles north-northeast of Carrboro. The mine is 0.2 mile west of SR 1759 and 1.0 mile southwest of the intersection of N. C. Highway 86 and SR 1760.

Workings: The mine was operated between 1872 and 1882, and several thousand tons of ore were removed. The hematite content ranged from 38 to 65 percent. In 1966, two caved adits and one small open cut 25 feet long, 8 feet wide, 4 to 5 feet deep were in the area. The strike of the cut was N. 78° W.

Geology: The country rock is felsic lithic tuff that has been brecciated and injected by hydrothermal solutions, predominantly iron-bearing quartz. The ore is usually dense, steel-gray hematite with fine-grained specular hematite along numerous fractures. Finely disseminated magnetite and hematite occur in the felsic tuff.

Duke Forest Prospect (AuP)

Location: The Duke Forest prospect, in southeastern Orange County, is 7.0 miles southeast of Hillsborough and 5.7 miles north of Chapel Hill. The prospect is 30 feet east of the Concrete Bridge Road in Duke Forest. To reach the prospect go 0.35 mile west on SR 1718 from the intersection of SR 1718 and SR 1719. Turn left onto the Concrete Bridge Road and go 0.65 mile south to the prospect.

Workings: Two small prospect pits are located approximately 80 feet apart. The larger pit is 15 feet wide, 30 feet long and 10 to 12 feet deep.

Geology: The prospect was opened in a gossaniferous, brecciated felsic tuff striking N. 30° E. and dipping vertically. The walls of the larger prospect pit show brecciated fragments healed by hematite and limonite which occasionally show iridescence. Small cubic cavities in the quartz and tuff suggest that iron sulphides were present but have been leached out. Covellite is present in the gossan.

Haw Gold Mine (AuP?)

Location: The Haw Mine is in southeastern Orange County and is approximately 400 yards south of the Chapel Hill Iron Mine. The mine is less than 0.25 mile west of the end of SR 1792.

Workings: The workings consist of a large partially filled trench 200 feet long, and 20 feet in average width. The trench trends N. 10° - 20° W. and may have a caved adit at the north end.

Geology: Rhyolitic tuff and diorite are on the dump, possibly indicating the mine is near the contact between the two. Abundant disseminated pyrite is in the tuff.

Hill Prospect (CuP)

Location: The Hill Copper prospect is in eastern Orange County, 5.6 miles northeast of Hillsborough and 3.4 miles southeast of Schley. To reach the mine, go 2.4 miles northeast on SR 1002 from the intersection of SR 1002 and SR 1538. At Mickey Hill's grocery store, turn left (north) onto a farm road, near the west side of the store, and go 0.6 mile. Then go almost due east for 400 feet to the prospect.

Workings: The prospect was originally 30 feet deep, but in 1966 was filled with water to within 5 feet of the surface. The pit is 12 feet wide by 18 feet long.

Geology: The country rock is sheared felsic tuff containing minute specks of finely disseminated pyrite and magnetite. The pit was sunk in a sheared 4-foot wide zone trending N. 40° E. and dipping 75° NW. The zone is iron stained, but there is no evidence of copper metallization.

North State (Robertson) Mine (AuP)

Location: The North State mine is in the southwestern corner of Orange County, 10.3 miles west of Chapel Hill and 12.6 miles southwest of Hillsborough. The old workings can be reached by following SR 1957 south for 0.25 mile from the intersection of SR 1957 and N.

C. Highway 54. Follow an old mine road due west for approximately 100 feet, then turn S. 10° E. for 530 feet.

Workings: The mine was in operation between 1905 and 1910.

Geology: The mine was opened in a gossaniferous, brecciated quartz vein bordered by sheared felsic tuff that strikes N. 40° E. and dips 70° NW. Metallization consists of massive limonite-hematite after pyrite and chalcopyrite. A small amount of chalcocite and covellite is also present.

Stebbins Prospect (CuP)

Location: The Stebbins prospect is 6.4 miles southwest of Hillsborough and 6.6 miles northwest of Chapel Hill. The prospect can be reached by travelling 0.45 mile north on SR 1126 from the intersection of SR 1126 and SR 1006. Turn west (left) onto a farm and go to a barn west of a house. Continue to the gate at the back of the first pasture west of the barn. From the gate go 1035 feet S. 10° W. to the edge of the woods. Then go S. 60° E. for 430 feet to the workings.

Workings: Two rectangular prospect pits were opened on the property. One pit is 18 feet by 17 feet and filled with water to within 5 feet of the surface. The other pit is 3 feet by 5 feet and 2 feet deep.

Geology: The pits were opened in felsic lithic tuff containing disseminated pyrite. Some milk quartz float was observed, and it also contained pyrite. A copper show was reported; however, no evidence was found at the site during the investigation for this report.

E. M. Stroud Prospect (CuP)

Location: The E. M. Stroud copper prospect is in the southwest corner of Orange County, 14.2 miles southwest of Hillsborough and 9.3 miles west-southwest of Chapel Hill. The mine is on the east side of SR 1954, 0.7 mile south of its intersection with SR 1005.

Workings: The shaft was opened in the early 1800's to a depth of approximately 90 feet. In 1966, the shaft had been bulldozed shut.

Geology: The shaft was sunk on a milk quartz vein showing some copper metallization. The country rock is coarse-grained weathered diorite, containing minor disseminated pyrite. Pyrite and chalcopyrite occur as blebs in the quartz vein and are also along fractures in the quartz. Supergene chalcocite has replaced both pyrite and chalcopyrite. Malachite and azurite have formed on the chalcocite, chalcopyrite and pyrite. The gangue consists of quartz and chlorite with minor disseminated pyrite.

Weaver-Carr Prospect (AuP)

Location: The Weaver-Carr prospect is in southeastern Orange County 3.4 miles north of Chapel Hill and 8.5 miles southeast of Hillsborough. The prospect is in a field approximately 900 feet due south of SR 1733, 0.65 mile east of the intersection of N. C. Highway 86 and SR 1733.

Workings: One prospect pit, 20 feet long by 12 feet wide and 20 feet deep, was sunk in a 6 to 8 foot wide shear zone trending N. 60° E.

Geology: The shear zone intersects with a N. 40° W. trending quartz vein enclosed by sheared felsic tuff in contact with quartz diorite. Pyrite is disseminated through the quartz.

Womble Prospect (AuP)

Location: The Womble prospect is in central Orange County, 3.3 miles southwest of Hillsborough and 3.1 miles southeast of Efland. The prospect is on the north side of SR 1135, 0.15 mile west of the southern intersection of SR 1135 with SR 1134.

Workings: The prospect is a series of pits and trenches trending N. 20° W.

Geology: Prospecting was carried out in a quartz vein at least 6 feet wide. The vein is massive, brecciated and iron stained. Pyrite has altered to hematite and limonite, and gold was observed in limonite and hematite.

The vein trends N. 15° E. and dips southeast at 50°. The country rock is sheared felsic lithic tuff.

PERSON COUNTY

Person County, in the northern portion of the slate belt (figure 1), is underlain primarily by metavolcanic and metasedimentary rocks into which have been intruded igneous plutonic rocks. Large areas underlain by igneous intrusive rocks are in the vicinity of and southwest of the Town of Roxboro. Higher rank metamorphic rocks occupy the northeast corner.

Most of the production of metallic minerals in this county has been from copper deposits associated with rocks of the Virgilina district (see Virgilina district under Granville County).

Copper King Mine (CuP)

Location: The Copper King mine, in northeastern Person County, is 12.3 miles northeast of Roxboro and 5.9 miles east of Bethel Hill (figure 7). To reach the mine, go to the intersection of SR 1557 and SR 1542. From this point, go 400 feet along a dirt road trending N. 10° W., then 375 feet N. 45° E., across a small intermittent stream, to the mine.

Workings: This deposit was apparently only a prospect with a single shaft being opened to a depth of 100 feet. In 1966, one caved shaft full of dump material remained. Little production was indicated by the size of the dumps. In 1917, some development work was carried out by Tenvanoca Copper Company and later by Fisher and Corozza Brothers Company of Baltimore.

Geology: The prospect was opened in chlorite-sericite

phyllite which Laney (1917, p. 157) described as being an epidotized portion of the Virgilina greenstone. Stringers of epidote, calcite and quartz are common in the rock. The schist shows shearing and faulting (slickensides) with copper oxide prominent along shears and joints.

The ore minerals present include the following associations: bornite and chalcocite in a matrix of calcite, quartz and chlorite; cuprite with calcite and chlorite; bornite and chalcocite with secondary chalcocite coating in a matrix of quartz, epidote and calcite; fine sulphide (bornite) veinlet in chlorite along with fragments of epidote, quartz and calcite (breccia?); fractured bornite cube in clacite with calcite cementing the fractures in the bornite cube. Laney (1917) also mentions the presence of klaprothite, malachite and azurite. The sulphides were described as being intimately associated with the gangue minerals.

Copper World Mine (CuM)

Location: The Copper World mine is located in northeastern Person County, 10.1 miles northeast of Roxboro and 6.4 miles southeast of Bethel Hill (figure 7). To reach the mine, travel 0.9 mile north on SR 1542 from the intersection of SR 1542 and SR 1556. At the Adolphus Jones residence, go S. 80° E. for 800 feet from the south side of the southernmost white frame house to a walnut tree in the back pasture. From the tree go 650 feet N. 45° E. to an old road in the woods. Follow the old road through a fence, to an old railroad bed. From the railroad bed continue across an old road 2750 feet east and then S. 80° E. to the mine.

Workings: The mine was first opened in 1882 and a shaft was sunk to 60 feet. Drifts were driven at 30 and 60 feet. An examination of the property in 1966 revealed two shafts filled with water to within 10 feet of the surface. The small amount of dump seemed to indicate little production.

Geology: The mine was opened in chlorite phyllite containing some malachite on fractures. Quartz and calcite stringers crosscut the country rock. Metallization consists of malachite and chalcocite and possibly some cuprite in milk quartz.

Cross-Cut Mine (CuP)

Location: The Cross-Cut mine is in northeastern Person County, 8.1 miles northeast of Roxboro and 6.9 miles southeast of Bethel Hill (figure 7). On SR 1555 travel west for 0.4 mile from the intersection of SR 1555 and SR 1542. Turn north (right) onto a farm road trending N. 5° E. and go 1750 feet to the second intermittent stream. Go S. 55° E. for 150 feet to the mine dumps.

Workings: The Cross-Cut consisted of a prospect shaft approximately 70 or 80 feet deep. The shaft was opened in the bed of an intermittent stream. Southwest of the Cross-Cut vein, numerous small prospect pits were opened in quartz veins. In 1966, the shaft was filled with water to within 12 feet of the surface. Some waste and gangue was in the stream.

Geology: The country rock is sheared andesitic tuff, in some places next to the quartz vein sheared to chlorite-mica schist. The quartz vein is primarily milk quartz with minor chlorite, sericite and calcite. The vein is approximately 3 feet thick and trends N. 40° W. Metallization includes pyrrhotite, bornite, chalcocite, azurite, malachite and cuprite primarily along fractures in the quartz vein. Laney (1917, pp. 143-144) reported the presence of copper stains in other quartz veins in the vicinity.

Duke Mine (CuM)

Location: The Duke mine is in eastern Person County, 6.2 miles east of Roxboro and 3.3 miles northeast of Surl (figure 7). The mine is located by going south on SR 1573 for 0.35 mile from the intersection of SR 1573 with SR 1536. Turn west (right) onto a logging road and go 405 feet N. 80° W. then 120 feet N. 10° E. to the first prospect pit.

Workings: The Duke mine, formerly known as the Tingen mine, was worked primarily during the late 1890's. There were two main shafts, one of which was 280 feet deep and one which was about 225 feet deep. Two levels were driven from the deepest shaft but little stoping was done. From the shallower shaft, one level was driven and some stoping was carried out. In 1966, the shafts were caved and little dump remained.

Geology: Mining was carried out in quartz veins enclosed by chlorite-mica schist. Shearing in the schist trends N. 10° E. and dips vertically. Some quartz veins trend parallel to the schist, but others trend N. 10° W. and dip vertically. The veins are composed of milk quartz with chlorite and sericite and contain the primary ore minerals of chalcocite and bornite. Also, secondary chalcocite and malachite are present, primarily on shear planes and fractures. Specular hematite occurs disseminated in the schist. In addition to the above minerals, Laney (1917, p. 141) listed azurite, cuprite and chalcopyrite in the veins. Some silver and gold also occurred.

Durgy Mine (CuM)

Location: The Durgy mine is in northeastern Person County, 9.0 miles northeast of Roxboro and 6.6 miles southeast of Bethel Hill (figure 7). The mine is 300 feet N. 70° W. from the front of Poole's store on SR 1542, 0.13 mile south of the intersection of SR 1542 and SR 1559.

Workings: The Durgy was one of the first mines opened in the district and was active in 1892. Two shafts were originally sunk, one to a depth of 150 feet and the

other to a depth of 88 feet. The mine was known as the Yancey mine at that time. The mine soon became idle and was allowed to fill with water. Around 1899, the property was purchased by the Person Consolidated Copper and Gold Mines Company. Two shafts were sunk by this company and the deposit was worked sporadically until 1908 when it closed. The Tennesee Copper Company worked the mine from 1910 until 1911. The Durgy mine was more extensively developed than any other mine in the district. A 410-foot deep shaft and a 160-foot deep shaft were opened, and more than 4,000 feet of drifting was done in the vein. Almost everything above the 335-foot level was stoped out. The mine was later opened again but closed in 1918.

In 1942, the U. S. Bureau of Mines bulldozed 1,141 feet of trenching, put down 5,713 feet of diamond drilling, restored some shafts and carried out a geophysical survey of the vein area (Newberry and others, 1948). No new ore shoots were discovered during this work, but the known ore shoots did persist at depth. In 1966, three or more shafts were visible in a line trending due north. The shafts were caved, choked and flooded, and the shaft openings were approximately 50 feet in diameter and 25 feet deep. A large dump remained.

Geology: The country rock is bleached andesitic or rhyolitic lithic-crystal tuff. Some of the fragments appear to have been feldspar crystals that have altered to clay minerals. There is also some sericite. One specimen has coarse fragments, the other fine fragments — both have some biotite and minor amounts of epidote. In addition, there are lavender-purple, greenish-gray and tan argillites on the dump.

A 5-foot wide quartz vein trending N. 5° W. crops out at the mouth of the main shaft. The country rock shows signs of bleaching next to the vein. The shears and joints in this quartz vein are generally filled with malachite. Shearing in the vein is parallel to the strike, but the joints appear normal to the strike. The ore in the quartz vein is primarily chalcocite, bornite and covellite. Malachite and cuprite are the main minerals of secondary enrichment.

The gangue is mainly chlorite, quartz, sericite and limonite. The selvage has been altered to chlorite schist with at least two ages of quartz present. Minor amounts of chalcocite(?) have been observed in drill core of the crystal tuff. In places, the vein is vuggy and fractured. Malachite, cuprite and limonite are commonly found in the vugs and fractures. The metallization has formed in preexisting fractures in the quartz. Pyrite is not common and only minor epidote was observed.

Laney (1917) stated that there are at least four copper-bearing veins on the property, but only the "main vein" was extensively developed. The "main vein" was traced for nearly a mile along strike and averaged from 6 to 18 feet in width. The ore minerals were listed as being bornite, chalcocite, malachite, azurite, cuprite, argentite(?), minor chalcopyrite, klaprothite, and a small amount of gold. These ore minerals are intergrown with the gangue minerals and are considered contemporaneous. Total production from the Durgy mine is not known, but it was one of the largest producers in the Virgilina district.

Durgy Gold Prospects (AuP)

Location: The Durgy Gold prospects are in northeastern Person County, 11.7 miles northeast of Roxboro and 5.8 miles southeast of Bethel Hill (figure 7). From the intersection of SR 1542 with SR 1558, go 400 feet on SR 1558 and then turn left and go N. 50° E. for 200 feet. The pits are located north of a power line.

Workings: Two small pits, the largest of which was 6 feet by 4 feet by 2 feet, were filled with leaves.

Geology: Around the pits, some iron-stained quartz gossan was found. Limonite after pyrite was present and possibly some chalcopyrite. Milk quartz float was abundant. The schistosity of the country rock, sheared felsic tuff, trends N. 40° - 50° E. and dips vertically.

Old Durgy Mine (CuP)

Location: The Old Durgy mine, in northeastern Person County and 0.5 mile north-northeast of the Durgy mine, is 9.4 miles northeast of Roxboro and 6.4 miles southeast of Bethel Hill (figure 7). The mine can be reached by travelling 0.14 mile east on SR 1559 from the intersection of SR 1559 with SR 1542. Turn left (north) onto a logging road and continue for 2280 feet. The mine is 50 feet north of the road.

Workings: In 1966, the workings consisted of two pits or shafts 25 feet apart on a line trending north-south. The northern pit was filled with water to the surface and was 25 feet square. The southern pit was open to a depth of 12 feet and was 30 feet square. There is no record of production.

Geology: Prospecting was carried out in a quartz vein that is fractured and healed with silica. The country rock is chlorite-mica-sericite schist, but some andesitic tuff is around the prospects.

Massive chalcocite occurs intermixed with epidote and quartz in the vein and some exhibits cubic form. Vugs in the quartz contain secondary quartz, malachite, cuprite, manganese and limonite and minor calcite. Chalcocite, malachite and cuprite also fill fractures in brecciated portions of the vein. Hemimorphite has been deposited as mamillary, botryoidal coatings on some cuprite. Minor amounts of bornite and covellite are in small fractures. A few flakes of gold were noted in the tuff.

Jeffers Mine (CuP)

Location: The Jeffers mine, in eastern Person County, is 7.2 miles east of Roxboro and 7.9 miles southeast of

Bethel Hill (figure 7). To reach the mine go 0.1 mile north on SR 1542 from the intersection of SR 1542 and SR 1574. Turn north (left) and go 300 feet N. 25° W. to the mine.

Workings: In 1966, the mine consisted of one 8 foot by 10 foot shaft filled with water to within 5 feet of the surface. A small pit 2 feet deep was southeast of the shaft.

Geology: The shaft was opened in a quartz vein enclosed by sheared andesitic tuff. Next to the vein, the tuff has been sheared to a chlorite-mica schist striking N. 20° E. and dipping vertically. Bornite, chalcocite and malachite are on fractures in the country rock and in quartz. Gangue minerals include quartz, specularite, chlorite and sericite.

RANDOLPH COUNTY

In Randolph County (figure 1) rock types include primarily northeast-trending mafic to felsic pyroclastic and flow rocks interbedded with epiclastic rocks. Small igneous bodies have intruded the slate belt rocks at various places. Metal mining has been primarily for gold from deposits scattered throughout the county.

Allred (Aldred, Burns, Overton, Randolph) Mine (AuM)

Location: The Allred mine is in northeastern Randolph County, 9.9 miles northeast of Asheboro and 5.0 miles north-northwest of Ramseur. The mine is reached by travelling 0.97 mile east on SR 2453 from the intersection of SR 2453 and N. C. Highway 22. Turn south (right) onto a logging road on the opposite side of the road from Cool Springs Baptist Church. Follow the logging road S. 55° W. and then S. 20° E. for 0.33 mile. The mine is on the left side of the road.

Workings: The mine was worked before and after the Civil War. In 1906, prospecting was carried out on the property by digging trenches 6 feet deep and by panning portions of the weathered rock. Some production was reported in 1920, 1921 and 1923, and considerable prospecting was carried out again in 1933. In 1968, a small trench striking N. 35° W. and a 12 foot by 12 foot by 6 foot prospect pit were on the property. Some dump material was present.

Geology: The mine was opened in a bleached and sheared felsic volcanic rock or argillite. Iron staining occurs throughout the rock and relic pyrite structure is present. Small tourmaline crystals are in a brecciated, milky, iron-stained, saccharoidal quartz vein. The quartz selvage is iron stained and appears to have contained disseminated pyrite and possibly chlorite. Hematite fills cubes in the selvage. No primary metallization was noted during the present study. Earlier reports indicate that the gold was difficult to recover because of its fineness and that the limonite pseudomorphs assayed higher than did the ore.

Branson Mine (AuP?)

Location: The Branson mine is in south-central Randolph County, 6.5 miles south-southwest of Asheboro and 6.9 miles northwest of Seagrove. The mine can be reached by travelling 0.45 mile west on SR 1142 from the intersection of SR 1142 and SR 1114. At this point, turn south along the east bank of Little River and continue to the mine.

Workings: The mine consists of a series of pits, shafts and drifts, caved and uncaved, trending perpendicular to the vein.

Geology: The country rock, striking N. 37° E. and dipping 70° NW., is possibly a severely altered felsic tuff composed of quartz, sericite, kaolin and lesser amounts of chlorite and minor phlogopite. Magnetite crystals are disseminated through the country rock.

Mylonite, along shear of fault zones, is altered to quartz-chlorite-sericite phyllite with minor magnetite; the phyllite is extremely iron stained. Some kaolin is present. The rocks in the fault zone, which trend N. 40° E. and dip vertically, are bleached and altered. All that remains are angular quartz crystals, kaolin and sericite. Milky quartz, apparently not associated with the main workings, contains altered biotite(?) or phlogopite. No sulphides or gold were observed.

Copple, Spencer and Ruth Mines (AuP)

Location: The Copple, Spencer and Ruth mines are in western Randolph County, 12.6 miles northwest of Asheboro and 12 miles west-southwest of Randleman. To reach the mines, go to the Mt. Zion Methodist Church, which is 0.15 mile east on SR 1551 from the intersection of SR 1551 and SR 1406. From the west side of the church, go south for 750 feet down an old road to the mines.

Workings: Numerous old cuts and dirt piles are along valleys at the workings. A trench, 30-35 feet wide, several hundred feet long and 6 feet deep, trends N. 40° E.

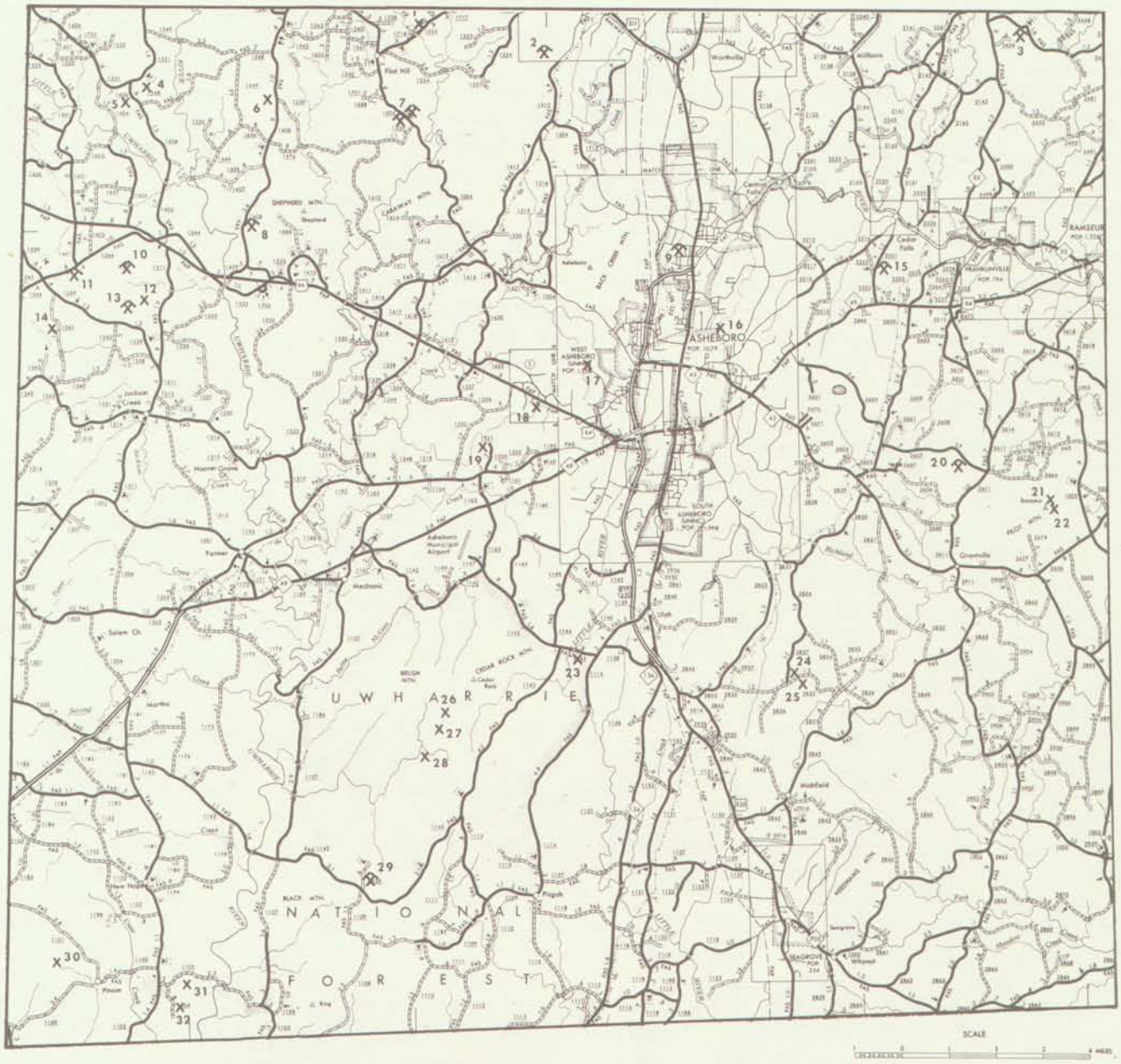
Geology: No description available.

Delft or Lafflin (Delph, Lofflin) Mine (AuP)

Location: The Delft or Lafflin mine is in western Randolph County, 13.2 miles west of Asheboro and 15.3 miles southwest of Randleman. The mine is near the west side of SR 1341, 0.60 mile south on SR 1341 from the intersection of SR 1341 and SR 1339.

Workings: The workings consist of three small pits, not over 8 feet deep, and a long trench 300 ± feet long, trending N. 70° W. There was no apparent production.

Geology: The country rock is a sheared iron-stained mylonite of either a felsic volcanic or argillite. There has been bleaching and some silicification(?) and sericitization(?). Iron-stained, fractured, gossan-like quartz trends



1 Merrill
2 New Sawyer
3 Allred
4 Copple, Spencer
5 and Ruth
6 Jones and Laughlin
7 Sawyer Complex
8 Hoover Hill
9 Scarlett
10 Jones-Keystone
11 Southern Homestake
12 Kindley
13 Parish
14 Delft
15 Redding
16 Pritchard
17 Gray
18 McAllister
19 Newby
20 Spoon
21 Pilot Mtn. No. 1
22 Pilot Mtn. No. 2
23 Branson
24 Smith
25 Goliham and Smith
26 Dowd
27 Rush
28 Gluyas
29 Uharie
30 Talbert and Hill
31 Griffin
32 Stafford

Figure 19. **Randolph County Deposits**

N. 70° E. in a 4 to 6 inch wide vein. The gossan may be after chlorite or specularite. Near the vein, the country rock is iron stained.

The dumps contain saccharoidal quartz and sericite selvage that is badly iron stained and coated with goethite and hematite on fractures. The selvage is sheared. Some clear and milky quartz is brecciated and contains goethite, limonite and sericite in the fractures. Secondary quartz crystals are in open fractures in the vein quartz. There is no indication of primary metallization except for a few rectangular impressions or molds in the selvage and quartz.

Dowd Mine (AuP)

Location: The Dowd mine is in southwest-central Randolph County, 9.1 miles southwest of Asheboro and 8.3 miles northwest of Seagrove. To reach the mine, travel 2.65 miles south on SR 1143 from the intersection of SR 1143 and SR 1142. Turn west (right) onto a farm road and go 0.4 mile to a fork. Take the right fork and go 0.25 mile to another fork. Take the left fork and go 0.45 mile to the National Forest boundary. At this point, follow the west fork for 0.3 mile. The mine is 100 feet northeast of the road.

Workings: The workings trend N. 25° E. and consist of many small pits and trenches in a small stream valley. There is a small drift and adit in a pit near the stream. The workings extend for 400 feet from the stream S. 20° W. towards the road.

Geology: The mine was opened in a hard, dense, blue-gray rhyolite in which small feldspar phenocrysts are weathering to clay minerals. On the dumps, there is a bleached mylonitic selvage with minor biotite. The selvage is barren of metallization and biotite and minor muscovite plates are aligned parallel to the shearing. Some flow banding is apparent in the rhyolite. Minor iron staining is present, possibly from the biotite. No metallization was noted.

Gluyas Mine (AuP)

Location: The Gluyas mine is in southwest-central Randolph County, 9.7 miles southwest of Asheboro and 8.3 miles northwest of Seagrove. The mine is 0.6 mile southwest of the Rush mine. The Gluyas mine is 300 feet N. 50° W. from Hannahs Branch along an old logging road. The mine is reached by travelling 2.65 miles south on SR 1143 from the intersection of SR 1142 and SR 1143. Turn right at the home of Jay Williams onto a westerly trending farm road. Continue west for 0.4 mile to the fork in the road and take the left fork for 0.9 mile to the mine.

Workings: The workings consist of some old pits and trenches with small dumps. Production was probably minor.

Geology: The country rock is a felsic lithic-crystal tuff which has been silicified. The selvage is primarily chlorite and sericite. Barren vein quartz is present, and small amounts of magnetite altering to hematite is the only indication of metallization. Small amounts of fine-grained epidote are associated with the country rock. Chlorite fills fractures in the quartz and is altering to hematite and limonite. A small amount of pyrophyllite(?) may be present.

Goliham and Smith Mine (AuP)

Location: The Goliham and Smith mine is in south-central Randolph County, 7.0 miles south-southeast of Asheboro and 5.0 miles north of Seagrove. The mine is 0.3 mile southeast of the Smith prospect. To reach the mine, travel 0.2 mile east on SR 2835 from the intersection of SR 2835 and SR 2837. The mine is south of SR 2835 and is beside the road.

Workings: The workings consist of ten shallow pits trending N. 40° E. and a trench trending N. 50° W. No production is indicated.

Geology: The pits were opened in a sheared quartz-sericite felsic volcanic rock containing feldspar altering to clay. Shears in the rock strike N. 30° E. and dip vertically. Iron, after chlorite(?) or biotite(?), stains vugs in the rock. No metallization was noted during the current investigation (1968).

Gray Mine (AuP)

Location: The Gray mine is in central Randolph County, 1.9 miles west of Asheboro and 7.0 miles south-southwest of Randleman. The mine is reached by travelling 1.0 mile northwest on SR 1433 from the intersection of SR 1433 and SR 1424. The mine is east of the road.

Workings: The Gray mine consists of a cluster of 6 pits and a few trenches. All the workings are overgrown with large trees. The mine may have started as a placer deposit in an intermittent stream bed.

Geology: Prospecting at this mine was carried out in a sheared, iron-stained, rhyolitic, lithic-crystal tuff containing inclusions of chlorite, pyrite and mica. Magnetite, pyrite and blebs or clots of chlorite are in the banded tuff, and hematite stains many fractures. Metallization is minor and no ore minerals of any kind was observed during the present study.

Griffin Mine (AuP?)

Location: The Griffin mine is in southwest Randolph County and is 0.5 mile north of the Stafford mine. To reach the mine, travel 1.65 miles west on SR 1105 from the intersection of SR 1105 and SR 1107. Turn south (left) onto a logging road and go 0.2 mile to the mine, which is on the east side of the logging road.

Workings: in 1968, a shaft filled with water was on the property. At a depth of 10 feet, a drift trending N.

70° E. was cut. It appears that production was minor.

Geology: The shaft was opened in a 6.5 foot wide, iron-stained, mylonitized shear zone striking N. 25° E. and dipping 70° SW. The quartz-sericite selvage is iron stained on some shear planes. Black, vitreous, mamillary limonite occurs on quartz grains, and limonite crystals fill cavities in the mylonite. Some cubic cavities are stained or filled with earth-brown limonite after pyrite(?). A small amount of kaolin may be on some shear planes. No primary metallization was observed.

Hoover Hill Mine (AuM)

Location: The Hoover Hill mine, in western Randolph County, is 9.5 miles west-northwest of Asheboro and 10.7 miles southwest of Randleman. The mine can be reached by travelling 2.0 miles north on SR 1408 from the intersection of U. S. 64 and SR 1408. The mine is located along an old road trending S. 10° E. at this point and is 450 feet from SR 1408.

Plate 8A. Shaft at Hoover Hill Mine

Workings: The deposit was discovered in 1848 by Joseph Hoover and was worked for several years. The mine was reactivated in 1881 by the Hoover Hill Gold Mining Company, Ltd., of London, England and operations continued until 1895. In 1914, the mine was dewatered and a small production was reported in that year. Some production was also reported in 1917. Total production was reported to be $350,000.

The deposit was worked from two main shafts, the deepest of which was 350 feet. In 1968, four main shafts were located. The shafts were filled with water to within 100 feet of the collar. Many smaller shafts and adits are in the workings (Plate 8, A & B).

Geology: The ore was taken from pockets or chimney-like shoots. The largest body was 12 feet wide at its widest point and 70 feet long. The bodies occurred in

Plate 8B. Shaft at Hoover Hill Mine

northeast-trending, sheared and brecciated zones of rhyolite. Older reports indicate that free gold was found along the planes of contact between the quartz in the shoots and the sheared rhyolite. Sphalerite is disseminated through the sheared and brecciated zones in the rhyolite. The color of the sphalerite ranges from reddish black to light greenish brown. Pyrite (auriferous?) is disseminated throughout, generally exhibiting good cubic outlines. Some pyrite has been smeared out along fractures while other pyrite was emplaced with the quartz that healed the fractures. The sphalerite is usually associated with the more fractured zones and is disseminated through the silicified zones and sheared, brecciated country rock. There is massive white orthoclase feldspar in the brecciated rhyolite that, along with the quartz, has healed fractures. The biotite in the breccia appears confined to clots or clusters, some of which show minor silicification. Chlorite is minor and is disseminated through the quartz-feldspar matrix. A few pieces of bornite have been observed in the breccia. The ore deposit is apparently fault controlled.

Jones-Keystone Mine (AuM)

Location: The Jones-Keystone mine is in western Randolph County, 11.7 miles west of Asheboro and 13.3 miles southwest of Randleman. To reach the mine, travel 1.0 mile southwest on SR 1344 from its intersection with U. S. Highway 64. Turn south (left) onto a farm road and go 0.65 mile. The mine is 100 yards S. 50° W. of the old farm road.

Workings: The mine was active in 1852 and was apparently operated until the Civil War. The mine was reopened in the late 1870's but was idle from 1881 to 1883. In 1884, the mine was reopened and was worked intermittently until 1903. A considerable amount of development work was undertaken in the 1930's but

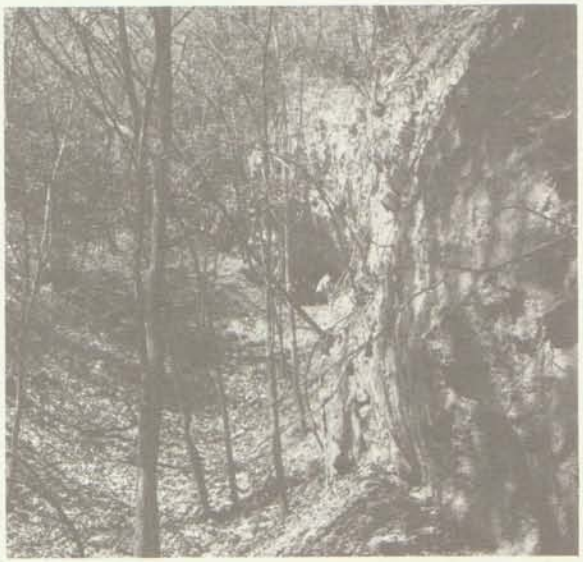


Plate 8C. Open cut , Jones-Keystone Mine

there is no record of production. Mining was carried out in two large open pits and several shafts. In 1968, many large pits and shafts remained along with three Chilean mills and one or more cyanide vats.

Geology: Mining was concentrated in sheared, silicified, felsic volcanic rock. Minor quartz stringers in the silicified zone strike N. 30° to 48° E., and dip vertically. The silicified zone and the workings strike N. 60° E. and the zone dips 80° NW. Pyrite and pyrite cavities are disseminated throughout the zone.

Earlier reports indicate pyrophyllite composes a major portion of some samples. The silicified zones were said to be about 50 feet wide and iron-rich zones exposed were 30 feet wide. Gold was supposedly disseminated throughout the rock and a great deal of it was lost during processing because of the fineness of the gold.

Jones and Laughlin Mine (AuP)

Location: The Jones and Laughlin mine is in western Randolph County, 10.2 miles northwest of Asheboro and 9.3 miles west-southwest of Randleman. The mine is 510 feet due west of the intersection of SR 1408 and SR 1539.

Workings: One partially filled shaft was on the property in 1967. Apparently, only prospect work was carried out here.

Geology: Prospecting was carried out in a quartz vein enclosed by gray-green to black, porphyritic rhyolite. The quartz is fractured and healed with silica and contains pyrite altering to limonite in the fractures. Pyrite and chalcopyrite after pyrite are also in the fractures. The rhyolite contains disseminated vugs filled with limonite which has altered from pyrite. The rhyolite is fractured, and the phenocrysts, now altered, seem to have been orthoclase. Minor felsic tuffs are associated with the rhyolite.

Kindley (Wilson) Mine (AuP)

Location: The Kindley mine is in western Randolph County, 11.5 miles west of Asheboro and 13.4 miles southwest of Randleman. The Jones-Keystone mine is 0.7 mile north of the Kindley, and the Parish mine is 0.3 mile southwest. The mine is reached by travelling 1.15 miles south on SR 1311 from the intersection of SR 1311 and U. S. Highway 64. Turn west onto a farm road and continue 0.35 mile to a farm house at the end of the road. The mine is 480 feet due south from the south side of the farm house.

Workings: Several small shallow pits and trenches are on the property. The mine was apparently active in the 1890's, but there are no records of production.

Geology: The country rock is a bleached, sheared, iron-stained, felsic volcanic rock. The shearing strikes N. 40° E. and dips 70° NW. Most of the country rock is altered to sericite, clay minerals and quartz. The country rock contains minor rectangular vugs which may have formed from feldspar crystals. Long, thin blebs of ocher hematite in the rock may be from specularite. There is no evidence of gold.

McAllister (Davis Hill) Mine (AuP)

Location: The McAllister mine is 3.1 miles west-southwest of Asheboro and 4.4 miles southwest of Balfour. The mine can be reached by turning onto a logging road on the southwest side of U. S. Highway 64 opposite the intersection of U. S. Highway 64 and SR 1708. Follow the logging road for 450 feet in a S. 20° W. direction. Then follow the road 270 feet in a S. 55° E. direction. Turn south-southwest and continue 300 feet, and then go S. 85° E. for 180 feet to the mine.

Workings: This property was prospected prior to the Civil War by means of a pit 20 feet in diameter and 30 feet deep. In 1968, there were three pits present and a trench 200 feet long trending N. 35° W. at one point and trending N. 10° E. at another. The north end of the workings consists of caved adits and drifts going into the hill.

Geology: Prospecting was carried out in a sheared zone of felsic volcanic rock which trends N. 15° E. and dips 70° NW. The country rock has been sheared to a sericite-chlorite-quartz phyllite containing pyrite and arsenopyrite. Portions of the phyllite have been bleached and silicified and much of the material is iron stained. A few relic crystal and lithic fragments occur in the sheared rock. Epidote, magnetite, hematite, limonite and specularite are also present. Pratt (1907) reports that "a 60 foot zone of hard oxidized slates with many lenses (18 inches by 10 feet or less) of coarser schist containing limonite cubes," was prospected.

Merrill Mine (AuP)

Location: The Merrill mine, in northwestern Randolph County, is 9.0 miles northwest of Asheboro and 5.0 miles west of Randleman. The mine can be reached by travelling 1.18 miles northeast on SR 1525 from the intersection of SR 1525 and SR 1004. Turn northwest (left) onto a logging road and continue 0.15 mile N. 65° W. to the mine.

Workings: In 1968, the workings consisted of a cluster of 8 to 10 pits with one 12 foot by 10 foot shaft. The shaft is 60 feet deep and dry. Most of the dump material has weathered to soil.

Geology: Prospecting was carried out in a sericitized, silicified mylonite containing pyrite altered to limonite. The country rock is a sheared felsic volcanic rock (rhyolite?). The iron-stained, milky, vein quartz is barren and saccharoidal in places. The quartz-sericite selvage contains rectangular impressions in a few places filled with limonite and hematite. No primary metallization was noticed during the present investigation.

Newby (Newberry) Mine (AuP)

Location: The Newby mine is in west-central Randolph County, 4.5 miles west-southwest of Asheboro and 10.4 miles southwest of Randleman. To reach the mine, travel to the north end of SR 1321 to a frame farm house. From the southwest corner of the farmhouse, go S. 85° W. for 650 feet to the edge of a field, go S. 20° W. for 180 feet to the mine.

Workings: The workings include two shafts and many pits and trenches. The main shaft, which may be 100 feet deep, is filled with water to within 10 feet of the surface. The workings trend N. 25° E. for about 200 feet and are parallel to shearing in the country rock. There is no record of production at this mine.

Geology: The shaft was opened in felsic volcanic rock, possibly rhyolite, that has been intruded by blue-gray granite or quartz monzonite. The intrusive contains pyrite, chalcopyrite(?) and magnetite. Rocks near the contact between the intrusive and volcanic rocks contain disseminated sulphides. Also near the contact, the igneous rocks become fine grained and xenoliths of rhyolite occur in the granite near the chilled border. The volcanic rocks are almost completely silicified but contain some relic structures that may have been either crystal or lithic fragments.

New Sawyer Mine (AuM)

Location: The New Sawyer Mine is in north-central Randolph County, 7.1 miles northwest of Asheboro and 3.6 miles southwest of Randleman. The mine can be reached by travelling southwest on SR 1415 for 0.95 mile from the intersection of SR 1415 and SR 1514. Turn west (right) onto a road to the Rosswell farm and go for 0.5 mile to the mine.

Working: The New Sawyer mine was apparently in operation about 1902 and some sampling was carried out again in 1930. Several shafts, ranging from 30 to 60 feet deep, were sunk on the property. A visit to the property in 1968 revealed several shafts, a series of northeast-trending trenches and a stope. Drifts trending N. 45° W. are about 30 feet down the shafts. The area adjoining the mine workings has been heavily prospected by pits and trenches. The deepest shaft appears to be approximately 100 feet deep.

Geology: The country rock is a felsic volcanic rock or argillite, and mining was carried out in a bleached, sericitized and silicified mylonite. Operations ceased when sulphides were encounterd. Rhyolites near the workings have been injected by diorite dikes striking N. 20° E. Sheared, and apparently barren, iron-stained, milky quartz is on some of the dumps. The diorite dikes contain minor disseminated pyrite and magnetite.

The gold apparently was concentrated in a mylonite zone composed of fine-grained quartz flour, sericite and kaolin. This mylonite contains disseminated pyrite both in cube form and in smeared fractured crystals. The fractured pyrite crystals are filled with quartz and sericite. Possibly there are two ages of pyrite or some of the pyrite cubes were not affected by later movement. It is possible that the gold is contained in the pyrite. In some of the mylonite, the pyrite is altered to hematite which has caused considerable staining in the quartz and sericite.

Fine-grained saccharoidal quartz with blebs of disseminated biotite and phlogopite mica occurs in parts of this silicified mylonite. Some of this type of mylonite contains pieces of quartz and feldspar as well as relic pyrite altered to hematite along fractures. Quartz flour mylonite with relic (hematite) pyrite and clear quartz along fractures is present.

Parish Mine (AuM)

Location: The Parish mine, in western Randolph County, is in a cluster of mines including the Jones-Keystone, Southern Homestake, Kindley and Delft or Lafflin mines. The Parish mine is 11.6 miles west of Asheboro and 13.8 miles southwest of Randleman. To reach the mine, travel 1.0 mile north on SR 1311 from the intersection of SR 1311 and SR 1339. Turn west (left) onto a farm road and continue 0.7 mile. Turn right and go an additional 0.13 mile north to the mine.

Workings: Seven shafts, the deepest of which is 68 feet, are on the property. The mine is on the property of Mr. F. A. Briles who reported that the ore was taken to the Jones-Keystone mill for processing.

Geology: The country rock at the Parish mine is gray phyllite, white, bleached mylonite (phyllite?) and altered rock composed of quartz, tremolite, sericite, chlorite and hematite. This last rock could be the hydrothermal alter-

ation product of a silty-sandy limestone. The altered rock is bleached so that some pieces of fresh rock have a porous texture. The phyllite is in contact with it. The altered rock contains some fine-grained disseminated pyrite. Most of the pyrite in the altered rock and in the phyllite has been oxidized to "limonite" and hematite. There is finely disseminated pyrite altering to limonite in the bleached, phyllitized quartz-sericite mylonite. Also, there is considerable fine-grained pyrite as well as some tremolite in the phyllite. It is possible that the pyrite was auriferous and the mylonite and phyllite contained the ore. Some barren, iron-stained, milk quartz is also present.

In general, it appears that metamorphism at this mine is higher than that normally found in the slate belt. It is possible that contact metamorphism occurred in this area.

Pilot Mountain Mine No. 1 (AuP)

Location: The Pilot Mountain No. 1 mine is in eastern Randolph County, 8.4 miles southeast of Asheboro and 5 miles south of Ramseur. The mine is located on a south-trending farm road on the west side of Pilot Mountain. The farm road is south on SR 2664, 0.60 mile from the intersection of SR 2664 and SR 2607.

Workings: The workings consist of trenches trending N. 65° E. and a few old pits.

Geology: The pits were opened in a sheared felsic tuff striking N. 60° E. The tuff is a silicified welded lithic tuff which contains disseminated hematite. The rock has been bleached and brecciated in the vicinity of the workings. Some saccharoidal and milky bull quartz is also present. Minor secondary manganese oxide and limonite coat fractures in the rock.

Pilot Mountain Mine No. 2 (AuP)

Location: The Pilot Mountain No. 2 mine is in eastern Randolph County, 8.4 miles southeast of Asheboro and 5 miles south of Ramseur. To reach the mine, travel 0.60 mile south on SR 2664 from the intersection of SR 2664 and 2607. At this point, follow a farm road south for 0.45 mile then turn east and continue for 0.2 mile to the mine.

Workings: The workings consist of a caved shaft 6 feet by 8 feet by 10 feet and three major trenches in a stream drainage. The major trenches trend northwest with minor trenches trending in various directions.

Geology: The mine was opened in a silicified, sericitized and bleached zone of felsic lithic-crystal tuff. Hematite is disseminated throughout the rock. At the mine workings, the rocks have been brecciated and altered to chlorite-sericite phyllite containing kaolin. The rocks are iron-stained with limonite and hematite. A fine-grained saccharoidal quartz with quartz phenocrysts and limonite and hematite in vugs and fractures is also on the dumps. Minor phlogopite and sericite is in the quartz. Little bull quartz was found during the present investigation and no sulphides were noted.

Pritchard (Pritchett) Mine (AuP)

Location: The Pritchard mine is in central Randolph County, 1.2 miles northeast of Asheboro and 1.4 miles southeast of Balfour. The mine is just east of the Acme McReary plant on the east side of a stream.

Workings: The mine was reportedly operated for about 3 months and did not show a profit (Mr. G. P. Pritchard, Oral Communication). The workings consist of placer diggings along the stream.

Geology: The workings were in an alluvial terrace near the stream.

Redding Mine (AuM)

Location: The Redding mine is in east-central Randolph County, 4.7 miles northeast of Asheboro and 4.7 miles west of Ramseur. To reach the mine, travel 200 feet south on SR 2222 from the intersection of SR 2221 and SR 2222. Turn east (left) onto a logging road and continue 0.2 mile to the mine.

Workings: The mine apparently had some production prior to 1906 with a shaft being opened in a stream bed. In 1906, the shaft was reopened to a depth of 55 feet with a 10 foot long drift. Other shallow pits were opened along the stream drainage with minor cuts into the hillsides. In 1934, the deposit was tested with a G-B portable washing machine. A single wooden building remained on the property in 1968.

Geology: The main shaft was opened on a one-half inch to 6 inch wide white quartz seam that was reported to carry chalcopyrite and gold. The country rock is a porphyritic rhyolite containing orthoclase and quartz phenocrysts in a dense, silicic, black alphanitic groundmass. Minor hematite, possibly after magnetite, is present. Ilmenite(?) is in quartz stringers in the country rock. The milk quartz veins are essentially barren with minor healed fractures. There is minor pyrite in the rhyolite and in sheared mylonitized rhyolite. There is also a fine-grained biotite granite associated with this mine. The biotite is altering to chlorite and there is minor muscovite in the granite. The mylonite has been bleached and is now primarily fine-grained quartz with some relic feldspar crystals.

Rush Mine (AuP)

Location: The Rush mine is in southwest-central Randolph County and is 0.3 mile south of the Dowd mine. The mine is 8.1 miles southwest of Asheboro and 7.3 miles northwest of Seagrove. To reach the mine, travel 2.65 miles south on SR 1143 from the intersection of SR 1143 and SR 1142. Turn west (right) onto a farm road and continue 0.4 mile to a fork. Take the right

fork, trending north, for 0.25 mile to another fork. Take the left fork for 0.45 mile and then take the left fork at the National Forest boundary. Continue for 0.15 mile to the mine site. The mine is in a ravine and on hillsides N. 60° W. from the end of the road.

Workings: The workings consist of a few pits and trenches on each side of a small stream with considerable workings along the stream. There is no recorded production.

Geology: Prospecting was carried out in a blue-gray porphyritic rhyolite containing finely disseminated biotite and pyrite. Silicified mylonite selvage containing minor biotite and sericite is associated with the rhyolite. The mylonite is iron stained in places. The rhyolite is brecciated, particularly along the stream, and in places the fractures have been healed by quartz.

Sawyer Mine (AuM)

Location: The Sawyer mine, located in northwest-central Randolph County, is 7.8 miles northwest of Asheboro and 6.8 miles southwest of Randleman. The mine is located on both the northeast and southwest sides of SR 1004, 0.23 mile northwest on SR 1004 from the intersection of SR 1004 and SR 1539. The workings farther northeast of the road are also referred to as Brummel Hill.

Workings: The mine was first worked prior to 1856 and has been sporadically worked since. A total of seven shafts were opened on the vein with the deepest shaft being 150 feet. Some prospecting was carried out in the early 1930's. In 1968, there were extensive workings on the west side of SR 1004. Large open pits with accessible portals and drifts extended west from the road for about 500 feet. Northeast of the road many shafts, pits and trenches were opened along a length of about 500 feet.

Geology: The mine is located in a quartz-sericite mylonite that appears to be at least 100 feet thick, strikes N. 40° E. and dips 50° NW. The shear zone possibly contains pyrophyllite, and quartz stringers and veinlets are common in the selvage. The selvage is extremely iron stained, and what appears to be goethite coats some fractures. Brownish-black hematite, biotite and chlorite are also present. The quartz veins and veinlets associated with this mine are iron stained and appear to be barren. Fractures in the quartz have been healed with silica. Much of the quartz is saccharoidal.

Previous reports state that the gold was found in five or six parallel "beds" of slate and that the lode was a mineralized zone. The sulphides were reported to begin at a depth of 80 feet and were fine grained. In the wall rock, pyrite cubes as large as one inch on a side were found. The mineralized zone ranges from 6 to 50 feet in thickness and averages 15 feet.

Scarlett Mine (Au, CuM)

Location: The Scarlett mine is located in central Randolph County, 2.4 miles north of Asheboro and 8.9 miles west of Ramseur. The mine is in the Town of Balfour and can be reached by travelling 0.1 mile south on SR 1499 (Sky Drive) from the intersection of SR 1499 and SR 1500 (Bailey Street). The mine is west of SR 1499 behind Hinshaw Mill.

Workings: The Scarlett mine was originally opened as a gold mine about 1882. The original working consisted of the development of a 60 foot shaft and almost 200 feet of drifting. A second shaft was later sunk to the 120 foot level with development for 500 feet along the veins. A third shaft, 120 feet deep, was also sunk. The mine closed after a few years but was reopened and worked for copper between 1899 and 1915. The ore was reportedly shipped to Ducktown, Tennessee; Charlotte, North Carolina and Norfolk, Virginia. Most of the work between 1910 and 1918 was done by the Tenvanoca Copper Company. Sampling was carried out on the property in 1930 and 1940 by the U. S. Smelting, Refining and Mining Company and in 1948 the mine was unwatered by J. I. Moore.

In March and April of 1948, the U. S. Bureau of Mines put down three diamond-drill holes on the property (Kline and Dosh, 1949). The drilling disclosed that the vein did not extend over 300 feet along strike and was limited in depth to the contact with granite mylonite. In 1969, the shafts were filled. The main shaft has been converted to an auxillary water supply with a pumphouse covering the shaft.

Geology: There are reported to be three 6 inch to 30 inch wide veins on the property striking nearly north and dipping approximately vertically. The veins widen with depth, but then apparently narrow to stringers. The country rock appears to be a rhyolite containing finely disseminated biotite. A second rock type is a quartz-sericite-chlorite mylonite which contains minor disseminated pyrite, sphalerite and chalcopyrite. These minerals also fill fractures in the mylonite. There appears to be two colors of sphalerite in the mylonite, golden tan-brown and black-brown. Also some pyrite is noted embaying the black-brown sphalerite. Silicified chlorite in quartz with minor pyrite in fractures in the silicified chlorite is also present. Sericite and chlorite are deformed (sheared out) in the mylonite along with actinolite. Minor epidote is in fractures of the mylonite.

The main ore seems to have been a massive sulphide body composed primarily of sphalerite, chalcopyrite and pyrite with minor chalcocite and covellite on the pyrite. Secondary minerals are malachite, zinc oxide and limonite. Gold, as well as copper and zinc, was mined but most of the dump was hauled away by the highway department for road metal. A considerable amount of massive sulphide remains.

Smith Prospect (AuP)

Location: The Smith prospect is in south-central Randolph County, 6.7 miles south-southeast of Asheboro and 5.2 miles north of Seagrove. The prospect is east of SR 2837, 0.2 mile north of the intersection of SR 2837 and SR-2835. The mine is on the property of Claude Deheart.

Workings: Only minor prospecting was carried out at the Smith prospect.

Geology: Prospecting was carried out in a vein of milky quartz containing minor pyrite. The vein strikes N. 35° E. and dips 45° NW. The country rock, a felsic volcanic, contains vertical shears.

Southern Homestake Mine (AuM)

Location: The Southern Homestake mine is in western Randolph County, 12.8 miles west of Asheboro and 14.5 miles southwest of Randleman. To reach the mine, travel 0.1 mile southwest on SR 1344 from the intersection of SR 1344 and SR 1401. Turn south (left) onto an old farm road trending 0.1 mile S. 20° E. to the mine.

Workings: Most of the work at this mine was done around 1910. A shaft was opened on the property to a depth of 52 feet with minor drifting. Two crosscut trenches and an open cut were also opened. In 1968, three pits approximately 20 feet by 20 feet by 10 feet and a 200 foot long trench trending N. 30° W. were at the mine. The trench was about 5 feet wide and 3 to 6 feet deep. A fourth pit on a quartz vein had been bulldozed over.

Geology: Prospecting was apparently carried out in a brecciated zone in gray-black porphyritic rhyolite. Feldspar phenocrysts, minor pyrite and minor blebs of epidote are in the rock. The brecciated zone is bleached, silified, sericitized and iron stained and contains minor limonite cavities. Little vein quartz was on the dumps. There is also present a fine-grained feldspathic(?) olivine(?) gabbro or coarse-grained basalt (diabase) intrusive in the area, and it contains sparse disseminations of pink-bronze to white pyrrhotite with a light to dark blue coating. The pyrrhotite may contain minor nickel (oral communication, Dr. Robert Slipp). Some of the rock is weathered or hydrothermally bleached.

Spoon (Pee Dee) Mine (AuM)

Location: The Spoon mine is in east-central Randolph County, 6.2 miles east-southeast of Asheboro and 5.2 miles southwest of Ramseur. The mine is 100 yards S. 10° W. from the Davis residence on SR 2607. The Davis residence is 0.5 mile west on SR 2607 from the intersection of SR 2607 and SR 2611.

Workings: The Spoon shaft has been filled and little dump remains. The mine was an important producer in the early 1920's.

Geology: The remaining dump material is primarily chlorite-sericite phyllite with minor kaolin that was probably selvage along the vein(?) or shoot walls. Massive, vuggy, bull quartz with manganese coating is also present. Minor chlorite and sericite occur in the quartz. Finely disseminated pyrite, possibly auriferous, is in the phyllite.

Stafford Mine (AuP)

Location: The Stafford mine is in the southwest corner of Randolph County, 17.2 miles southwest of Asheboro and 13.0 miles west-southwest of Seagrove. The mine can be reached by travelling 0.43 mile south on SR 1104 from the intersection of SR 1104 and SR 1105. Turn left and travel N. 77° E. for 0.1 mile to a tall oak tree behind Wesley Hopkins' field. The mine is 200 feet S. 50° E. from the tree or 100 feet S. 50° E. from the property line fence.

Workings: The mine consists of a 10 foot by 10 foot shaft which has been filled to within 15 feet of the surface. Several prospect pits and a trench are located within 0.25 mile of the shaft. No production was indicated.

Geology: The mine was opened in bedded argillite and phyllite containing saccharoidal quartz veins or stringers. All of the material appears to be selvage. Massive, fibrous and radiating natrolite has been deposited in fractures in the phyllitized argillite. There is considerable iron staining on all samples, especially on fractures and joints.

The metallization consists primarily of pyrrhotite with minor pyrite and chalcopyrite disseminated primarily in the quartz but also in the phyllite and argillite selvage. The pyrrhotite has, in many instances, altered to limonite. The phyllite is composed mostly of sericite with some quartz and minor chlorite blebs.

Talbert and Hill Prospect (AuP)

Location: The Talbert and Hill prospect is in the southwest corner of Randolph County, 18.3 miles southwest of Asheboro and 15.5 miles due west of Seagrove. The mine can be reached by travelling 0.9 mile north on Davidson County SR 2549 from the intersection of SR 2549 and N. C. Highway 109. Turn east onto a farm road located at the east end of a field and continue 0.95 mile to the mine.

Workings: The prospect consists of a pit, 15 feet by 15 feet by 20 feet, and three trenches. One trench trends east-west, a second trench trends N. 30° W. and a third trench trends N. 25° W. In 1910, a small production of gold was reported from the Talbert property; however, it is not definite as to whether the Talbert and Hill prospect is that property.

Geology: The country rock is silicified felsic crystal tuff in which the feldspar phenocrysts are altering to kaolin and sericite. The rock contains minor fine-

grained, disseminated magnetite(?) and biotite(?). Small fractures contain what may be fine-grained specularite in quartz. Red hematite occurs along some of the fractures. Some of the felsic tuff has been sheared almost to mylonite. In a few instances, there appears to be biotite, quartz and feldspar. There is no evidence of sulphide metallization.

Uharie (Uwharrie) Mine (AuM)

Location: The Uharie mine is in southwest Randolph County, 12.6 miles southwest of Asheboro and 8.9 miles west of Seagrove. The mine can be reached by travelling 0.2 mile north on SR 1109 from the intersection of SR 1109 and SR 1143. Turn east (right) onto an old road and go 400 feet to the mine.

Workings: This mine was apparently most active during the period around 1887. A shaft was sunk to a depth of 170 feet with drifts at three levels. In 1968, the main shaft was caved at the collar and filled with water to within 20 feet of the surface. Many small pits and trenches were around the main shaft.

Geology: The mine was apparently opened in a sheared zone enclosed by blue-gray rhyolite. The rhyolite, which contains a few lithic fragments, has been silicified and contains finely disseminated biotite and pyrite with minor sericite and chlorite. The mylonite is iron stained and contains cubic cavities containing limonite and also small amounts of biotite and phlogopite. No metallic minerals other than pyrite and pyrrhotite were observed during the present investigation. Altered diorite, sheared in places and silicified, is also found on the dumps. Pyrite and pyrrhotite are smeared along some fractures.

ROWAN COUNTY

Most of Rowan County lies within the Charlotte belt, but slate belt rocks extend northeasterly through the southeast corner of the county (figure 1). The Gold Hill fault forms much of the contact between the predominantly igneous intrusive rocks of the Charlotte belt and the metavolcanic-metasedimentary rocks of the slate belt. The Silver Hill fault extends northeasterly through the county, approximately one and one-half miles southeast of the Gold Hill fault.

The southeastern portion of Rowan County contains what was once one of the most important gold and copper mining regions in the State. Although a few mines were in the igneous rocks of the Charlotte belt, most of the production was from mines in slate belt rocks of what became known as the Gold Hill district.

The Gold Hill Mining District

The Gold Hill district includes a northeast-trending zone about 18 miles long and 8 miles wide in southeastern Rowan, northeastern Cabarrus and northwestern Stanly counties. The first discovery of gold in this district was prior to 1824, but most of the mines were discovered between 1842 and 1844 and were actively mined until 1915. Little work has been done since that time. Total production from the mines has been estimated at $3,300,000 in gold (at $20.67 an ounce) and $700,000 in copper with the Randolph mine the largest gold producer and the Union Copper mine the largest copper producer. Minor silver was also produced.

Generally, the deposits occur in chlorite-sericite phyllite bordered to the west by the Gold Hill fault and to the east by the Silver Hill fault. Most of the lodes are silicified zones in the phyllite that are recognizable by the presence of sulphides. Some zones are apparently free of quartz. The zones average 3 to 6 feet in width but may be as much as 15 feet wide. They pinch and swell at depth and along strike.

The principal ore minerals are chalcopyrite, gold-bearing pyrite and native gold, usually associated with a gangue of quartz, chlorite, sericite, calcite and pyrite. Galena, sphalerite, chalcocite and bornite are frequently present. Most of the lodes are weathered to depths of 50 to 100 feet.

Barnhardt Shaft (AuM)

Location: The Barnhardt shaft is 250 feet southwest of the Miller shaft and 1100 feet northeast of the Old Field Diggings. The shaft is 50 yards southeast of SR 2352 on the opposite side of the road from the Gold Hill Methodist Chruch. The church is on SR 2352, 0.17 mile north of the intersection of SR 2352 and SR 1221.

Plate 9A. Collapsed headframe over Barnhardt Shaft

Workings: The Barnhardt shaft was approximately 450 feet deep and on the same lode as the Miller shaft. Levels were driven at depths of 160 feet, 300 feet, 380 feet and 435 feet. The remaining workings consist of a wooden head frame caved in over a 5 foot by 5 foot

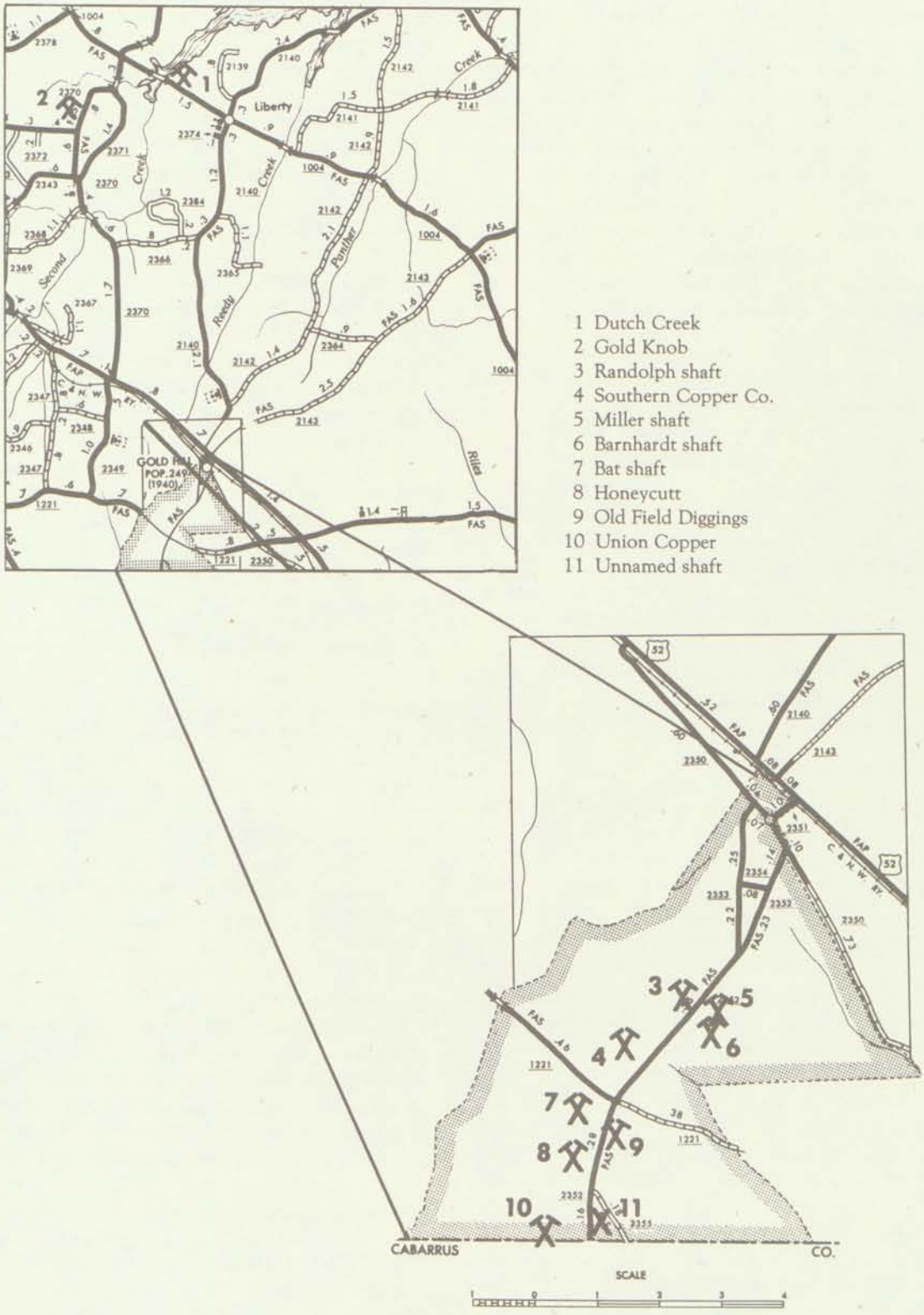


Figure 20. **Rowan County Deposits**

shaft (Plate 9 A). The shaft is choked to within 30 feet of the surface. The dumps are abundant and have been only slightly overgrown.

Geology: The country rock is a dark-green, chlorite-sericite phyllite containing disseminated pyrite. Malachite is on weathered surfaces and in a few places forms a thin coat around the rocks. Vein quartz contains limonite pseudomorphs after pyrite. Some light-gray, quartzose phyllite is on the dumps but is not as abundant as the dark-green variety and contains little pyrite. The phyllite strikes N. 40° E. and dips vertically. Other than pyrite, the only mineralization evident is chalcocite and calcite. Some chalcopyrite is reported to be present.

Bat Shaft (AuM)

Location: The Bat Shaft is 1 mile southwest of Gold Hill and 4.5 miles southeast of Rockwell. The shaft is 200 yards west of the intersection of SR 1221 and SR 2352. The shaft can be reached by travelling 0.2 mile northwest on SR 1221 from SR 2352 and turning west (left) onto a dirt road. Follow the dirt road to a fence enclosing an old barn and walk north from the barn for approximately 100 yards to the shaft.

Workings: The shaft is approximately 30 feet in diameter and appears to be open as far as can be seen from the top. The area around the shaft is overgrown.

Geology: The Bat shaft was opened in a siliceous zone of phyllite containing pyrite, chalcocite, galena and sphalerite. The sphalerite is light yellowish brown.

Dutch Creek Mines (AuM)

Location: The Dutch Creek mines are 4.5 miles northeast of Rockwell and 4.7 miles north of Gold Hill. Numerous shafts are along a ridge north of SR 1004 between Second Creek (an extension of High Rock Lake) and SR 2140. To reach several of the shafts, turn northeast from SR 1004 onto a private dirt road 0.1 mile south of Second Creek. Follow the dirt road to the creek (High Rock Lake), and the shafts are on a ridge to the right of the road. Numerous other shafts are southeast of this location.

Workings: The work at these mines was done prior to 1895 and most of the shafts did not extend below the water table. The workings just south of Second Creek include several shafts paralleling the ridge; the largest shaft is 25 feet in diameter and 30 feet deep. A second shaft is 20 feet in diameter and 25 feet deep. Many shallow trenches are cut perpendicular to the trend of the ridge.

Geology: Numerous northeast-trending quartz veins containing gold and copper have been worked on this property. The veins are in granite which is sheared and sericitized near the veins. The veins are reported to be from 1 foot to 18 feet in width and contain pyrite, chalcopyrite and specularite below the water table. Most of the quartz found on the surface of the ground contains only hematite, limonite and manganese oxide in fractures and vugs. Some of the quartz appears to be sheared and contains elongate pockets of limonite.

Gold Knob Mine (AuM)

Location: The Gold Knob mine, in southeastern Rowan County, is 3.1 miles northeast of Rockwell and 4.6 miles northwest of Gold Hill. To reach the mine, travel 0.2 mile north on SR 2370 from the intersection of SR 2370 and SR 2375. The workings are in the woods, 100 feet west of the road.

Workings: This property consisted of as many as 11 veins. The Gold Knob vein was the largest, up to 20 feet in width. Apparently, the last vein to be worked was the Holtshauser, in 1895. In 1970, a series of pits were on the property. One pit, 10 feet in diameter and 5 feet deep, was opened in diabase. A trench trending N. 25° W. opened into the south side of the pit and extended for 15 feet to the southeast.

Geology: Mining was carried out in northeast-trending veins that dip 70° - 75° southeast. The ores said to be of low grade and carried small amounts of copper. Chimneys of high-grade ore were encountered.

Honeyutt Shaft (AuM)

Location: The Honeycutt shaft is 200 yards west of SR 2352 and is south of SR 1221. The shaft is reached by turning west on a dirt road off of SR 2352, 100 feet north of SR 2355. Follow the dirt road past several small pits to the dumps of the mine. This shaft is 1200 feet southeast of the Bat Shaft and 1100 feet southwest of the Old Field Diggings.

Workings: The shaft is 15 feet by 15 feet at the collar and is filled with water to within 5 feet of the surface. Several large dumps are present. 100 yards southwest of the shaft is a series of small prospect pits or shafts. The work was done in the early days of mining at Gold Hill and produced free-milling gold.

Geology: The country rock is gray sericite phyllite and some vein quartz containing limonite is also present. The most completely metallized zones are those that have been silicified, sericitized and bleached. These zones contain large concentrations of pyrite. Some of the pyrite cubes have thin coatings of chalcocite. Chalcocite is less commonly seen as fine grains disseminated through siliceous portions of the phyllite.

Miller Shaft (AuM)

Location: The Miller shaft is 250 feet northeast of the Barnhardt shaft and 800 feet southeast of the Randolph shaft. It is on the southeast side of SR 2352 and is east of the Gold Hill Methodist Church.

Workings: This shaft was opened on the same vein as

the Barnhardt shaft and was developed to a depth of 160 feet. Little dump remains at the Miller shaft and much of the dump seems to have been used to refill the shaft.

Geology: The shaft was opened in a mineralized zone enclosed by chlorite-sericite phyllite. Pyrite is disseminated throughout the phyllite and in a few specimens is concentrated. Some samples of the phyllite are sheared and others are bleached and iron stained. A small amount of barren vein quartz and gossan is scattered over the area near the shaft.

Old Field Diggings (AuM)

Location: The Old Field Diggings are in southeastern Rowan County, 1.0 mile southwest of Gold Hill and 4.6 miles southeast of Rockwell. The Diggings are along a 0.1 mile stretch of SR 2352 beginning 100 feet south of SR 1221. The workings are east of SR 2352 and are commonly within 30 feet of the road. One pit is on the shoulder of the road.

Workings: The workings consist of a series of prospects and shallow shafts. The pits generally average 25 feet in diameter and 10 feet in depth. The shafts were extended only to water level. The workings are extremely overgrown and no fresh dump material remains. A considerable quantity of free gold was obtained from these workings just prior to 1861.

Geology: The workings were opened on a series of gold-bearing quartz stringers enclosed by sericite phyllite. Pyrite is disseminated through the phyllite.

The Old Field Diggings are approximately 1200 feet southwest of the Barnhardt shaft and probably represent a continuation of the same mineralized zone (Laney, 1919, p. 102).

Randolph Shaft (Cu, Au, AgM)

Location: The Randolph shaft is 800 feet northwest of the Miller shaft and 1100 feet northeast of the shafts of the Southern Copper Company. The shaft is 100 yards northwest of SR 2352, 0.25 mile southwest on SR 2352 from the intersection of SR 2352 and SR 2353. Numerous other shafts are northeast and southwest of the Randolph shaft.

Workings: The Randolph shaft was the deepest in the Piedmont gold belt and extends to a depth of 820 feet. The underground workings extend along the vein to the northeast and open to the surface by way of the Center, South, Line, North, Chain and Crosby shafts. From these shafts the 2 to 15 foot wide Randolph vein was worked for about 1500 feet along strike and to a depth of about 700 feet. The principal work was done here between 1845 and 1881. On the 800 foot level, about 200 feet of exploratory drifts were driven.

The Randolph shaft is approximately 4 feet by 4 feet at the collar and is now filled with water to within 15 feet of the surface. The dumps are extensive around the shaft and numerous prospect pits are densely concentrated for several hundred yards northeast and southeast of the Randolph shaft.

Geology: The Randolph shaft was opened in a mineralized zone enclosed by chlorite-sericite phyllite. Portions of the phyllite have been bleached and others have been silicified. A small amount of barren iron-stained quartz is present. The country rock strikes N. 35° E. and dips 80° NW. Some portions of sheared, bleached phyllite contain pyrite with minor chalcopyrite and chalcocite along the foliation planes. Massive concentrations of pyrite are noted in a few places. The upper levels of the mine were reported to be extremely rich in gold but the values decreased below the oxidized zone. Mining was actually from a series of veins rather than from a single large vein. Those veins rich in gold were notably low in copper, and vice versa.

Southern Copper Company (Au, CuM)

Location: The workings of the Southern Copper Company are reached by travelling 0.1 mile north on SR 2352 from the intersection of SR 2352 and SR 1221. Turn left onto the dirt road to the house of Mr. Linker. The shafts are on the hill northwest of the house. The Randolph shaft is 1100 feet northeast of these workings and the Bat shaft is 1300 feet southwest.

Workings: The workings are scattered over the hill and consist of numerous shafts and pits. The northernmost shaft is 3 feet by 8 feet and inclined parallel to the foliation of the country rock. According to a local resident, the shaft opens at the northeast side of the hill near the creek. The adit trends N. 35° E. A second shaft, 100 feet north of the first shaft, is 20 feet in diameter and choked to within 10 feet of the surface. Southwest of the first two shafts is a shaft 25 feet in diameter, vertical and filled to within 75 feet of the surface. The fourth shaft is 3 feet by 8 feet and may be inclined. The shaft trends southwest and is open as far as can be seen. One-hundred feet southwest of this shaft, three vertical raises apparently open into this larger shaft. These raises are choked. Numerous small prospect pits are also around the area. Most of the workings are overgrown. The remains of a boiler room and an equipment room still stand.

Geology: The country rock is chlorite-sericite phyllite containing disseminated pyrite, occasionally in concentrations. Portions of the phyllite are bleached powdery white and malachite forms a thin coat on the surface of some of the weathered samples. Sphalerite and galena form narrow veinlets in some portions of the siliceous material. Chalcopyrite is reported to be present and all of the sulphides are said to be auriferous. A small amount of gossan is scattered about the workings.

Plate 9B. Mine dump at Union Copper Mine

Union Copper Mine (CuM)

Location: The Union Copper mine is on the Rowan-Cabarrus county line, 1.45 miles southwest of Gold Hill and 4.6 miles southeast of Rockwell. The mine is reached by travelling 0.16 mile south on SR 2352 from the intersection of SR 2352 and SR 2355. Turn west (right) onto a dirt road and go past a cemetery. Follow the dirt road to the left of an abandoned house. The workings are on the slope of the hill behind (west of) the house.

Workings: Most of the work at the Union Copper mine was done from 1899 to 1906. Five shafts were opened on the property and together they form a line trending N. 30° E. roughly the strike of the ore body. Shaft 3 and shaft 4 were the most extensively worked. Shaft 3 was developed to a depth of 600 feet with workings on five levels (Plate 9, B & C). The dumps at these two shafts occupy an area covering several acres. The shafts are now either caved or filled with water.

The property was drilled in 1943 by the U. S. Bureau

Plate 9C. Mine dump at Union Copper Mine

of Mines. This drilling indicated a 30 to 40 foot wide zone of mineralization containing sphalerite and pyrite with minor chalcopyrite and galena. Other irregular shoots of zinc mineralization were noted.

Geology: The Union Copper mine was opened in a quartz vein and mineralized zone enclosed by chlorite-sericite phyllite trending about N. 40° E. The ore body was irregular and was developed in a fault zone. Most of the metallization is concentrated in bleached and silicified portions of the phyllite and in quartz veins. Minerals present include malachite, bornite, pyrite, chalcopyrite, sphalerite and galena. Fractures in quartz are in many specimens coated with malachite. Chalcopyrite and bornite form veinlets with the chalcopyrite being concentrated in the center of the veinlet and bornite near the margins. Tiny veinlets of covellite, crosscut some veins of chalcopyrite. Reddish-brown sphalerite forms small grains disseminated through the samples but in a few cases forms concentrations with galena. Most of the metallization found on the dumps occurred in vein quartz. Some gold was produced as a by-product of the copper mining.

Laney (1910, p. 105) stated that the ore was in quartz and in altered schists and the average run of the vein was about 1½ to 3 percent copper. By hand cobbing the value could be raised to 8 or 10 percent.

Unnamed Shaft (AuP)

Location: This shaft, not named in the literature, is located just north of the Rowan-Cabarrus County line. It is reached by travelling on SR 2355 for 0.1 mile southeast of the intersection of SR 2355 and SR 2352. The workings are 100 feet west of SR 2355. The shaft is 0.9 mile northeast of the Union Copper mine and 0.8 mile southeast of the Honeycutt shaft.

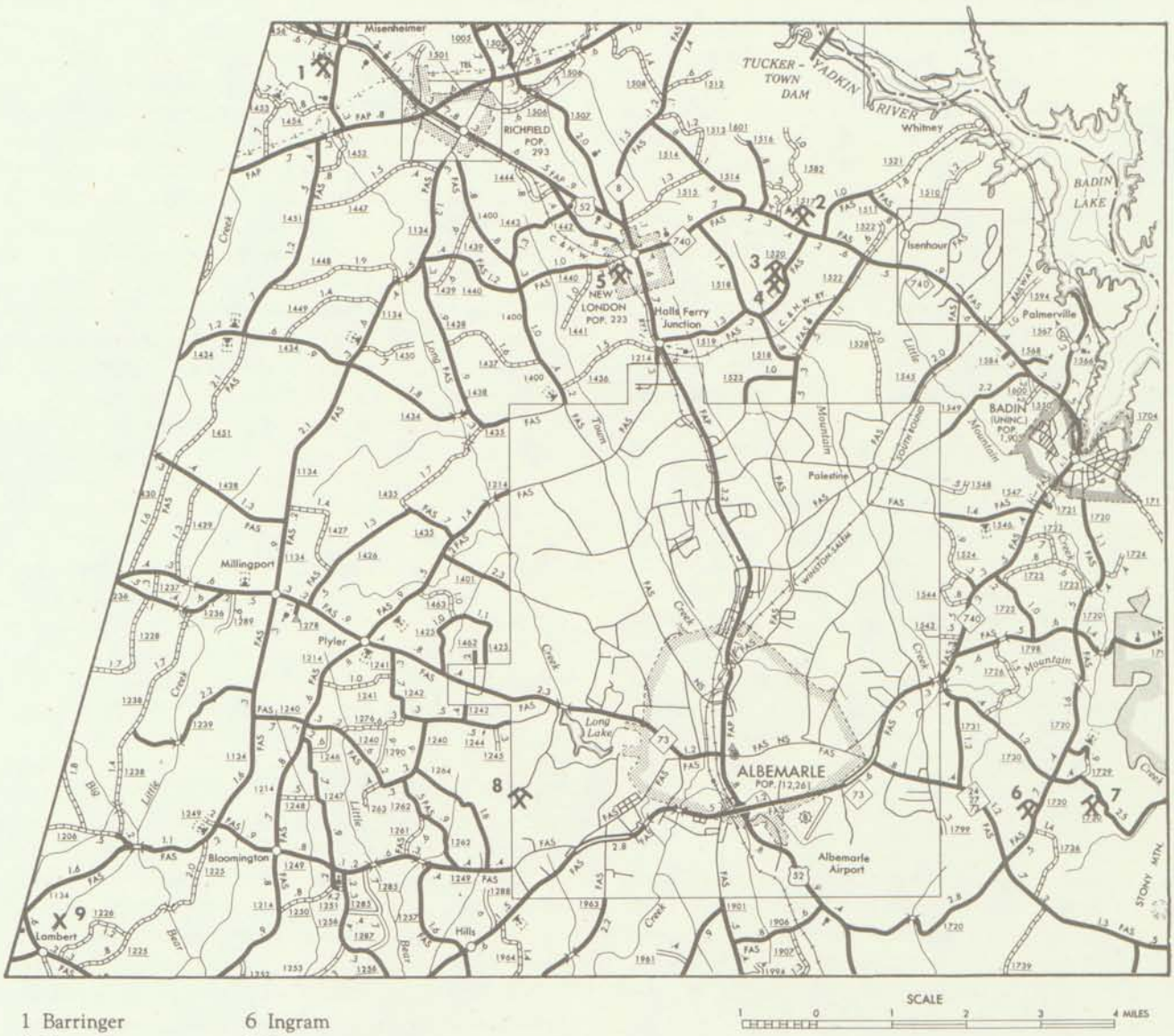
Workings: A series of pits and a rectangular choked shaft, 10 feet by 15 feet are present. This vertical shaft is choked to within 20 feet of the surface. Little dump material is present.

Geology: The prospect pits and shaft were opened in sericite phyllite striking N. 45° E. and dipping 85° NW. The phyllite is iron stained and exhibits cubic cavities where pyrite has weathered out. Some milky iron-stained quartz is scattered about. No metallization was noted; however, some gossan is scattered around the openings. Some samples of the phyllite are slickensided.

STANLY COUNTY

Stanly County is near the southwestern edge of the slate belt (figure 1). The geology of the Albemarle quadrangle is typical of the geology of Stanly County. Rock types mapped by Conley (1962) in the Albemarle quadrangle include an interbedded sequence of volcanic and sedimentary rocks which are folded into a series of northeast-trending anticlines and synclines.

Inactive gold mines are scattered throughout the middle and northern portions of the county and the Cotton Patch mine, near New London, is open to the public for panning. Stanly County contains the site of the first gold lode deposit, the Barringer mine, to be worked in the State.



1 Barringer
2 Crowell
3 Mountain Creek
4 Cotton Patch
5 Parker
6 Ingram
7 Thompson
8 Lowder
9 Eudy

Figure 21. **Stanley County Deposits**

Barringer Mine (AuM)

Location: The Barringer mine is in northern Stanly County, 2.05 miles northwest of Richfield and 0.5 mile southwest of Misenheimer. The mine can be reached by travelling northwest on U. S. Highway 52 and then turning south on SR 1455. Continue for 0.35 mile and turn west onto a logging road. Follow the logging road for 0.25 mile to the mine, which is south of the logging road.

Workings: This mine was opened prior to 1824 and was reported to be the first mine in the State opened on a lode. Nearly $100,000 of ore is reported to have been taken from the one ore shoot. The property has apparently been inactive since about 1910, except for a small amount of work by Mr. Spencer Plyler. All of the shafts are choked except for the shaft dug by Mr. Plyler. This shaft is 70 feet deep and 20 feet in diameter. Several of the old mine buildings remain on the property. A considerable amount of dump material remains but it is overgrown with vegetation. The present owner of the property is Mrs. Mildred Casper of Salisbury.

Geology: Mining was done in a quartz vein enclosed

by felsic tuff. The tuff is brecciated near the vein and calcite has filled fractures in the tuff. The calcite contains gold as well as pyrite and pyrrhotite. Portions of the country rock are silicified and sericitized; however, the relationship of this material to the vein could not be determined from the material on the dump. Diabase from a nearby dike is also in the dump material.

Cotton Patch Mine (AuM)

Location: The Cotton Patch mine is in northern Stanly County, 1.9 miles southeast of New London and 6.0 miles northeast of Albemarle. The mine is reached by travelling 1.15 miles south on SR 1520 from N. C. Highway 740. The mine is 75 yards west of the road.

Workings: Most of the work at the Cotton Patch mine was carried out prior to 1865 and was aimed at the recovery of gold from placer material. In 1958, a trench was opened on the property and in 1961 the mine was opened to the public for panning and mineral collecting. In 1972 a 30 foot deep shaft was opened in an 18 inch wide quartz vein. The material from the shaft is occasionally mixed with the placer material and tourists usually have good results in panning. Camp sites are available for extended visits.

Geology: The gold-bearing quartz stringers and veins are enclosed by andesitic tuff. Magnetite is disseminated throughout the tuff and concentrates as "black sand" in gullies. Placer material is taken from the floodplain of a small stream south of the vein.

Crowell Mine (AuM)

Location: The Crowell mine is in northern Stanly County, 7.0 miles north of Albemarle and 2.1 miles east of New London. The mine is reached by travelling east on N. C. Highway 740, continuing past SR 1517. Turn north (left) into the driveway east of Bethel Methodist Church. Fifty feet north of N. C. Highway 740, turn east (right) onto a logging road. Follow the road 100 feet to the mine.

Workings: This mine was first worked in 1887 and a shaft was opened to a depth of 125 feet. The mine was apparently inactive until about 1933 when extensive exploration work was carried out; however, the deposit proved to be of too low grade to be worked economically. The workings consist of numerous pits and trenches over an area approximately 200 yards square. The workings are considerably overgrown. A large trench trending N. 70° E. is 15 feet wide, 5 feet deep and 50 feet long. North of this trench is an open pit 150 feet long, 80 feet wide and 15 feet deep.

Geology: The vein is enclosed by amygdaloidal andesite. Iron stains some of the andesite, and cubic cavities are common. The present investigation revealed no metallization. Previous reports indicate three veins on the property and described the country rock as silicified, sericite and chloritic schist. The ore body was reported to differ little from the country rock.

Eudy(?) Mine (AuP)

Location: (Local residents were not familiar with the name.) The Eudy mine is located 9.1 miles southwest of Albemarle and is 5.7 miles northeast of Locust. The old mine site is reached by travelling east on SR 1227 from Lambert and turning north onto SR 1226. Travel on 1226 for 0.3 mile and turn west onto a dirt road. The dirt road continues for 0.55 mile to the house of Mr. M. W. Scott. On foot, follow an old logging road north past the barn, past the open fields and down into the woods past the creek. Cross the small creek to the pits. The pits are less than 0.25 mile from the Scott house.

Workings: The Eudy prospect was worked between 1895 and 1905 and again in 1932. Three holes, two approximately 10 feet in diameter and 3 feet deep and one smaller pit, are located on the Scott property. Two shafts on the property were 30 feet deep and 35 feet deep. There was apparently little activity here as the dumps are small. The alignment of the pits is in a north-south direction.

Geology: The pits are opened in quartz veins which cut greenish-gray massive felsic tuff. There is little metallization noticeable other than weathered pyrite, which is not abundant.

Ingram (Crawford) Mine (AuM)

Location: The Ingram mine is in eastern Stanly County, 4.0 miles east of Albemarle and 4.5 miles south of Badin. The mine was a placer operation along a 0.3 mile section of the small creek west of SR 1720. The placer workings begin 0.75 mile north of N. C. Highway 24-27-73.

Workings: The Ingram mine was worked as a placer operation from 1892 until about 1897. A small amount of work was done in 1936. The mine was worked for a length of 3,000 feet along the stream and for a width of approximately 250 to 300 feet. Shallow openings were made in several quartz veins west of the placer.

Geology: The Ingram mine was developed from floodplain sediments formed by a small stream flowing over felsic tuffaceous argillite. Several quartz veins crop out on the hill west of the stream; however, these veins contained only a small amount of gold. The gold in the placer usually occurred as coarse, rough, irregular-shaped nuggets and the exact source of these nuggets was apparently never found.

Lowder (Sibly) Mine (AuM)

Location: The Lowder mine is 3 miles west of Albemarle and 3.3 miles east of Bloomington. The mine is reached by following SR 1266 for 1.0 mile south from its intersection with SR 1267. The road leads past one

house on the right then forks left around an old house in a field. At the top of the next hill, take a left to the mine. The workings are on the right of this logging road.

Workings: The mine was opened in 1835, and the only work since the Civil War was some prospecting carried out in 1895. A series of shallow pits trending N. 5° E. and several shallow trenches perpendicular to the trend of the pits have been opened on the property. The pits are a maximum of 8 feet in diameter and 4 feet deep. The trenches are 2 feet wide and 1 foot deep. A deeper pit (shaft?) south of the other workings is 15 feet in diameter and 10 feet deep. The workings are overgrown.

Geology: The float and dump material is quartz (similar to that at the Eudy) which in many specimens has box-work structure and vugs lined with quartz crystals. The only indication of metallization is weathered iron oxide (limonite). The country rock is gabbro (a sill according to Conley, 1962). No metallization was noted.

Mountain Creek Mine (AuM)

Location: The mine is 1.9 miles east of New London and is reached by travelling south on SR 1520 for 0.90 mile from N. C. Highway 740. The mine is 100 yards west of SR 1520 on the property of Mr. Bill Tucker. This mine is 100 feet north of the Cotton Patch Mine.

Workings: The mine is open to tourists for panning and gold digging. The largest opening is a trench 75 feet long, 40 feet deep and 25 feet wide and has revealed several quartz stringers. Numerous old shafts are on the property and some quartz has been removed from these shafts. One of the operators of the mine is Mr. Reece Whitley of Albemarle.

Geology: The gold occurs in quartz stringers which are generally narrow but pinch and swell (according to the owners). Andesitic tuff is the country rock. Iron-stained quartz contains concentrations of chlorite. No metallization was noted other than small magnetite crystals in the country rock.

Parker Mine (AuM)

Location: The Parker mine is 0.50 mile southwest of New London and 2.8 miles southeast of Richfield in northern Stanly County. From the intersection of U. S. Highway 52 and N. C. Highway 740, travel south on U. S. Highway 52 and turn west (right) onto the first street. Continue to the end of this street and turn right. Travel 50 feet, then turn left onto the first dirt road. Follow the dirt road approximately 0.4 mile crossing the railroad tracks. Continue to the top of the hill, take a dirt road to the left and continue 75 yards to the mine.

Workings: The Parker mine was originally operated as a placer mine and most of the production has been from placer material. Two shafts were sunk in 1895 and 1896 and placer work was again carried out in 1899 and 1902. In 1933, the deposit was sampled and an analysis was run on the material. In 1935, an adit was run to the westernmost shaft and some gold was taken from a quartz vein.

The workings were overgrown with vegetation in 1970 and both shafts were choked. The westernmost shaft was 20 feet in diameter at the surface and choked to within 15 feet of the surface. A trench southwest of this shaft trended N. 30° W. and was 20 feet wide, 7 feet deep and 75 feet long. A considerable amount of vein quartz was encountered in this trench. Hydraulicking was carried out south of the shaft and revealed a network of quartz stringers; however, no metallization was noted in the quartz. In 1973, Mr. Jack Scott of the Zane Gold Mining Company, Zanesville, Ohio, carried out some exploratory work at the mine.

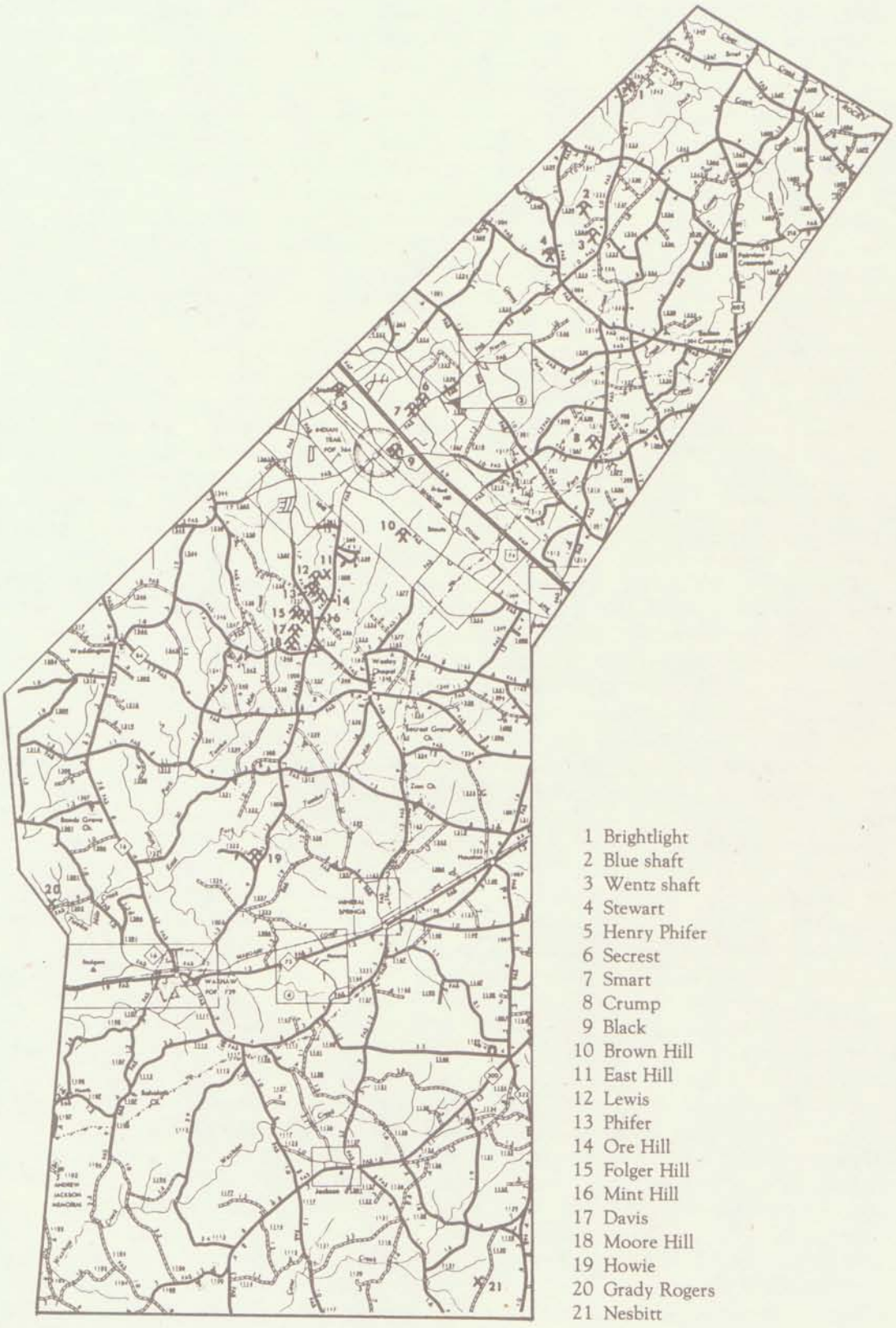
Geology: The presence of andesitic tuff, argillite and basalt on the dumps indicates the mine may be near the contact of two or more units. This supports the mapping of Conley (1962) who placed the mine in andesitic tuff near the contact with basaltic tuff. Portions of the country rock are bleached and silicified and contain disseminated pyrite and minor pyrrhotite. Shearing is also noted in the bleached and silicified rock. A small amount of pyrite was in the unaltered tuff. Gold occurred in quartz veins on the property; however, the small amount of quartz that was found on the dumps was not mineralized.

Thompson Mine (AuM)

Location: The Thompson mine is located in eastern Stanly County, 4.8 miles east of Albemarle and 4.5 miles south of Badin. The mine can be reached by travelling east on SR 1730 for approximately 0.4 mile from the intersection of SR 1730 and SR 1729. Turn southwest (right) at this point and follow the dirt road for approximately 0.2 mile. After passing an old homesite at the crest of a hill, turn southeast (left) and walk across the ridge into the valley to the mine.

Workings: The mine was first worked prior to 1906 and consisted of an open cut 30 to 40 feet wide, 100 feet long and 25 feet deep. The mine was again worked from 1931 to 1933, during which time a diamond drilling program was carried out. Fourteen holes were put down and the cores assayed averaged from 35 cents to $1.05 per ton. The highest grade material penetrated averaged 1.73 ounces per ton along a six and one-half foot length of core. In 1970, the open cut was partially filled with water. A shaft, described in earlier reports, was not found. The workings were moderately overgrown, and a small amount of dump material remained.

Geology: Mining was carried out in mineralized zones in a rhyolite tuff striking N. 65° E. and dipping 32° NW. Andesitic tuff is found along the ridge west of the deposit. The mineralized zones are bleached and silicified and contain pyrite and pyrrhotite. Portions of the rhy-



1 Brightlight
2 Blue shaft
3 Wentz shaft
4 Stewart
5 Henry Phifer
6 Secrest
7 Smart
8 Crump
9 Black
10 Brown Hill
11 East Hill
12 Lewis
13 Phifer
14 Ore Hill
15 Folger Hill
16 Mint Hill
17 Davis
18 Moore Hill
19 Howie
20 Grady Rogers
21 Nesbitt

Figure 22. **Union County Deposits**

olitic tuff have been brecciated and pyrite has filled voids between the fragments. Some pyrite has weathered out of the andesitic tuff leaving cavities. The gold occurred with the pyrite.

UNION COUNTY

Union County is underlain by a sequence of interlayered metavolcanic and metasedimentary rocks (figure 1). The primary rock types include tuffaceous argillites, laminated argillites, felsic crystal and crystal-lithic tuffs, felsite porphyries and impure cherts (Randazzo, 1973). The New London Synclinorium and the Troy Anticlinorium form major northeast-trending structures. Small intrusions of diabase and gabbro occur throughout the county.

A dense concentration of inactive gold mines in a northeast-trending zone essentially parallels the Mecklenburg-Union County line. Many of these mines were small and were developed only to the water table. The Lewis group of mines was developed along an approximately 100-foot wide northeast-trending mineralized zone which extends for almost three miles along strike (Pardee and Park, 1948). The largest gold producer in Union County was the Howie mine.

Black Mine (AuM)

Location: The Black mine, in western Union County, is 0.4 mile east of Indian Trail and 9.1 miles northwest of Monroe. The Smart mine is 1.0 mile north of the Black and the Henry Phifer mine is 1.7 miles to the northwest. The Black mine can be reached by travelling 0.35 mile southeast on SR 1367 from the intersection of SR 1367 and SR 1008. The mine is 50 feet north of the road on the opposite side of the road from the Atlantic Lumber Company.

Workings: The Black mine was active around 1900(?) and development was limited to a 60 foot shaft and a drift. The mine is now in a bean field, and the workings have been completely covered with soil and tree stumps. No dumps remain; however, a considerable amount of the dump has apparently been scattered in the field.

Geology: The shaft was opened on a quartz vein enclosed by chlorite-sericite phyllite. The phyllite strikes N. 38° E. and dips 80° SE., and some small-scale folding has developed. The milky vein quartz contains disseminated pyrite, chalcopyrite and galena. Chalcopyrite commonly is coated with malachite and minor azurite. Fractured portions of phyllite are sealed with calcite and siderite.

Brightlight (Crowell) Mine (AuM)

Location: The Brightlight mine is 9 miles northeast of Indian Trail and 7.7 miles northwest of Unionville. It can be reached by travelling northeast on SR 1544 for 0.2 mile from the intersection of SR 1544 and SR 1525. At this point, walk N. 20° W., 75 yards across an open field to a low hill. The mine is near the crest of this hill. The Long mine is 1.3 miles southeast of the Brightlight.

Workings: The main shaft is 15 feet by 15 feet and choked to within 30 feet of the surface. Numerous smaller prospect pits are on the east side of the hill. The mine was opened in June 1882 to explore three quartz veins. The shaft was developed to 80 feet and some silver as well as gold was encountered. The property was drilled in 1954 by the U. S. Bureau of Mines as a part of the Bureau's strategic minerals survey. The drilling revealed a mineralized zone composed of silicified sericite schist containing a "sprinkle" of sulphides.

Geology: The shaft was opened in quartz veins in sericite phyllite. Most of the dump material is vuggy, iron-stained vein quartz containing small amounts of decomposed pyrite. A small amount of galena is disseminated through the quartz. A small amount of ore was produced from this mine.

Brown Hill (Harkness?) Mine (AuM)

Location: The Brown Hill mine is in western Union County, 8.0 miles northwest of Monroe and 1.7 miles south-southeast of Indian Trail. To reach the mine, travel 100 feet southeast on SR 1009 from the intersection of SR 1009 and SR 1374. Turn southwest (right) onto a dirt road leading to an abandoned house on a hill. The mine is southwest of the house and is on the south side of an open field 200 yards from the house.

Workings: This mine was worked along strike for 300 feet and to a depth of 120 feet. In 1970, a shaft 20 feet by 8 feet was located. The shaft was caved and filled with trash.

Geology: Mining was carried out in a quartz vein enclosed by andesite that is sheared in places. Most of the quartz is iron stained and vuggy, containing limonite. Pardee and Park (1948) described the vein at the Brown Hill mine as consisting of a series of connected lenses. They observed the vein to be as thick as 20 feet in one place and less than 3 feet thick in another.

Crump Mine (AuM)

Location: The Crump mine is in western Union County, 4.4 miles east of Indian Trail and 7.2 miles northwest of Monroe. The mine can be reached by travelling 0.38 mile north on SR 1514 from the intersection of SR 1514 and SR 1367. Turn west (left) and continue to a white house. There is an open field south of the house. Walk west along the north edge of the field to a dirt road leading from the northwest corner of the field. The main workings are south of this old road and just west of the field.

Workings: The Crump mine was operated about 1890 and worked to a depth of 120 feet. Several shafts were opened along a line trending N. 12° E. All of the

shafts are now choked and many have been filled with trash. Several trenches, approximately 8 feet deep, 15 feet wide and 35 feet long were cut parallel to the vein. A considerable amount of dump remains, but it is overgrown with vegetation.

Geology: The shafts were opened in a quartz vein enclosed by felsic tuff. The tuff is sheared to a sericite phyllite near the vein and in places it has been brecciated and healed with silica. Near the vein, the country rock is commonly silicified and contains disseminated pyrite. Some portions of the country rock are bluish gray and contain calcite and minor chalcopyrite. Previous reports state that the Crump mine was noted for its remarkable pockets of gold and for its peculiar nuggets.

Davis Mine (AuM)

Location: The Davis mine is in western Union County, 9.1 miles west of Monroe and 3.6 miles south-southwest of Indian Trail. The mine is approximately 1600 feet south of the Mint Hill - Folger Hill workings. To reach the mine, travel to the Mint Hill workings and then continue to follow the old road south for 1600 feet to the Davis mine.

Workings: The mine was worked to a maximum depth of 150 feet and for a length of 500 feet. In 1970, several shafts were open up to 70 feet deep.

Geology: The Davis mine was opened in the same zone as the Mint Hill and Folger Hill mines. Little dump remains and no metallization was noted.

East Hill Mine (AuP)

Location: The East Hill workings are in western Union County, 2.3 miles southwest of Indian Trail and 9 miles northwest of Monroe. The workings are a part of a series of mines known collectively as the Lewis group. The East Hill workings are reached by travelling south on SR 1008 for 0.65 mile from the intersection of SR 1008 with SR 1361. Turn west (right) onto a dirt road, continue for 0.18 mile and turn south (left) continuing past a cemetery. The workings began south of the cemetery and continue for 1500 feet south.

Workings: The work was carried out here prior to 1861 and consisted of shallow pits and shafts. The shafts and pits are concentrated along the crest of a ridge trending N. 25° E. parallel to the foliation of the country rock. The workings are overgrown with vegetation and little dump material remains.

Geology: The ridge in which the work was done is underlain by a bedded argillite which, in the area of the workings, has been sheared to sericite phyllite. Some silicified phyllite is around the workings. The vein quartz is generally milky and iron stained and contains vugs and fractures filled with limonite. No metallization other than a small amount of pyrite was noted.

Plate 10A. Howie Mine

Howie (Colossus, Condor) Mine (AuM)

Location: The Howie mine is 2.9 miles northeast of Waxhaw and 3 miles northwest of Mineral Springs in west-central Union County. The mine can be reached by travelling 0.1 mile northwest on SR 1323 from the intersection of SR 1323 and SR 1008. The main workings are on the north side of the road, but other shafts and pits are south of SR 1323.

Workings: The Howie mine was worked prior to 1840 as a placer deposit. Numerous small-scale operations were carried out on the lodes until 1854, when Commodore Stockton took over the property. He worked the deposit until the Civil War. Following the

Plate 10B. Mill at the Howie Mine

Civil War, the mine was operated by several different companies, including the Colossus Gold Mining and Milling Company and the Condor Consolidated Mines, Ltd., of Canada. A total of 41,300 ounces of gold is reported to have been produced from the mine up to 1934. In 1940, 1941 and 1942 the Condor mine was the leading gold producer in the State. In 1955, and again in the early 1960's the mill at the Condor mine was used for the processing of gold ore from the Star mine in Montgomery County.

The workings of the mine are along a northeast-trending belt approximately 250 feet wide and 2,800 feet long. The mine was worked by a series of vertical shafts and extensive underground workings. The Cureton shaft, which was deepened and enlarged by the Colossus Company, was 365 feet deep in 1935. In 1970, the workings were overgrown with vegetation, but several of the shafts were clear to a considerable depth. Some dump material is near the workings northeast of SR 1323. The old mill remains on the property, but all the equipment has been removed (Plate 10, A & B).

Geology: The shafts were opened in sheared and silicified felsic volcanic rocks which strike N. 60° E. and dip steeply to the northwest. Tiny cubes of pyrite are disseminated through the country rock. Portions of the lode are enriched with calcite. In the ore zone, much of the weathered rock is fine-grained, sugary quartz and sericite. At depth, the material becomes a banded, flinty rock. The gold is reported to occur as minute grains distributed primarily along micaceous layers in the flinty quartz.

Lewis, Phifer and Ore Hill Mines (AuM)

Location: The Lewis, Phifer and Ore Hill mines are in western Union County and are included in the Lewis group of mines. They are approximately 3 miles south of Indian Trail and 9 miles northwest of Monroe and lie between the East Hill workings to the north and the Davis mine to the south. The Lewis, Phifer and Ore Hill mines are located by travelling 0.65 mile northwest on SR 1357 from the intersection of SR 1357 with SR 1008. Turn north (right) onto a dirt road and follow the first fork to the right. The Ore Hill mine is 50 feet east of the fork. The Phifer workings are northwest of the Ore Hill and trend northeast into the Lewis workings.

Workings: The work at these three mines was carried out prior to 1891. The Ore Hill workings consist of numerous deep pits or shallow shafts, all of which are caved, forming a line trending N. 15° W. A small amount of dump material remains.

The Phifer workings consist of densely spaced pits and shallow shafts up to 35 feet deep. Many of the pits are so closely spaced that they connect with each other. Much milky quartz and sericite phyllite is scattered about the dumps and several wheels from Chilean mills remain.

The Phifer workings are continuous to the northeast with the Lewis Mine. The Lewis workings are also densely concentrated, but the shafts are not as deep as are those at the Phifer. The workings are overgrown with vegetation. Previous reports attribute the large number of diggings on these properties to petty leases and the rich value of the deposits. Apparently these mines were never worked systematically and were not developed to a depth of over 100 feet.

Geology: The shafts and pits at the Lewis, Phifer and Ore Hill mines were opened in quartz veins associated with siliceous zones. The veins are of milky quartz which is iron stained and contains vugs lined with manganese oxide. Sheared phyllite crosscut by veinlets of quartz forms the country rock adjacent to the quartz veins and siliceous material. Other than tiny cubes of pyrite in the siliceous material, no metallization was noted during the present investigations. Galena, sphalerite and chalcopyrite were mentioned in previous reports.

Mint Hill and Folger Hill Mines (AuM)

Location: The Mint Hill and Folger mines are in western Union County, 9.1 miles west of Monroe and 3.6 miles south-southwest of Indian Trail. The mines are on the property of Mr. R. L. Welch and are referred to locally as the Welch mine. The mines can be reached by travelling 0.65 mile northwest on SR 1357 from the intersection of SR 1357 and SR 1008. Turn south (left) on to a dirt road leading to the Welch home. The Folger Hill workings are the first ones to the west of the dirt road, and the Mint Hill workings are east of the road.

Workings: The Mint Hill and Folger Hill mines are a part of the Lewis group. There were opened prior to 1861 and were apparently active until around 1890. The Mint Hill was worked as an open cut, 100 feet in diameter and 50 feet deep; the Folger Hill was worked for a length of 300 to 400 feet and to a depth of 90 feet. In 1969, the workings consisted of numerous openings along two parallel ridges. The workings were overgrown with vegetation and no dumps remained.

Geology: The Mint Hill and Folger Hill mines were opened in the zone of sheared argillite and phyllite extending southeast from the Lewis, Phifer and Ore Hill mines. Much milky, iron-stained vein quartz is near the workings. In places, the quartz is associated with siliceous country rock, and tiny crystals of pyrite are disseminated through the zone. A small amount of dark, reddish-brown sphalerite is also in the siliceous rock.

Moore Mine (AuM)

Location: The Moore mine is in northwestern Union County, approximately 6.5 miles northeast of Indian Trail and 6.2 miles northwest of Unionville. The Stewart mine is 1.0 mile southwest of the Moore mine. To reach

the mine travel west on SR 1554, 0.25 mile from the intersection of SR 1554 and SR 1525. To reach the Wentz shaft, take the left fork in the road and continue 0.3 mile to the crest of a hill. The Wentz shaft and a smaller shaft are on the crest of the hill south of an old barn.

To reach the Blue shaft, take the right fork in SR 1554 and travel 0.2 mile, then turn left and continue 0.15 mile to the shaft. This shaft is in the unplowed portion of a corn field. The property is owned by James Paschal Clontz.

Workings: The Moore mine was opened around 1880 and apparently little work has been done since 1910. The Blue shaft was developed to a depth of 80 feet and the Wentz shaft, on a separate vein, was developed to 180 feet. All of the shafts are now (1972) completely filled with dump material; however, much of the dump is scattered over the area of the workings. The U. S. Bureau of Mines drilled two holes near the Blue shaft in 1954, and the analysis showed less than 0.1 percent copper or zinc.

Geology: The Blue shaft and the Wentz shaft were opened in quartz veins, enclosed by andesite. In most places near the quartz veins, the andesite has been sheared to chlorite-sericite phyllite. Commonly, fragments of phyllite are in the vein quartz. At the Wentz shaft, thin plates of specular hematite were in vuggy, milky quartz, and calcite formed stringers and was also disseminated throughout chloritized portions of the andesite. Silicified phyllite at the Blue shaft contained galena, sphalerite and pyrite with minor chalcopyrite intergrown with pyrite. Weathered surfaces of some rocks were coated with malachite.

Moore Hill Mine (AuM)

Location: The Moore Hill mine is in western Union County, 8.9 miles northwest of Monroe and 4.2 miles south-southwest of Indian Trail. The mine is 3700 feet south of the Mint Hill-Folger Hill workings and can be most easily reached by following the power line that crosses SR 1357 at a point 0.1 mile northwest of SR 1008. Follow the power line west to tower no. 136 where a dirt road intersects the right-of-way. Follow the road south to the Moore Hill mine. The road can be followed north to the Davis mine.

Workings: The Moore Hill mine was worked to a depth of 70 feet and along its length for 100 feet. In 1971, a series of overgrown pits and shafts were along the crest of a ridge. One shaft was filled with water and the others were caved. Several building foundations and parts of Chilean mills also remained.

Geology: The geology at this mine is similar to other mines in this zone.

Nesbitt Mine (AuP)

Location: The Nesbitt mine is in southwestern Union County, 11.0 miles southwest of Monroe and 3.2 miles southeast of Jackson. To reach the mine, go 1.3 miles south on SR 1130 from the intersection of SR 1130 with SR 1128. Turn right (west) and go 200 feet N. 70° W. to the mine.

Workings: In 1972, the mine consisted of a series of pits trending N. 60° E. There were four large pits, approximately 20 feet in diameter and up to 20 feet deep, and numerous smaller pits, approximately 6 to 10 feet in diameter and 6 feet deep. The workings are on the east slope near a small creek and are overgrown with vegetation. Little dump material remains and it appears there was little, if any, production.

Geology: The country rock is primarily felsic lithic tuff with some andesitic tuff. Both rock types show the effects of shearing, and slickensides are in the andesitic tuff. Pyrite cubes are disseminated through the rocks. A small amount of milky quartz was scattered about the workings. Approximately 200 yards north of the mine workings is a pyrophyllite deposit.

Henry Phifer Mine (AuM)

Location: The Henry Phifer mine, in western Union County, is 0.3 mile northeast of Stallings and 1.5 miles northwest of Indian Trail. The mine is 50 yards southwest of the intersection of SR 1365 and SR 1367. To reach the mine, travel 0.1 mile west on SR 1367 from the intersection of SR 1365 and SR 1367. The mine is 150 feet south of the road.

Workings: This mine was worked prior to 1888 and a small amount of work was carried out in 1933. Little is recorded concerning production or development at the mine. According to one report (Pardee and Park, 1948, p. 103), the main shaft was at least 70 feet deep and a 260 foot drift crosscut the shaft at the 70 foot level. A series of north-south trending shafts or pits, all of which are choked, was at the mine in 1970. The workings are considerably overgrown and little remains of the dump material.

Geology: The main shaft at the mine was opened in a quartz vein enclosed by granite, which is sheared near the vein. Pyrite is disseminated throughout the milky quartz and in a few places is abundant. Small flakes of specular hematite also occur.

Grady Rogers (or Ezell?) Mine (AuP)

Location: The Grady Rogers mine is in southwestern Union County, 2.9 miles northwest of Waxhaw and 5.5 miles south of Weddington. To reach the mine, follow SR 1305 west from SR 1301. At the North Carolina state line, turn north (right) onto a dirt road leading to the Charlotte Rifle and Pistol Club range. The mine is at the top of the first hill, 150 feet from SR 1305.

Workings: At this mine, a 40 foot shaft was opened in phyllite containing streaks of pyrite and chalcopyrite and scattered grains of galena. In 1971, a shaft 40 feet by 25 feet wide at the collar was in the phyllite. Many smaller pits were dug along the northeast-trending ridge, and numerous shallow trenches were cut perpendicular to the ridge.

Geology: The workings were opened in felsic crystal tuff that has been sheared to phyllite. The phyllite strikes N. 65° E. and dips vertically. Iron-stained milky quartz is scattered around the dumps.

Note: J. R. Butler (written communication, 1977) indicates that this location is actually the Ezell mine. The Grady Rogers mine may be near the east side of SR 1301, 0.2 mile north of the intersection of SR 1301 and SR 1305.

Secrest Mine (AuM)

Location: The Secrest mine, in western Union County, is 1.6 miles northeast of Indian Trail and 9.5 miles northwest of Monroe. The mine is 0.4 mile northeast of the Smart mine and is 400 feet northeast of the intersection of SR 1520 and SR 1522, 40 feet west of SR 1520.

Workings: The Secrest mine was operated prior to 1896, and little information is available concerning the workings. When visited in 1970, most of the shafts had been filled with trash. The northernmost shaft was still partially open.

Geology: The mine was opened in what appears to be the northeast extension of the Smart vein. The country rock is chlorite-sericite phyllite. Dump remains consist of phyllite and iron-stained quartz. Earlier reports mention galena and chalcopyrite in a vein west of the main workings.

Smart (Bonnie Doon) Mine (AuM)

Location: The Smart mine, in western Union County, is 1.2 miles northeast of Indian Trail and 9.5 miles northwest of Monroe. The Secrest mine is 0.4 mile northeast of the Smart. The Smart mine is 100 feet southwest of the intersection of SR 1522 and SR 1520. The workings run parallel to SR 1520 for approximately 0.05 mile and are 20 feet from the road.

Workings: This mine was first opened in 1835 and was worked intermittently until 1911. A shaft was sunk to a depth of approximately 200 feet with numerous drifts from the shaft. In 1970, a large shaft, 20 feet by 15 feet at the surface, and numerous small prospect pits were along a line trending N. 40° E. The workings were overgrown with vegetation and have been used as trash dumps.

Geology: The Smart mine was opened in a zone of silicified sericite phyllite striking N. 40° E. and dipping northwest at 75°. The phyllite has been sheared and contains disseminated pyrite. Only pyrite was noted in samples from the dump; however, galena is mentioned in several reports.

Stewart Mine (AuM)

Location: The Stewart mine is in northwest Union County, 5.4 miles northeast of Indian Trail and 6.5 miles northwest of Unionville. The Moore mine is 1 mile north of the Stewart and the Crump mine is 4 miles south. The Stewart mine is at the crest of a hill 300 feet northwest of the intersection of SR 1004 and SR 1539.

Workings: Several shafts, reaching a maximum depth of 185 feet, were sunk on three parallel ore belts. In 1952, the U. S. Bureau of Mines put down a drill hole northwest of the shaft; however, the core disclosed only a "sprinkle of pyrite." The shafts are now choked and little dump remains.

Geology: The shafts were opened in quartz veins enclosed by chlorite-sericite phyllite. Much andesitic tuff float is present over the hilltop, and the phyllite apparently represents a sheared phase of the tuff. Some portions of the tuff are brecciated. The milky vein quartz contains irregular-shaped vugs filled with limonite and iron-stained sericite. Some portions of the phyllite are silicified and contain disseminated pyrite. Galena and free gold are reportedly present.

VANCE COUNTY

Vance County (figure 1) has been of importance because of occurrences of tungsten. The western half of the county is underlain by a large igneous pluton, primarily albite granodiorite, which has been emplaced into rocks of the slate belt. Tungsten-bearing quartz veins occur along the eastern contact between the granodiorite and chlorite-sericite phyllite. The most important mine in the county is the Tungsten Queen (Hamme) mine, which was last worked in 1971.

Tippet Tungsten Prospect (WP)

Location: The Tippet prospect is in northwestern Vance County, 3.4 miles southwest of Townsville and 10.8 miles northwest of Henderson. To locate the mine, go 100 feet east on SR 1341 from the intersection of SR 1341 and SR 1303. Turn north onto a farm road trending N. 10° - 20° E. and go for 0.36 mile. The prospect is on the right side of the road.

Workings: A trench, 100 feet long by 15 feet wide and 10 feet deep, strikes almost due north.

Geology: The dumps around the trench contain quartz and saprolite. Some of the quartz is sheared, and shearing in outcrop trends N. 18° E. Metallization is spotty, and no tungsten was observed. There is a small amount of pyrite, mostly altered to limonite.

Tungsten Queen (Hamme Tungsten) Mine (WM)

Location: The Tungsten Queen mine is located in

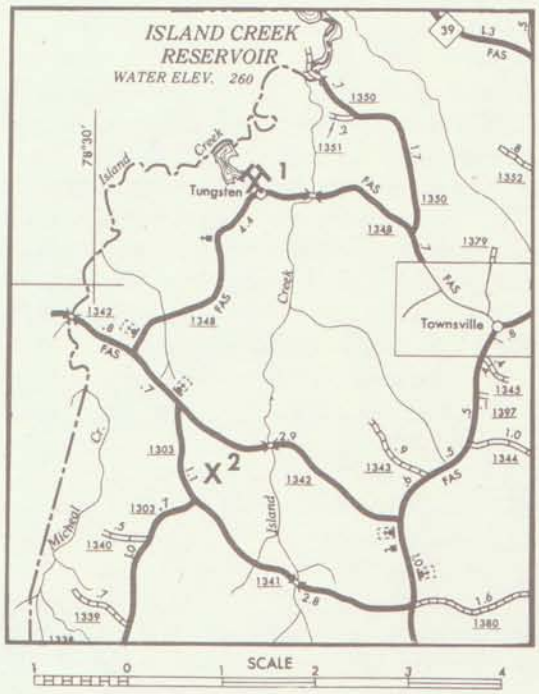


Figure 23. **Vance County Deposits**

northwestern Vance County at the Town of Tungsten, 2.9 miles northwest of Townsville and 13.4 miles north-northwest of Henderson.

Workings: The property was discovered in 1942 by Joseph and Richard Hamme, who were searching for strategic minerals for use during World War II. They prospected and mined the veins on a small scale until August 1943, when Haile Mines, Incorporated, acquired the property. In June 1945, the Tungsten Mining Corporation, formed by Haile Mines, Incorporated and General Electric Company, took over the property. The property was rapidly developed between 1947 and 1951. Between 1951 and June 30, 1958, the mine was the largest single producer of tungsten concentrates in the United States. Market conditions forced the closing of the mine on June 30, 1958. On June 1, 1960, operations resumed at the mine, but when market conditions failed to improve, the mine was again closed in February 1963.

In 1966, Ranchers Exploration and Development Corporation conducted an economic study of tungsten and began a study of existing tungsten deposits. In 1968, Ranchers acquired an option to purchase the Hamme mine and began dewatering the mine and evaluating ore reserves. Ranchers purchased the property in December of 1968 and began deepening the main shaft, reshoring the existing drifts and completing engineering and metallurgical studies.

A new mill was designed at a capacity of 90,000 short ton units of huebnerite annually. Through December 1970, all of the mill's production was sold at a price of $68.50 per short ton. Approximately 200 persons were to have been employed when the mine and mill were in full production. The mill produced a tungsten concentrate, a copper-lead concentrate and a pyrite concentrate.

Prior to reopening of the mine in 1968, the vein had been worked to a depth of 1,500 feet and along its length for a distance of 6,600 feet on several levels. Ranchers deepened the main shaft to about 1,800 feet and began driving a production drift on the 1,700-foot level. The mine has some 35 miles of underground workings. Proven and probable ore reserves have been estimated at about 1-million tons of huebnerite ore. The ore grade ranges from 0.50 to 0.55 percent tungsten trioxide.

Plate 11. Old headframe, Tungsten Queen Mine

In July, 1971, Engineering Mining Journal reported that the mine had cut back operations because of difficulty in bringing the Tungsten Queen to a profitable level of production. The recovery of the ore and a recent decline in the tungsten price were cited as the principal problems. The mine had been operating at a loss since it opened in September 1970. Modification of the mill was undertaken to correct the recovery problems.

With the tungsten market continuing to decline, Ranchers was forced to suspend operations the middle of September 1971. The mine was placed on standby, anticipating an improvement in the tungsten market. During the quarter ending March 31, 1971, the mine incurred a $165,000 loss (Metals Week, August 16, 1971, p 5). During the fiscal year ending June 30, 1971, the loss was $874,000.

Geology: Mining was carried out in quartz veins a few inches to several feet wide and containing lenses or pods

of ore. The veins lie along a fracture zone between albite granodiorite and sericite-chlorite phyllite. The nearly vertical veins contain huebnerite and scheelite as the chief tungsten minerals associated with sphalerite, pyrite, chalcopyrite, galena, tetrahedrite, molybdenite, rhodochrosite and fluorite. Gold, silver, copper, lead and zinc have been recovered as by-products of the operations. Next to the vein, the wall rock is sheared and altered to a light-green sericitic schist. This altered granodiorite is enriched with sericite, calcite, chlorite, pyrite, biotite, fluorite and garnet. Detailed descriptions of the veins can be found in the report by Espenshade (1947).

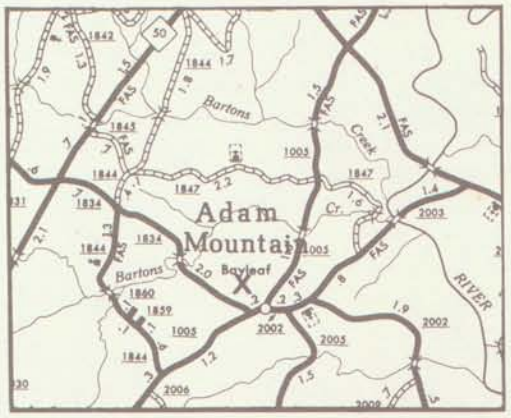


Figure 24. **Adam Mountain, Wake County**

WAKE COUNTY

Wake County is located along the eastern edge of the slate belt but is underlain predominantly by higher rank metamorphic rocks and granite (figure 1). The eastern portion of the county is underlain by a large granitic mass which is bordered to the west by mica and hornblende gneisses and schists. West of the gneisses and schists is a narrow, northeast-trending sequence of slate belt rock consisting primarily of phyllite. The extreme western portion of the county is underlain by sediments of the Triassic basin. Coastal Plain sediments cap upland areas in eastern and southern sections of the county. Chromite has been prospected in northern Wake County from an ultramafic body underlying Adam Mountain.

Adam Mountain Prospects (CrP)

Location: The Adam Mountain prospects, in northern Wake County, are 11.9 miles north of Raleigh and 8.0 miles west-southwest of Wake Forest. The prospects are located by going 0.2 mile west on SR 1834 from the intersection of SR 1834 with SR 1005. Turn right (north) onto a farm road trending N. 15° W. At the end of the road, go N. 15° W. to Adam Mountain.

Workings: The prospect consists of a 50 foot shaft and several small prospect pits. There has been little work carried out here, but about 1950, a core hole was put down on the property. The Cr_2O_3 content averaged less than 30 percent and no attempt was made at mining (Broadhurst, 1955, p. 13).

Geology: Prospecting was carried out in soapstone bodies containing chromite as disseminations and as stringers. Enclosing the soapstone is quartz-muscovite schist and talc schist.

COMMENTS

While a detailed study of each deposit was not practical, the number and variety of metallic deposits examined did provide the opportunity to make some general observations regarding metallization within the slate belt.

A location map for all the gold, copper, lead and zinc mines (Plate 1) reveals three parallel northeast-trending belts or zones, even though gaps exist within each belt where no mines exist, and a few mines are scattered between the belts. The two easternmost belts or zones may merge in central Orange County.

The deposits of the westernmost belt in almost all areas occur within or near the Gold Hill-Silver Hill fault zone and deposits of the other two belts are generally associated with sheared zones. Recent mapping has delineated areas of major folding in the slate belt. The belts of mineralization may be related to this folding.

Most of the gold, copper, lead and zinc deposits occur either in volcanic rocks ranging from rhyolitic to andesitic in composition or in volcanic-sedimentary rocks. Rarely are deposits associated with basalts. The closest relationship between metal and a specific host rock are the copper deposits of southwestern Chatham County and the Virgilina district. In southwestern Chatham County the deposits are almost universally in felsic pyroclastic rocks. The copper deposits of the Virgilina district are in rocks described by Laney (1917) to be of andesitic composition.

Copper and molybdenum deposits appear to be characteristic of particular areas of the slate belt. Copper occurrences can be grouped into three main areas: the area from Gold Hill in southeastern Rowan County to southern Guilford County, the Virgilina district and the southern Chatham County area.

Although molybdenum has been noted in gold mines throughout the slate belt, the significant occurrences are in the northern counties of the belt. These occurrences extend east-west from Granville County to Halifax County. Molybdenum also occurs in the Neverson Quarry in Wilson County. In each of these occurrences, the molybdenum is associated with igneous intrusive-volcanic rock contacts.

A number of theories are available for explaining the

origin of the metal deposits, and it most likely that a combination of processes was involved and that not all of the deposits were formed in the same manner. The usual theories involve the association of the deposits with nearby intrusives. Worthington and Kiff (1970) proposed a volcanogenic origin for certain deposits in the southern portion of the slate belt in North Carolina. Further attempts at explaining the origin of the metallic mineral deposits should take into consideration the following observatons: 1) The metal deposits are concentrated into three parallel northeast-trending belts, 2) the gold deposits in volcanic rocks are usually in rocks ranging in composition from rhyolitic to andesitic, 3) most of the metal mines are in rocks that show evidence of faulting, 4) the copper deposits in Chatham County are commonly in felsic pyroclastic rocks associated with volcanic rocks of andesitic composition, and 5) the copper deposits of the Virgilina district are in rocks of andesitic composition.

The close association of the deposits to particular rock types suggests that the deposits may be related to the volcanism from which those particular rocks were derived (or were these rocks simply more suitable for replacement?). The faults in which the deposits occur could represent the channels through which the mineralizing solutions originally migrated. It is also possible that the metals were deposited during volcanism and were later mobilized (during regional metamorphism?) and concentrated in the fault zones. Recent studies in other parts of the world have related the distribution of sulphide mineralization to island arc systems and, with additional study, such a relationship may be shown to exist in the slate belt in North Carolina.

SELECTED REFERENCES

Allen, E. P., and Wilson, W. F., 1968, Geology and mineral resources of Orange County, North Carolina: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Bull. 81, 58 p.

American Association of Petroleum Geologists, 1970, Geological highway map of the Mid-Atlantic region: U. S. Geol. Hwy. Map Series, Map No. 4.

Ballard, T. J., and Clayton, A. B., 1948, Conrad Hill copper and gold deposit, Davidson County, N. C.: U. S. Bur. Mines Rept. of Inv. 4290, 7 p.

Becker, G. F., 1895, Reconnaissance of the gold fields of the Southern Appalachians: U. S. Geol. Survey, Sixteenth Annual Report, Part 3, pp. 251-316.

Berry, E. W., 1943, The copper prospects of Chatham County: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Rept. of Inv. 43, 8 p.

Broadhurst, S. D., 1955, The mining industry in North Carolina from 1945 through 1953: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Econ. Paper 66.

Bryson, H. J., 1927, The mineral industry in North Carolina for 1924 and 1925: North Carolina Geol. and Econ. Survey Econ. Paper 60.

_____ 1927, The mineral industry in North Carolina during 1926: North Carolina Geol. and Econ. Survey Econ. Paper 62.

_____ 1930, The mining industry in North Carolina during 1927 and 1928: North Carolina Dept. of Conser. and Devel. Econ. Paper 63.

_____ 1936, Gold deposits in North Carolina: North Carolina Dept. of Conser. and Devel. Bull. 38, 157 p.

_____ 1937, The mining industry in North Carolina from 1929 to 1936: North Carolina Dept. of Conser. and Devel. Econ. Paper 64.

Carpenter, P. A., III, 1970, Geology of the Wilton Area, Granville County, North Carolina: Unpublished Master's Thesis, North Carolina State University at Raleigh, 106 p.

_____ 1972, Gold resources of North Carolina: North Carolina Dept. of Nat. and Econ. Resources, Div. of Mineral Resources Inf. Circ. 21, 56 p.

Conley, J. F., 1962a, Geology of the Albemarle quadrangle, North Carolina: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Bull. 75, 26 p.

_____ 1962b, Geology and mineral resources of Moore County, North Carolina: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Bull. 76, 40 p.

Conley, J. F., and Bain, G. L., 1965, Geology of the Carolina slate belt west of the Deep River — Wadesboro Triassic basin, North Carolina: Southeastern Geology, v. 6, no. 3, pp. 117-138.

Cook, R. B., Jr., 1972, Exploration for disseminated molybdenum — copper mineralization in the Conner stock, Wilson and Nash counties, North Carolina: Geol. Soc. of America Abs. with Programs, 1972 Annual Meetings, Minneapolis, Minnesota, p. 476.

Drane, B. S., and Stuckey, J. L., 1925, The mining industry in North Carolina, 1918 to 1923, inclusive: North Carolina Geol. and Econ. Survey Econ. Paper 55, p. 25-30.

Emmons, Ebenezer, 1856, Geological report of the midland counties of North Carolina: Raleigh, Henry D. Turner, 351 p.

Engineering and Mining Journal, 1971, News briefs — North Carolina: Eng. and Mining Jour., v. 172, no. 7, p. 130.

Espenshade, G. H., 1947, Tungsten deposits of Vance County, North Carolina, and Mecklenburg County, Virginia: U. S. Geol. Survey Bull. 948-A, 17 p.

Ford, W. E., 1932, Dana's textbook of mineralogy, Fourth edition: New York, John Wiley and Sons, Inc., 851 p.

Graton, L. C., 1906, Reconnaissance of some gold and tin deposits of the southern Appalachians: U. S. Geol. Survey Bull. 293, 134 p.

Hadley, J. B, 1973, Igneous rocks of the Oxford area, Granville County, North Carolina: Am. Jour. of Sci., Cooper Volume 273-A, p. 217-233.

Hickman, R. C., 1948, Cline copper and tungsten mine, Cabarrus County, North Carolina: U. S. Bur. Mines Rept.

of Inv. 4203, 5 p.

Hidden, W. E., 1890, Addendum to the minerals and mineral localities of North Carolina: Jour. Elisha Mitchell Sci. Soc., v. 6, p. 45-78.

Houston, R. S. 1950, Tungsten deposits in Cabarrus County: Unpublished Master's Thesis, North Carolina State College, Raleigh, 56 p.

Jones, J. O., and Peyton, A. L., 1950, Investigation of Furniss tungsten deposit, Cabarrus County, N. C.: U. S. Bur. Mines Rept. of Inv. 4724, 14 p.

Kerr, W. C., 1875, Report of the Geological Survey of North Carolina: North Carolina Geol. and Econ. Survey, v. 1, 120 p.

Kerr, W. C., and Hanna, G. B., 1893, Ores of North Carolina: North Carolina Geol. Survey, v. II, Chapter 2, 359 p.

Kinkel, A. R., Jr., 1974, Geochemical sampling at the Jones-Keystone mine, Randolph County, North Carolina: U. S. Geol. Survey, open-file report, 4 p.

_____ 1974, Geochemical sampling at the Russell mine, Montgomery County, North Carolina: U. S. Geol. Survey, open-file report, 3 p.

Kline, M. H., and Dosh, H. G., 1949, Investigation of the Scarlett copper mine, Randolph County, North Carolina: U. S. Bur. Mines Rept. of Inv. 4492, 6 p.

Koschmann, A. H., and Bergendahl, M. H., 1968, Principal gold-producing districts of the United States: U. S. Geol. Survey Prof. Paper 610, 283 p.

Laney, F. B., 1910, The Gold Hill mining district of North Carolina: North Carolina Geol. and Econ. Survey Bull. 21, 137 p.

_____ 1917, The geology and ore deposits of the Virgilina district of Virginia and North Carolina: North Carolina Geol. and Econ. Survey Bull. 26, 176 p.

Legrand, H. E., and Bell, Henry, III, 1966, Guidebook of excursion in Cabarrus County, North Carolina: Carolina Geol. Soc. Field Trip Guidebook, 39 p.

Metals Week, 1971, Ore and ferro — tungsten — death of a queen: Metals Week, v. 42, no. 33, 5 p.

McIntosh, F. K., 1948, Investigation of the Hamme tungsten district, Vance County, North Carolina, and Mecklenburg County, Virginia: U. S. Bur. Mines Rept. of Inv. 4380, 6 p.

Murdock, T. G., 1947, The geology and mineral resources of Guilford County: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Inf. Circ. 5, 22 p.

_____ 1950, The mining industry in North Carolina from 1937 to 1945: North Carolina Dept. of Conser. and Devel. Div. of Mineral Resources Econ. Paper 65.

Newberry, A. W., and others, 1948, Investigation of the Virgilina copper district, Virginia and North Carolina: U. S. Bur. of Mines Rept. of Inv. 4384, 12 p.

Nitze, H. B. C., 1893, Iron ores of North Carolina: North Carolina Geol. Survey Bull. 1, 239 p.

Nitze, H. B. C., and Hanna, G. B., 1896, Gold deposits of North Carolina: North Carolina Geol. Survey Bull. 3, 200 p.

Nitze, H. B. C., and Wilkens, H. A. J., 1897, Gold mining in North Carolina and adjacent south Appalachian regions: North Carolina Geol. Survey Bull. 10, 164 p.

Nixon, E. C., 1954, Geology of the Harpers Crossroads area, southwestern Chatham County, North Carolina: Unpublished Master's Thesis, North Carolina State College, Raleigh, 39 p.

North Carolina Dept. of Conser. and Devel., 1958, Geologic map of North Carolina, Scale 1:500,000.

Pardee, J. T., and Park, C. F. Jr., 1948, Gold deposits of the Southern Piedmont: U. S. Geol. Survey Prof. Paper 213, 156 p.

Peyton, A. L., 1957, Examination of copper-lead-zinc deposits, Cabarrus and Union counties, N. C.: U. S. Bur. Mines Rept. of Inv. 5313, 13 p.

Pogue, J. E., 1910, Cid mining district of Davidson County, North Carolina: North Carolina Geol. and Econ. Survey Bull. 22, 140 p.

Pratt, J. H., 1901, The mining industry in North Carolina during 1900: North Carolina Geol. and Econ. Survey Econ. Paper 4.

_____ 1902, The mining industry in North Carolina during 1901: North Carolina Geol. and Econ. Survey Econ. Paper 6.

_____ 1903, The mining industry in North Carolina during 1902: North Carolina Geol. and Econ. Survey Econ. Paper 7.

_____ 1904, The mining industry in North Carolina during 1903: North Carolina Geol. and Econ. Survey Econ. Paper 8.

_____ 1905, The mining industry in North Carolina during 1904: North Carolina Geol. and Econ. Survey Econ. Paper 9.

_____ 1906, The mining industry in North Carolina during 1905: North Carolina Geol. and Econ. Survey Econ. Paper 11.

_____ 1907, The mining industry in North Carolina during 1906: North Carolina Geol. and Econ. Survey Econ. Paper 14.

_____ 1908, The mining industry in North Carolina during 1907: North Carolina Geol. and Econ. Survey Econ. Paper 15.

_____ 1914, The mining industry in North Carolina during 1911 and 1912: North Carolina Geol. and Econ. Survey Econ. Paper 34.

Pratt, J. H., and Berry, H. M., 1911, The mining industry in North Carolina during 1908, 1909 and 1910: North Carolina Geol. and Econ. Survey Econ. Paper 23.

_____ 1919, The mining industry in North Carolina during 1913 and 1917, inclusive: North Carolina Geol. and Econ. Survey Econ. Paper 49.

Ranchers Exploration and Development Corporation, 1970, 1970 annual report: Albuquerque, Ranchers Exploration and Development Corporation, 26 p.

Randazzo, A. F., 1972, Petrography and stratigraphy of the Carolina slate belt, Union County, North Carolina: North Carolina Dept. of Nat. and Econ. Resources, Div. of Min-

eral Resources, Spec. Pub. 4, 38 p.

Roberts, Bruce, 1971, The Carolina gold rush: Charlotte, McNally and Loftin, 80 p.

Robertson, A. F., and others, 1947, Boy Scout-Jones and Moss-Richardson Molybdenum deposits, Halifax County, North Carolina: U. S. Bur. Mines Rept. of Inv. 4156, 9 p.

Stromquist, A. A., and Sundelius, H. W., 1969, Stratigraphy of the Albemarle group of the Carolina slate belt in central North Carolina: U. S. Geol. Survey Bull. 1274-B, 22 p.

Stromquist, A. A., and others, 1971, Geologic map of the Denton quadrangle, central North Carolina: U. S. Geol. Survey Geol. Quad. Map GQ-872.

Stromquist, A. A., and Sundelius, H. W., 1974, Interpretive geologic map of bedrock and aeromagnetic and radioactivity maps of the Salisbury, Southmont, Rockwell, and Gold Hill quadrangles, Rowan and Davidson counties, North Carolina: U. S. Geol. Survey, open-file report 74-20.

Stuckey, J. L., and Conrad, S. G., 1961, The mining industry in North Carolina from 1954 through 1959: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Econ. Paper 67.

Stuckey, J. L., 1965, North Carolina: Its geology and mineral resources: Raleigh, North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources, 550 p.

_____ 1970, The mining industry in North Carolina from 1960 through 1967: North Carolina Dept. of Conser. and Devel., Div. of Mineral Resources Econ. Paper 68.

Sundelius, H. W., and Bell, Henry, III, 1964, An unusual radioactive, rare earth-bearing sulphide deposit in Cabarrus County, North Carolina: Southeastern Geology, v. 5, no. 4, p. 207-221.

Sundelius, H. W., 1970, The Carolina slate belt, in Studies of Appalachian Geology, Central and Southern: New York, Interscience Publishers, pp. 351-365.

U. S. Bur. of Mines, 1932-69, Minerals yearbook [annual volumes, 1931-68]: Washington, U. S. Govt. Printing Office.

_____ 1943, Virgilina district, Halifax County, Virginia; Person and Granville counties, N. C.: U. S. Bur. Mines War Mineral Rept. 25, 10 p.

U. S. Geol. Survey, 1883-1924, Mineral resources of the United States [annual volumes, 1882-1923]: Washington, U. S. Govt. Printing Office.

White, W. A., 1943, Tungsten deposit near Townsville, North Carolina (Advanced Report): North Carolina Dept. of Conser. and Devel., Mineral Inv. 1, 9 p.

Worthington, J. E., and Kiff, I. T., 1970, A suggested volcanigenic origin for certain gold deposits in the slate belt of the North Carolina Piedmont: Econ. Geology, v. 65, no. 5, pp. 529-537.

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*The symbols represent the principal mineral or minerals extracted from the deposit: Ag - silver, Au - gold, Cr -chromium, Cu - copper, Fe - iron, Mo - molybdenum, Pb -lead, W - tungsten, Zn - zinc. A "M" following the symbol indicates that the deposit was a mine. A "P" following the symbol indicates that the deposit was a prospect.